World Health Organization

Equity, social determinants and public health programmes

Edited by Erik Blas and Anand Sivasankara Kurup

health partners, l.l.c.

promoting health, providing care

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About this book

This book was commissioned by the Department of Ethics, Equity, Trade and Human Rights as part of the work undertaken by the Priority Public Health Conditions Knowledge Network of the Commission on Social Determinants of Health, in collaboration with 16 of the major public health programmes of WHO: alcohol-related disorders, cardiovascular diseases, child health, diabetes, food safety, HIV/AIDS, maternal health, malaria, mental health, neglected tropical diseases, nutrition, oral health, sexual and reproductive health, tobacco and health, tuberculosis, and violence and injuries. In addition to this, through collaboration with the Special Programme of Research, Development and Research Training in Human Reproduction, the Special Programme for Research and Training in Tropical Diseases, and the Alliance for Health Policy and Systems Research, 13 case studies were commissioned to examine the implementation challenges in addressing social determinants of health in low-and middle-income settings. The Priority Public Health Conditions Knowledge Network has analysed the impact of social determinants on specific health conditions, identified possible entry-points, and explored possible interventions to improve health equity by addressing social determinants of health.

For more information on the work of WHO on social determinants of health, please visit
http://www.who.int/social_determinants/en/

For more information on the content of the book, please write to pphc@who.int

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WHO Library Cataloguing-in-Publication Data

Equity, social determinants and public health programmes / editors Erik Blas and Anand Sivasankara Kurup.

1.Health priorities. 2.Health status disparities. 3.Socioeconomic factors. 4.Health care rationing. 5.Patient advocacy. 6.Primary health care. I.Blas, E. II.Sivasankara Kurup, A. III.World Health Organization.

ISBN 978 92 4 156397 0 (NLM classification: WA 525)

Design and Layout: Inís Communication

Cover photos: Column 1 (1) © 2005 Todd Shapera, Courtesy of Photoshare; (2) Alejandro Lipszyc / World Bank; (3) © 2005 Stéphane Janin, Courtesy of Photoshare; Column 2 (1) 123RF; (2) © 2009 Kyaw Thar, Courtesy of Photoshare; (3) iStockphoto; Column 3 (1) 123RF; (2) Tran Thi Hoa, 2002 / World Bank; (3) Inís Communication; Column 4 (1) © Manoocher Deghati / IRIN; (2) © 2007 Galina Toktalieva, Courtesy of Photoshare; (3) © 2003 Bale-Robe Health Center, Courtesy of Photoshare

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Printed in Switzerland.

Acknowledgements

This book was produced under the overall direction of Tim Evans (Assistant Director-General), Jeanette Vega, Nick Drager (former Directors of the Department of Ethics, Equity, Trade and Human Rights) and Rüdiger Krech (present Director of the Department of Ethics, Equity, Trade and Human Rights). Financial contribution of the Department of Health, United Kingdom for the publication of the book is also gratefully acknowledged.

The authors of various chapters of the book are: Jens Aagaard-Hansen, Awa Aidara-Kane, Amitava Banerjee, Fernando C. Barros, Erik Blas, Claire-Lise Chaignat, Joanne Corrigall, Annette David, Chris Dye, Katharine Esson, Christopher Fitzpatrick, Alan J. Flisher, Michelle Funk, Davidson Gwatkin, Sean Hatherill, Norman Hearst, Ernesto Jaramillo, Jean-Louis Jouve, Stella Kwan, Knut Lönnroth, Crick Lund, Pia Mäkelä, Shawn Malarcher, David Meddings, Shanthi Mendis, Les Olson, Vikram Patel, Anne-Marie Perucic, Poul Erik Petersen, Sophie Plagerson, Mario Raviglione, Jürgen Rehm, Helen Roberts, Gojka Roglic, Robin Room, Robert W. Scherpbier, Laura A. Schmidt, Anand Sivasankara Kurup, Nigel Unwin, Cesar G. Victora, David Whiting and Brian Williams.

Valuable inputs in terms of contributions, peer reviews and suggestions on various chapters were received from a number of WHO staff at headquarters, regional offices and country offices, as well as other partners and collaborators, including Palitha Abeykoon, Marco Ackerman, Thérèse Ange Agossou, Awa Aidara-Kane, Daniel Albrecht, Mazuwa Banda, Amal Bassili, Sara Bennett, Douglas Bettcher, Anjana Bhushan, Adriana Blanco, Claire-Lise Chaignat, Pierpaolo de Colombani, Vera da Costa Silva, Catherine D'Arcangues, Denis Daumerie, Hernan Delgado, Ridha Djebeniani, Martin Christopher Donoghoe, Alberto Concha Eastman, Fatimah Elawa, Jill Farrington, Edwige Faydi, Mario Festin, Christopher Fitzpatrick, Sharon Friel, Michelle Funk, Gauden Galea, Luiz Augusto Galvao, Massimo Ghidinelli, Francisco Martínez Guillén, Anthony Hazzard, Norman Hearst, Samuel Henao, James Hospedales, Tanja Houweling, Ernesto Jaramillo, Brooke Ronald Johnson, Tigest Ketsela, Gauri Khanna, Mary K. Kindhauser, Rüdiger Krech, Stella Kwan, Jerzy Leowsky, Knut Lönnroth, Prerna Makkar, Shawn Malarcher, Emmalita Manalac, Michael Marmot, Matthews Mathai, David Meddings, Shanthi Mendis, Patience Mensah, Maristela Monteiro, Charles Mugero, Davison Munodawafa, Benjamin Nganda, Carla Obermeyer, Patricia Palma, Anne-Marie Perucic, Poul Erik Petersen, Vladimir Pozyak, Kumanan Rasanathan, Dag Rekve, Eugenia Rodriguez, Gojka Roglic, Ritu Sadana, Sarath Samrage, Alafia Samuels, Robert Scherpbier, Santino Severino, Iqbal Shah, Aushra Shatchkute, Sameen Siddiqi, Sarah Simpson, Johannes Sommerfeld, Birte Holm Sørensen, Shyam Thapa, Luigi Toma, Jaana Marianna Trias, Nicole Valentine, Pieter van Maaren, Eugenio Villar, Xiangdong Wang, Susan Watts and Erio Ziglio.

Technical Editor: John Dawson

Abbreviations and acronyms

ADHD . . . . . attention deficit hyperactivity disorder

BCG . . . . . bacille Calmette–Guérin

CVD . . . . . cardiovascular disease

DALY . . . . . disability-adjusted life year

DHS . . . . . Demographic and Health Survey

DPT . . . . . diphtheria–pertussis–tetanus (vaccine)

EPPI-Centre . . Evidence for Policy and Practice Information and Co-ordinating Centre

FAO . . . . . Food and Agriculture Organization of the United Nations

GDP . . . . . gross domestic product

GISAH . . . . . Global Information System on Alcohol and Health

HACCP . . . . . Hazard Analysis Critical Control Point System

HIV/AIDS . . . human immunodeficiency virus/acquired immunodeficiency syndrome

HKD . . . . . hyperkinetic disorder

IMCI . . . . . Integrated Management of Childhood Illness

MICS . . . . . Multiple Indicator Cluster Survey

mmol/l . . . . . millimoles per litre

NTD . . . . . neglected tropical disease

PEPFAR . . . . United States President's Emergency Plan for AIDS Relief

PROGRESA . . Programa de Educación, Salud y Alimentación

SAFE . . . . . surgery, antibiotics, facial cleanliness, environmental improvement

TB . . . . . tuberculosis

TRIPS . . . . . trade-related intellectual property rights

UNAIDS . . . . Joint United Nations Programme on HIV/AIDS

UNDP . . . . . United Nations Development Programme

UNESCO . . . . United Nations Educational, Scientific and Cultural Organization

UNFPA . . . . . United Nations Population Fund

UNICEF . . . . United Nations Children's Fund

USAID . . . . . United States Agency for International Development

WHO . . . . . World Health Organization

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FOREWORD

Equity, social determinants and public health programmes

The report of the Commission on Social Determinants of Health, issued in September 2008, challenged conventional public health thinking on several fronts. The report responded to a situation in which the gaps, within and between countries, in income levels, opportunities, health status, life expectancy and access to care are greater than at any time in recent history. As the report argued, improving the health of populations, in genuine and lasting ways, ultimately depends on understanding the causes of these inequities and addressing them.

The Commission found abundant evidence that the true upstream drivers of health inequities reside in the social, economic and political environments. These environments are shaped by policies, which makes them amenable to change. In the final analysis, the distribution of health within a population is a matter of fairness in the way economic and social policies are designed. By showing how social factors directly shape health outcomes and explain inequities, the report challenged health programmes and policies to tackle the leading causes of ill-health at their roots, even when these causes lie beyond the direct control of the health sector.

This publication takes these challenges several steps forward, with the aim of translating knowledge into concrete, workable actions. Individual chapters represent the major public health programmes at WHO, reflecting the premise that health programmes must lead the way by demonstrating the relevance, feasibility and value of addressing social determinants. Each chapter is organized according to a common framework that allows a fresh but structured look at many familiar problems. Levels in this framework range from the overall structure of society, to differential exposure to risks and disparate vulnerability within populations, to individual differences in health care outcomes and their social and economic consequences.

Throughout the volume, an effort is made to identify entry-points, within existing health programmes, for interventions that address the upstream causes of ill-health. Possible sources of resistance or opposition to change are also consistently identified. The result is a sound and systematic analysis that gives many long-standing obstacles to better health a fresh perspective with an encouraging message.

In its traditional concern with prevention, public health has much to gain when biomedical approaches to health and disease are extended by a focus on the true root causes of ill-health, suffering and premature death. As obvious examples, the health sector can treat the costly consequences

of obesity, tobacco use, the harmful use of alcohol and unintentional injuries, including those arising from road traffic crashes. But prevention – which is by far the better option – depends on action in other sectors, whether involving trade agreements, food production and marketing policies, road design, or regulations and their enforcement. Health programmes do not need to invest in these other sectors, but they do need to work with them to realize shared benefits in a whole-of-government approach to health.

Equally important, arguments and experiences collected in this volume offer ways to operationalize the renewed commitment to primary health care, an approach that has long recognized the value of fairness and the importance of intersectoral action. In my view, a concern with the social determinants of health can further energize the renewed enthusiasm for primary health care expressed in all WHO regions.

I warmly welcome this publication. Decades of experience tell us that this world will not become a fair place for health all by itself. Health systems will not automatically gravitate towards greater equity or naturally evolve towards universal coverage. Economic decisions within a country will not automatically protect the poor or promote their health. Globalization will not self-regulate in ways that ensure fair distribution of benefits. International trade agreements will not, by themselves, guarantee food security, or job security, or health security, or access to affordable medicines. All of these outcomes require deliberate policy decisions.

In my view, *Equity, social determinants and public health programmes* makes the enormous challenges uncovered in the Commission's report look more manageable and more inviting. Policy-makers and programme managers would do well to accept this invitation. Despite decades of efforts, supported by powerful technical interventions, the health of the people of Africa and of women still lags far behind the goals set in international commitments. The sheer magnitude of unmet needs compels us to consider the fresh – and sometimes daring – proposals for action set out in this volume.

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1 Introduction and methods of work

Erik Blas and Anand Sivasankara Kurup

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1.1 Introduction

The work presented in this volume was carried forward with the conviction that achieving greater equity in health is a goal in itself, and that achieving the various specific global health and development targets without at the same time ensuring equitable distribution across populations is of limited value. Most literature on equity and the social determinants of health is based on data that are from high-income countries and that focus on possible causal relationships. Even in high-income countries there is limited documentation of experiences with interventions and implementation approaches to halt growing or reduce existing inequities in health.

This shortfall is addressed within the World Health Organization (WHO) system by the Priority Public Health Conditions Knowledge Network, which aims to widen the discussion on what constitutes public health interventions by identifying the social determinants of health inequities and appropriate interventions to address the situation. The work of the Network has been focused on practice, establishing the knowledge base as a starting-point and then quickly and pragmatically moving on to exploration of potential avenues and options for action. While the scientific review of evidence has played a major role in the work of the Network, the main aim has been to expand the known territory and move, in a responsible and systematic way, into the unknown, by suggesting new paths of action for public health programmes. Effectively addressing inequities in health involves not only new sets of interventions, but modifications to the way that public health programmes (and possibly WHO) are organized and operate, as well as redefinition of what constitutes a public health intervention.

While old public health problems persist, such as malaria, tuberculosis and sexually transmitted diseases, new challenges are presenting themselves. Many of the old problems persist because we have failed to effectively apply the tools that we have at hand – and some of those tools have even been destroyed in the process, for example by creating drug resistance. Another set of reasons for the failure is that we have not sufficiently recognized and appropriately dealt with the inequities underlying average health statistics. This has meant that even when overall progress has been made, large parts of populations, and even whole regions of the world, have been left behind.

Most if not all of the new public health challenges that we are facing – be it in the areas of communicable, maternal, perinatal and nutritional conditions, non-communicable conditions or injuries – are directly related to how we organize our societies and live our lives, with inequities among and within populations again standing out. Inequities both fuel the emergence of new public health challenges and result from them. Most ministries of health, health systems and health programmes are still primarily concerned with delivering the downstream interventions responding to the incidental needs and demands of individuals that constitute the traditional intramural health care services. These are important and need to be provided in any decent society. However, they are not effective responses to the old and new public health problems that continue to be produced and reproduced. In the public health community there is a growing recognition that if we are to deal with both the old and the new challenges and to achieve global targets, such as the health-related Millennium Development Goals, especially from a health equity perspective, we will have to go far beyond the traditional health interventions and address the upstream determinants of health.

The Priority Public Health Conditions Knowledge Network was established as one of nine knowledge networks by the Commission on Social Determinants of Health, which was created in 2005 by WHO to marshal evidence and provide recommendations on what can be done to promote health equity and to foster a global movement to achieve it (*1*). From the outset, it was anticipated that the Network could contribute to the work of the Commission in at least two unique ways: from a health conditions perspective, as distinct from the topical perspectives of social determinants pursued by the other knowledge networks; and from a programmatic perspective, as public health programmes in their various shapes are key actors on the ground. A large number of WHO-based public health programmes participated in the work, which resulted in the 12 individual chapters and synthesis chapter that comprise the remainder of this volume. The number of programmes was large enough for the resulting proposals to have a general value.

During the work of the Priority Public Health Conditions Knowledge Network a number of events occurred with direct relevance to or bearing on the future work of public health programmes:

- The Commission on Social Determinants of Health completed its work and presented its final report documenting the magnitude of health inequities, identifying their social causes and proposing directions for action (*1*). The Priority Public Health Conditions Knowledge Network, as one of the networks of the Commission, assisted in generating evidence and proposals for action, and gained inspiration from the work of the Commission and the other knowledge networks.
- The 2008 *World Health Report* placed health equity as the central value for the renewal of primary health care and called for priority public health programmes to align with the associated principles and approaches (*2*).

- A global financial crisis and recession developed during 2008, first impacting high-income countries and later extending to low- and middle-income countries. The recession, following three decades that have seen a gradually reduced role in many countries for the state in direct provision and financing of social and health service provision and increased reliance on the demand and supply mechanisms of the market, will certainly pose challenges to health and equity in health. As trade protectionism is looming and jobs are lost, those who are most vulnerable are becoming even more vulnerable, not only in terms of access to health care services, but also with regard to other determinants of health, including degree of social exclusion, education, housing and general living conditions, quality of diet, vulnerability to violence and alcohol consumption.

In May 2009, the World Health Assembly called upon the international community and urged WHO Member States to tackle the health inequities within and across countries through political commitment on the main principles of "closing the gap in a generation". It emphasized the need to generate new, or make use of existing, methods and evidence, tailored to national contexts in order to address the social determinants and social gradients of health and health inequities. The Assembly requested the WHO Director-General to promote addressing social determinants of health to reduce health inequities as an objective of all areas of the Organization's work, especially priority public health programmes and research on effective policies and interventions (*3*).

The vehicle for change to improve health equity over which the Priority Public Health Conditions Knowledge Network would have the most direct influence was seen as the programmes themselves. The focus was therefore on what programmes could do and less on what others should do. This meant that the work set out to address four groups of questions:

- What can public health programmes do individually?
- What can public health programmes do collectively?
- What can public health programmes do vis-à-vis other sectors?
- What must be done differently?

An important implication of these questions is that while addressing social determinants requires intersectoral action, there are crucial programmatic tasks that need to be undertaken within the health sector before asking other sectors to do their part. It is with this in mind that the methods and processes of work were chosen.

1.2 Key terms and concepts

The Priority Public Health Conditions Knowledge Network shares the holistic and value-driven view of social determinants taken by the Commission on Social Determinants of Health, namely that the structural determinants and conditions of daily life constitute the social determinants of health and that they are crucial to explaining health inequities. More specifically these include distribution of power, income, goods and services, globally and nationally, as well as the immediate, visible circumstances of peoples lives, such as their access to health care, schools and education; their conditions of work and leisure; their homes, communities, and rural or urban settings; and their chances of leading a flourishing life (*1*). In addition, these structural determinants influence how services are provided and received and thereby shape health care outcomes and consequences.

Health equity is a moral position as well as a logically-derived principle, and there are both political proponents and opponents of its underlying values. The Commission clearly acknowledges the values base of equity in the following definition: "Where systematic differences in health are judged to be avoidable by reasonable action they are, quite simply, unfair. It is this that we label health inequity" (*1*). While expecting opposition to the health equity position, it is important to note that most individuals and societies, irrespective of their philosophical and ideological stance, have limits as to how much unfairness is acceptable. These limits may change over time and with circumstances (*4*). To support the equity position in the public policy dialogue it will therefore be crucial to firmly document the extent of health inequities and demonstrate that they are avoidable, in that there are plausible interventions.

Three principal measures are commonly used to describe inequities: health disadvantages, due to differences between segments of populations or between societies; health gaps, arising from the differences between the worse-off and everyone else; and health gradients, relating to differences across the whole spectrum of the population (*5*). All three measures have been used by the Priority Public Health Conditions Knowledge Network, depending on the context and availability of data. However, equity is clearly not only about numbers that can be statistically processed and presented in tables and charts – it is about people, their values and what they want from life. There is a need to "focus not only on the extremes of income poverty but on the opportunity, empowerment, security and dignity that disadvantaged people want in rich and poor countries alike" (*6*).

While the general relationship between social factors and health is well established, the relationship is not

precisely understood in causal terms, nor are the policy imperatives necessary to reduce inequities in health easily deduced from the known data. Because of these uncertainties and the theoretical differences in explanations, there is little guidance available internationally to assist policy-makers and practitioners to act on the full range of social determinants (5). Consequently, the Priority Public Health Conditions Knowledge Network has taken practical guidance from some of the key principles for creating an evidence base: a commitment to the value of equity; identifying and addressing gradients and gaps; focusing on causes, determinants and outcomes; and understanding social structure and dynamics (5).

The term "priority" has different meanings to different people and in different contexts. While the job of the Priority Public Health Conditions Knowledge Network was not to impose a ranking on public health conditions, it did prove useful to apply four main criteria in identifying those public health conditions that merit priority attention:

- They represent a large aggregate burden of disease.
- They display large disparities across and within populations.
- They disproportionately affect certain populations or groups within populations.
- They are emerging or epidemic prone.

At the core of all four perspectives is a concern about the health of populations, and it is this concern that has guided the analysis and proposals for action.

Health systems are considered to include all activities whose primary purpose is to improve health (7). Public health programmes are thus an integral part of health systems. However, while health systems are not unified organizational entities but loose conglomerates of organizations, institutions and activities, public health programmes are distinct managerial units with objectives, directors, managers, lines of command, budgets and action plans. The notion of a public health programme has in this volume been used broadly to include the health condition-related WHO programmes as well as their health counterparts in countries and internationally, whether governmental, nongovernmental, private, intergovernmental or international.

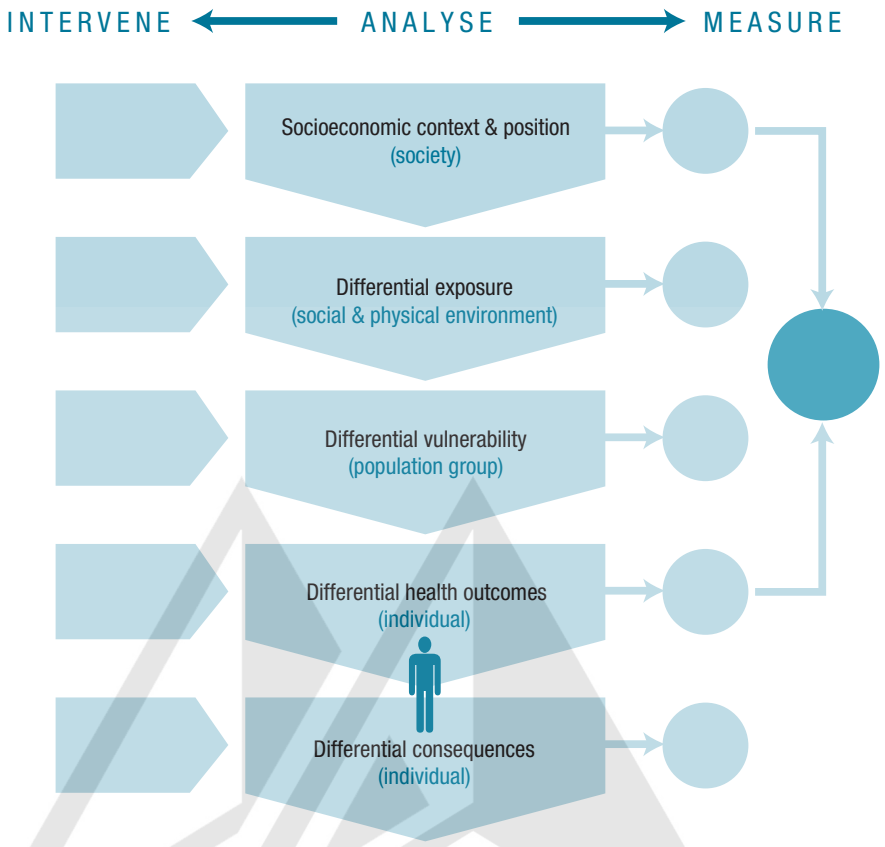
1.3 Framework of analysis

Given that the aim of the Priority Public Health Conditions Knowledge Network was to arrive at something with practical meaning, and given the theoretical differences in explanation expressed by the Measurement and Evidence Knowledge Network (5), a five-level framework was chosen. The framework was informed by discussion papers prepared for the WHO Regional Office for Europe (8), Diderichsen, Evans and Whitehead (9) and by the work on a comprehensive conceptual framework for the Commission on Social Determinants of Health (10). The priority public health conditions analytical framework (Figure 1.1) has three dimensions of activity – to analyse, intervene and measure – and five levels of analysis. The top level relates to the structure of society, the second to the environment, the third to population groups, and the last two to the individual.

The five levels can briefly be described as follows:

- *Socioeconomic context and position.* Social position exerts a powerful influence on the type, magnitude and distribution of health in societies. The control of power and resources in societies generates stratifications in institutional and legal arrangements and distorts political and market forces. While social stratification is often seen as the responsibility of other policy sectors and not central to the health sector per se, understanding and addressing stratification is critical to reducing health inequity. Factors defining position include social class, gender, ethnicity, education, occupation and income. The relative importance of these factors is determined by the national and international context, which includes governance, social policies, macroeconomic policies, public policies, culture and societal values.
- *Differential exposure.* Exposure to most risk factors (material, psychosocial and behavioural) is inversely related to social position. Many health programmes do not differentiate exposure or risk reduction strategies according to social position, though analysis by socioeconomic group would clarify which risk factors were important to each group, and whether these were different from those important to the overall population. Understanding these "causes behind the causes" is important for developing appropriate equity-oriented strategies for health. There is increasing evidence that people in disadvantaged positions are subject to differential exposure to a number of risk factors, including natural or anthropogenic crises, unhealthy housing, dangerous working conditions, low food availability and quality, social exclusion and barriers to adopting healthy behaviours.
- *Differential vulnerability.* The same level of exposure may have different effects on different socioeconomic groups, depending on their social, cultural and economic environments and cumulative life course factors. Clustering of risk factors in some population groups, such as social exclusion, low income, alcohol abuse, malnutrition, cramped housing and poor access to health services, may be as important as the individual exposure itself. Further, coexistence of other health problems, such as coinfection, often augments vulnerability. The evidence base on the amplifying effects of reinforcing factors

FIGURE 1.1 Priority public health conditions analytical framework



is still limited, though it is clear that they exist for low-income populations and marginalized groups. It is important that attempts to reduce or eliminate them identify appropriate entry-points for breaking the vicious circles in which vulnerable populations find themselves trapped.

- *Differential health care outcomes.* Equity in health care ideally implies that everyone in need of health care receives it in a form that is beneficial to them, regardless of their social position or other socially determined circumstances. The result should be the reduction of all systematic differences in health outcomes between different socioeconomic groups in a way that levels everyone up to the health of the most advantaged. The effects of the three upper levels of the analytical framework may be further amplified by health systems providing services that are not appropriate to or less effective for certain population groups or disadvantaged people compared to others.
- *Differential consequences.* Poor health may have several social and economic consequences, including loss of earnings, loss of ability to work and social isolation or exclusion. Further, sick people often face additional financial burdens that render them less able to pay for health care and drugs. While advantaged population groups are better protected, for example in terms of job security and health insurance, for the disadvantaged, ill-health might result in further socioeconomic degradation, crossing the poverty line and accelerating a downward spiral that further damages health.

For each level, the analysis aimed to establish and document:

- social determinants at play and their contribution to inequity, for example pathways, magnitude and social gradients;
- promising entry-points for intervention;
- potential adverse side-effects of eventual change;
- possible sources of resistance to change;
- what has been tried and what were the lessons learned.

There are potential overlaps, in particular between the differential exposure and vulnerability levels. Further, a pathway across the levels does not necessarily imply moving from the top to the bottom level of the framework, passing through all the intermediate levels. For example, a change in public policy may have an immediate effect on how health care services are provided and thereby positively or negatively impact equity in health

care outcomes without passing through the exposure and vulnerability levels. The framework should therefore be seen as a practical way of organizing the work from analysis to action in a manner that is consistent with the conceptual framework of the Commission on Social Determinants of Health and the frameworks used by most of the other knowledge networks.

The analysis for each of the public health conditions took its departure from the differential health care outcomes level, looking upstream to investigate where these differences originated. After having mapped the main pathways, attention went to proposing interventions at each promising entry-point and to issues of measurement.

1.4 Towards an actionable agenda

There are five clusters of possible interventions corresponding to each of the five levels of the analytical framework, ranging from the top societal level to the two individual levels. One of the prime tasks of public health programmes is to translate knowledge on causes into concrete action. Consideration of interventions and how these are to be implemented, while being sensitive to possible risks and assumptions, has therefore been key to the work.

Implementing such action may be the responsibility of public health programmes, the wider health sector or sectors beyond health. The upstream levels of the framework, namely context and position, differential exposure and differential vulnerability, can be usefully considered in relation to the classification of structured interventions suggested by Blankenship, Bray and Merson (*11*):

- interventions that acknowledge health as a function of social, economic and political power and resources, and thus seek to manipulate power and resources to promote public health;
- interventions based on the assumption that health problems result from deficiencies in behaviours, settings, or the availability of products and tools, and thus seek to address those deficiencies;
- interventions that recognize that the health of a society and of its members is partially determined by its values, cultures and beliefs, or those of subgroups within it, and thus seek to alter those social norms that are disadvantageous to health.

At the two individual levels of the framework – differential health care outcomes and differential consequences – the design characteristics of services may contribute to increasing inequity. In this respect the Priority Public Health Conditions Knowledge Network, applying the analogy of a staircase that an individual has to climb in order to fully benefit from a service, considered interventions aimed at addressing provider compliance and consumer adherence in addition to the three structural intervention categories described above. Table 1.1 shows a combination of two intervention frameworks dealing with access to and provision and use of health care services. The Tanahashi framework (*12*) focuses on access and proposes a four-step staircase that a prospective user of health care needs to climb before an effective contact with the health service is established. Once the contact is established there are still, according to Tugwell, Sitthi-Amorn et al. (*13*), three additional steps before a successful outcome is achieved. The obstacles to climbing each of these seven steps depend on a combination of service provision factors and social determinants related to the user. Tugwell, de Savigny et al. suggest that poorer people have a greater reduction in benefit at each step than the less poor (*14*).

However, it is one thing to propose interventions, and quite another to put them effectively to work in often very complex circumstances, where powerful interests may oppose them. General considerations related to implementing interventions include:

- *Replicability.* Can the intervention be implemented in different contexts and circumstances?
- *Sustainability.* Are the required human, technical and financial resources such that the interventions can be continued for long enough to have the desired lasting effect?
- *Scalability.* Can the interventions be expanded to the scale required to be meaningful?
- *Political feasibility.* Can the intervention be implemented in different political circumstances, for example with respect to timing, values and power structure?

TABLE 1.1 Two complementary frameworks for viewing obstacles to achieving effective and equitable outcome of health care interventions

	Four-step framework Tugwell, de Savigny et al. (*14*)	**Five-step framework** Tanahashi (*12*)
Access	Access	Availability coverage Accessibility coverage Acceptability coverage Contact coverage
Effectiveness	Diagnostic accuracy Provider compliance Consumer adherence	Effectiveness coverage

- *Economic feasibility.* What are the required investments and are they reasonable? How can the necessary finances be made available? What has to be given up by other sectors?
- *Technical feasibility.* Are the tools required to make the intervention happen available or can they be made available?

A comprehensive social determinants strategy must consider the political dimension at all levels. Inequity is intrinsically related to power relations and control of resources. Attempting to reduce inequities in public health inevitably means confronting the more powerful to benefit the less powerful, whether at the greater societal or the individual health clinic level. Comprehensive intervention strategies therefore need to include approaches to dealing with resistance and opposition.

1.5 Process: organizational learning

Equally important to the tangible outputs of the process was the organizational learning process. Therefore, the work of the Priority Public Health Conditions Knowledge Network was planned using an extensive network spanning a range of conditions and organizational units and levels. Fourteen programme nodes were established to include sixteen of the major public health programmes of WHO. Thirteen of those nodes completed all phases of their work and their outputs are presented as chapters of this volume (with Chapter 10 comprising the work of both the maternal health and the sexual and reproductive health nodes). The intention was that each of the nodes would extend their networks to cover WHO regions, countries and academia. Some of the nodes responded well to this challenge; others were less successful and only managed to expand their networks through contracting consultants.

A research node comprising three research programmes (the Special Programme for Research and Training in Tropical Diseases, the Special Programme of Research, Development and Research Training in Human Reproduction, and the Alliance for Health Policy and Systems Research) and the Department of Ethics, Equity, Trade and Human Rights posted a call for case study research to learn from implementation of social determinant approaches in countries. The studies covered five themes related to expanding implementation beyond pilot projects and experiments, namely going to scale, managing policy change, managing intersectoral processes, adjusting design and ensuring sustainability. Fourteen studies were commissioned and completed. The summary lessons learned from these case studies are presented in the synthesis chapter of this volume, while fuller reports are presented in a separate volume. Finally, a learning node was established to facilitate and document the organizational learning processes.

A steering group consisting of the leaders of the above fourteen programme and research and learning nodes oversaw the process and met monthly from January 2007 to June 2008. This was a very successful part of the set-up. It provided within WHO an opportunity for a number of programme representatives from across conditions and organizational units to come together around a common concrete technical project extending over a long period.

Overall, the work of the Priority Public Health Conditions Knowledge Network had four phases: (a) analysis of conditions; (b) interventions and implementation considerations; (c) measurement; and (d) synthesis, implications and conclusions. The first three phases included peer reviews, where one node would review and give feedback on another node's work in order to foster mutual learning. These reviews were extended to the WHO regions when the difficulties of expanding the networks for the individual programme nodes were realized. Most regions responded well to the opportunity for active participation of both regional advisers and country staff.

1.6 Bringing it all together

The analysis and proposals for each of the conditions have value in their own right and are presented in separate individual chapters of this volume (Chapters 2 to 13) as follows:

2. Alcohol
3. Cardiovascular disease
4. Health and nutrition of children
5. Diabetes
6. Food safety
7. Mental disorders
8. Neglected tropical diseases
9. Oral health
10. Unintended pregnancy and pregnancy outcome
11. Tobacco use
12. Tuberculosis
13. Violence and unintentional injury

The synthesis process, therefore, involved establishing the common ground – what are the common lessons and what could be the basis for common action – rather than summarizing the finding of each of the individual chapters. Its aim was to focus on and take advantage of the large amounts of work undertaken by the individual programme nodes and case studies, and to draw on the elaborate analyses and work of the

other eight knowledge networks of the Commission on Social Determinants of Health. The synthesis process thus involved seven major steps:

- map the different types of patterns of inequity across the public health conditions;
- identify the social determinants at each level of the priority public health conditions framework common to six or more of the conditions and for each level identify three promising entry-points for intervention;
- propose for each of these entry-points three possible interventions with key movers;
- propose three actions that public health programmes can take at each level of the priority public health conditions framework;
- discuss major lessons on implementation learned from the case studies;
- discuss the needs and options for data collection and monitoring to inform policy formulation and programme management;
- discuss the implications for public health programmes and for WHO in taking up the proposed actions.

By taking the two-pronged approach of identifying which characteristics are unique to each condition, and which are common to all and should be addressed in a collective and concerted way, the work presented in this volume should contribute to expanding the conceptual framework related to public health conditions and increasing the effectiveness of public health interventions and programmes that address them, and, equally importantly, will provide input for operationalizing the primary health care agenda described in the *World Health Report 2008* (*2*).

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Alcohol: equity and social determinants

2

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1 The authors would like to acknowledge Dag Rekve and Maria Renström for their contribution.

2.1 Summary

Alcohol is a psychoactive and potentially dependence-producing substance with severe health and social consequences. It is estimated that 2.5 million people died worldwide of alcohol-related causes in 2004, and alcohol ranks as the third leading risk factor for premature deaths and disabilities in the world. Evidence suggests that groups of low socioeconomic status experience a higher burden of alcohol-attributable disease, often despite lower overall consumption levels. Health outcomes and socioeconomic consequences are determined not only by the amount of alcohol consumed, but also by the pattern of consumption and the quality of alcohol consumed. These three determinants are again shaped by – and shape – the wider social determinants related to socioeconomic context and position, exposure and vulnerability. The level of abstention, reflecting such issues as gender and poverty levels, is an important mediating factor that often serves a protective role.

Alcohol consumption rates are markedly lower in poorer than in wealthier societies. However, within-society differences in alcohol-related health outcomes by socioeconomic status tend to be more pronounced than differences in alcohol consumption. In other words, for a given amount of consumption, poorer populations may experience disproportionately higher levels of alcohol-attributable harm. Such nuances in the relationships between alcohol and inequity demand further empirical exploration, particularly in developing countries.

Inequities stemming from the harmful use of alcohol can be reduced by interventions directly targeting socioeconomic context and differential vulnerability and exposure. While many existing alcohol interventions have proved effective, few have focused on reducing health disparities or the negative consequences of alcohol on the poor, and new approaches are required.

Alcohol use is an integral part of many cultures; consequently effective interventions to reduce alcohol-related harm and inequities often meet with considerable resistance. Concerted and bold actions at all levels of government are needed to tackle alcohol-related inequities worldwide. This will require increased awareness and acceptance of the public health issues and of the effectiveness of strategies among policy-makers and in public discourse.

2.2 Introduction

Alcohol and inequity: a complex relationship

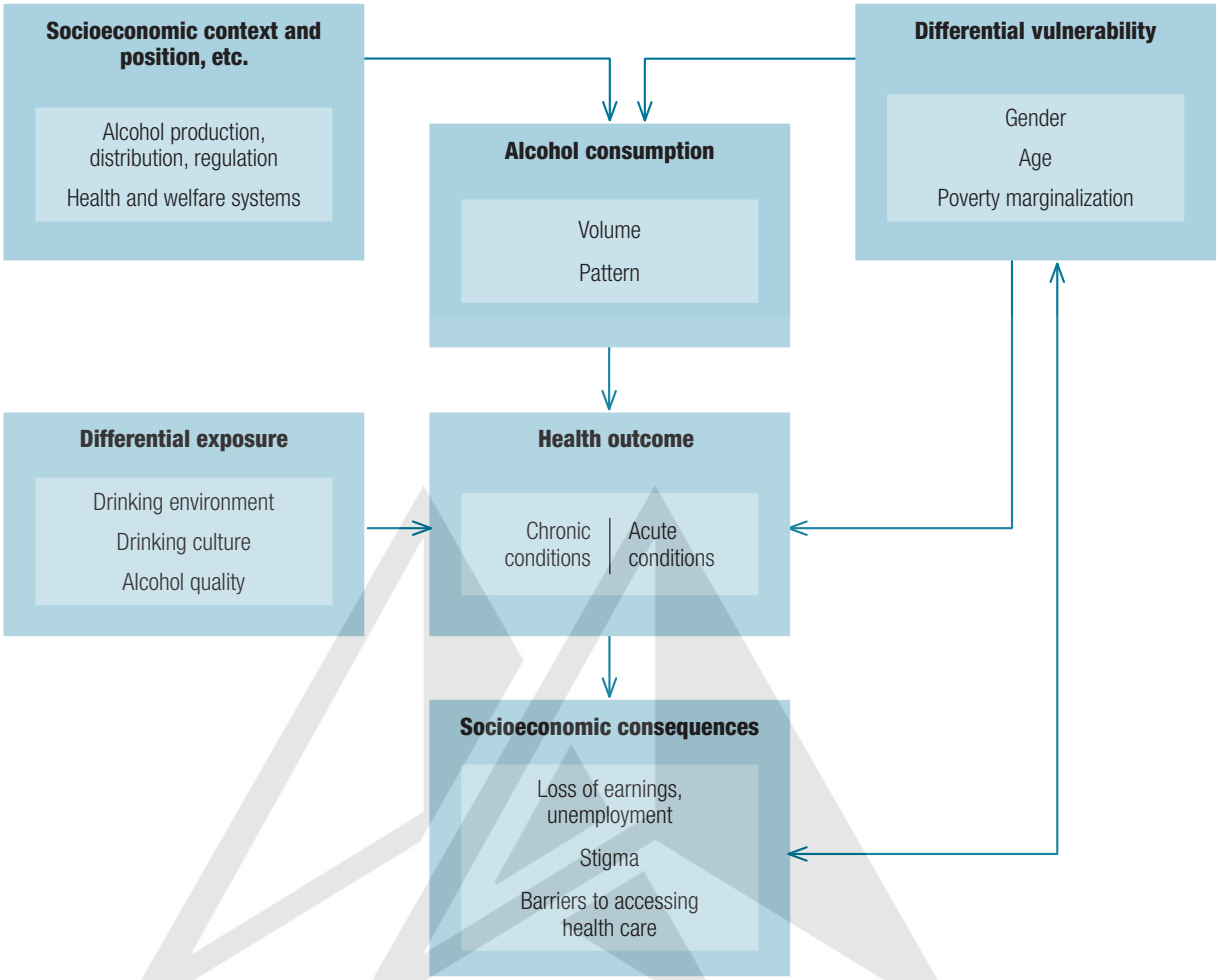
While there is a large body of evidence on the effectiveness of policies targeting the harmful effects of excess alcohol consumption, little is known about interventions that can reduce inequities in alcohol-attributable harm across the social gradient. In the absence of relevant data, policy-makers may either target groups of low socioeconomic status with interventions known to be generally effective, or implement interventions known to reduce the burden of harm in the population as a whole and thereby hope to impact the higher burden of harm borne by groups of low socioeconomic status. There is a need to test both approaches against the evidence.

While much recent work has been undertaken on international experiences with alcohol policy (*1–6*), policy-making on social inequity and alcohol remains hazardous, and the many different sociopolitical, economic and cultural factors giving rise to inequities in alcohol problems mean that predicting the impact of any given intervention is a complex undertaking. Much of the uncertainty stems from one simple, but empirically robust, finding: because alcohol is a commodity that requires disposable income to obtain, the poorest segments of the population are usually the least likely to drink. This opens up the possibility that otherwise beneficial decreases in socioeconomic inequity can lead to an increased burden of alcohol-attributable health problems in low-income populations. The conditions under which this is in fact the case are still not fully understood.

Other basic questions remain unanswered: Do reductions in alcohol-attributable harms at the population level necessarily lead to declines in alcohol-attributable health inequities between groups along the social gradient? How can inequities be reduced without imposing unfair constraints on individual choice among economically disadvantaged groups? How can increases in alcohol-attributable harm be prevented in people of low socioeconomic status in the context of economic development, such as that which has recently been enjoyed throughout portions of Asia and eastern Europe?

There is a great need to generate and disseminate new knowledge about the complex relationship between alcohol and social and health inequity, particularly in developing countries, and to build the evidence base on how interventions can be appropriately used to target alcohol-attributable disparities across the social gradient. This chapter represents an initial attempt to

FIGURE 2.1 Application of priority public health conditions analytical framework to alcohol-attributable harm



define what is already known, and to identify what more needs to be known and done to reduce worldwide health inequities attributable to alcohol.

Causal pathways linking alcohol and health inequity

While application of the priority public health conditions analytical framework may suggest some new ways to think about alcohol-attributable health inequities, causal pathways involving alcohol differ markedly from those pertaining to other conditions addressed in this volume. While alcohol consumption is an intermediate factor in the causal chain linking social determinants to a variety of end-point health conditions, including cancer, tuberculosis, HIV/AIDS and cardiovascular disease, it also has its own end-point disease states, including alcohol dependence and other alcohol use disorders. In most cases, alcohol consumption has deleterious effects on other disease outcomes, but in some, most notably heart disease, moderate consumption may be protective of health.

Figure 2.1 offers a simplified illustration of how the three top levels in the priority public health conditions analytical framework might be applied to the case of alcohol-attributable health inequities. Two end-points are of interest for this analysis: health outcomes and socioeconomic consequences attributable to alcohol consumption.

The health outcomes include a wide range of chronic diseases and acute conditions, and unintentional and intentional injuries (*7*). Health outcomes include chronic and acute alcohol use disorders, such as alcohol dependence, harmful use, acute intoxication and alcohol poisoning. Among the chronic noncommunicable health conditions, alcohol has a detrimental impact on various cancers (*8*), diseases of the gastrointestinal tract,

neuropsychiatric disorders and cardiovascular disease. Certain patterns of drinking have a beneficial impact on ischaemic disease, but this is by far outweighed by the detrimental effects (*7*). Finally, alcohol may impact the initiation of active tuberculosis and may play a role in HIV/AIDS initiation.

Alcohol can also impact the course of disease, partly by weakening of the immune system (*9*) and partly through its influence on behavioural factors, such as help seeking and adherence to therapy. Both effects have been found to impact especially poor and marginalized people, as they interact with malnutrition and other aspects of the living situation (for example, homelessness).

Inequities in the burden of alcohol-attributable disease can, in turn, lead to a second end-point: differential social and economic consequences, including loss of earnings, unemployment, family disruptions, interpersonal violence and stigmatization. Cultural stigma is typically most acute for the more marginalized segments of the population (*10*), and can in turn lead those with alcohol use disorders to experience increased difficulty accessing health and welfare services.

Health outcomes and socioeconomic consequences are determined by the overall amount or *volume* of alcohol consumed, and by the *pattern* in which that alcohol is consumed. For example, the cumulation of a volume of alcohol over a period of years is a predictor of many chronic illnesses, while a pattern of drinking more per occasion significantly increases the risk of injury, including alcohol overdose or poisoning. Also, regular moderate drinking may reduce the risk of contracting ischaemic heart disease, while excessive consumption will increase the risk.

The priority public health conditions analytical framework directs attention to three causal pathways that link social determinants with health outcomes and socioeconomic consequences:

Socioeconomic context and position. The global, national and subnational contexts in which alcohol is legally produced, distributed and consumed have an impact on alcohol-attributable health outcomes. Policy choices at all levels of government can determine the availability of alcohol to the population as a whole and the differential availability to populations of low socioeconomic status. Once health-related outcomes are present, aspects of the socioeconomic context can further impact the availability of health and welfare services that provide remediation.

Differential vulnerability. In most parts of the world, vulnerability to alcohol-related harm differs across social groupings as defined by gender, age and socioeconomic status. Cultural prohibitions on drinking by women and children are common to most cultures, resulting in reduced vulnerability to alcohol-attributable health outcomes for members of these groups. However, for those who break with such cultural prohibitions, vulnerability to the social consequences of drinking, particularly stigmatization, may be increased. Another aspect of differential vulnerability involves alcohol's negative effects on the course of illness or injury. Nutritional deficiencies and other consequences of low socioeconomic status can also increase vulnerability to the harmful health effects of alcohol.

Differential exposure. Throughout the developing world, heightened exposure to alcohol-related harm results from the consumption of poor-quality alcohol, which may be contaminated with harmful chemical additives such as methanol. Unsafe housing and public drinking settings, and some group drinking practices, may increase the risk of unintentional injury and exposure to certain infectious diseases, such as tuberculosis and HIV/AIDS.

2.3 Analysis: differential distribution of alcohol use and problems

This section examines evidence that alcohol use and problems vary along social gradients both within and between societies, given the limitation that most research to date has focused on measures of overall wealth and socioeconomic status rather than inequity per se.

Alcohol consumption

In cross-national comparisons, the relationship between national affluence and alcohol consumption is relatively close. Figure 2.2, in which each circle represents a country, shows the relationship between per capita purchasing power parity-adjusted gross domestic product (GDP) and per capita alcohol consumption[2] of adults aged 15 years and older. The positive relationship between per capita GDP and alcohol consumption is stronger among poorer countries, as shown by the steeper incline of the trend line at GDP levels below US$ 10 000.[3]

2 Includes estimated unrecorded consumption. The difficulty of obtaining such estimates is reflected in an overall Pearson correlation of 0.55.

3 Correlation among 115 countries below US$ 10 000 = 0.84; correlation among 46 countries above US$ 10 000 = –0.06.

FIGURE 2.2 Relationship between per capita purchasing power parity-adjusted GDP and adult consumption (litres) of alcohol per year, 2002 (weighted by adult population size)

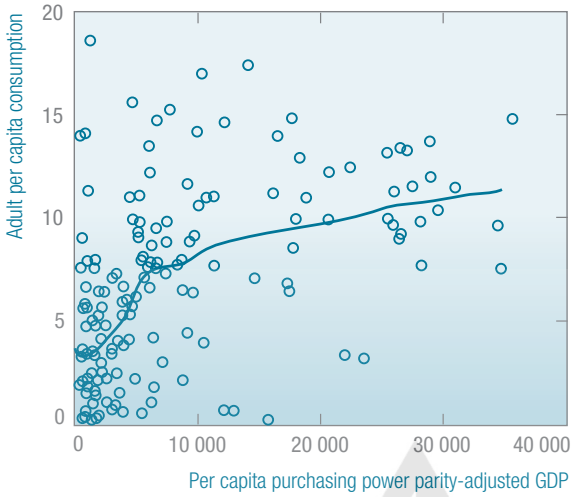


FIGURE 2.3 Relationship between per capita purchasing power parity-adjusted GDP and proportion of male abstainers, 2002 (weighted by adult population size)

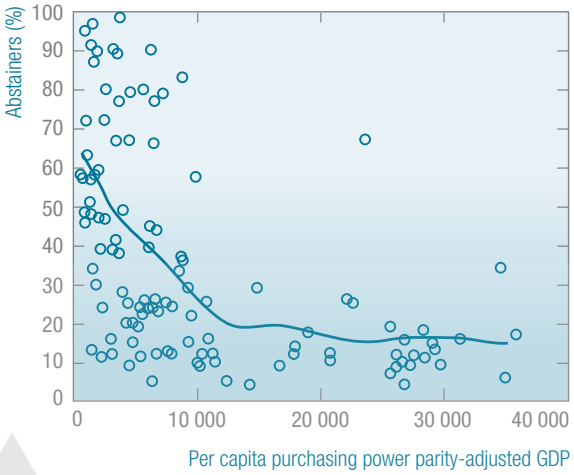


Figure 2.3 shows the relationship between per capita purchasing power parity-adjusted GDP and the rate of abstention in the country's adult male population. Below a per capita GDP of about US$ 5 000 the abstention rate falls sharply with increasing affluence; above that level there is little relationship between the degree of affluence and the rate of abstention.

Interpreting the meaning of these relationships is not straightforward. For Figure 2.2, alcohol consumption may serve as an indicator of the type of goods that become part of everyday life when economies start to prosper. After a certain threshold is reached, the relationship between affluence and alcohol consumption may no longer be as strong because most people can afford alcohol and other commodities.

One interpretation of Figure 2.3 suggests that abstention may be a matter of religious or principled commitment. It may also result from broader cultural practices and norms, or it may reflect extreme poverty, where meagre resources leave funds unavailable for alcohol. This is supported by work showing that between-society differences in rates of abstention account for a large part of the variation between rich and poor subregions in levels of alcohol consumption (*11*). This implies that if the laudable goal of ending extreme poverty throughout the world were attained there is the potential, in the absence of countermeasures, for a substantial increase not only in rates of people who drink but also in rates of heavy drinking.

Health outcomes of alcohol use

Variations between richer and poorer regions of the world in alcohol's contribution to the global burden of disease will now be considered. Table 2.1 compares alcohol-attributable harm across regions of the world using disability-adjusted life years (DALYs), which reflect a combination of the number of years lost from early death and fractional years lost when a person is disabled by illness or injury. The proportion of all DALYs lost attributable to alcohol is higher in the middle- and high-income regions than in the low-income regions. This is partly due to an overall higher burden of disease attributable to other causes in poorer parts of the world. The eastern Europe and central Asian grouping shows the greatest proportion of alcohol-attributable DALYs lost (12.1%).

In absolute terms, or DALYs per 1000 adults, the alcohol-attributable burden remains by far the highest in the eastern Europe and central Asia groupings (36.48 DALYs per 1000 adults), with the lowest tolls found in the industrialized countries and in the Islamic Middle East and Indian subcontinent.

The relative importance of different alcohol-attributable conditions also varies by region. Unintentional injuries account for a higher proportion of the overall disease burden in the two low-income categories, and in the eastern Europe and central Asia category. The burden of DALYs lost from intentional injuries is particularly high in poorer parts of the world where consumption levels are high, and in eastern Europe and central Asia. Alcohol use disorders (for example alcohol dependence, harmful use) account for a large part

TABLE 2.1 Economic development and alcohol-attributable disease burden, 2000 (in 1000 DALYs)

	Developing countries						Developed countries				World	
	Very high or high mortality; lowest consumption		Very high or high mortality; low consumption		Low mortality		Very low mortality		Former Socialist: low mortality			
	Islamic Middle East and Indian subcontinent		Poorest countries in Africa and America		Better-off developing countries in America, Asia, Pacific		North America, Western Europe, Japan, Australasia		Eastern Europe and central Asia			
	DALYs	%	DALYs	%	DALYs	%	DALYs	%	DALYs	%	DALYs	%
Perinatal conditions	29	0.5%	48	0.7%	29	0.1%	6	0.1%	11	0.1%	123	0.2%
Malignant neoplasms	154	2.6%	502	7.0%	2 321	9.1%	828	10.5%	395	3.4%	4 200	7.2%
Neuropsychiatric conditions in total	1 780	29.8%	1 692	23.5%	10 142	39.7%	5 697	72.1%	2 591	22.1%	21 902	37.6%
Only alcohol use disorders (also part of neuropsychiatric disorders)	*1 578*	*26.4%*	*1 328*	*18.5%*	*2 906*	*36.7%*	*5 100*	*64.6%*	*2 299*	*19.6%*	*19 671*	*33.7%*
Cardiovascular diseases	899	15.1%	442	6.1%	2 260	8.9%	–1 548	–19.6%	1 931	16.4%	3 984	6.8%
Other noncommunicable diseases	303	5.1%	594	8.3%	1 864	7.3%	787	10.0%	1 010	8.6%	4 558	7.8%
Unintentional injuries	2 293	38.4%	2 740	38.1%	5 961	23.4%	1 571	19.9%	3 929	33.5%	16 494	28.3%
Intentional injuries	506	8.5%	1 183	16.4%	2 940	11.5%	558	7.1%	1 874	16.0%	7 061	12.1%
Total alcohol-related burden in DALYs	5 966	100.0%	7 199	100.0%	25 519	100.0%	7 897	100.0%	11 742	100.0%	58 323	100.0%
Total alcohol-related burden in DALYs per 1000 adults	6.99		18.70		15.54		11.75		36.48			
Total burden of disease in DALYs	458 601		364 117		409 688		115 853		96 911		1 445 169	
% of total disease burden that is alcohol related	1.3%		2.0%		6.2%		6.8%		12.1%		4.0%	

Source: Rehm et al. (*7*).

of the burden in the richest group of countries, and in middle-income developing countries. Cancers account for disproportionately more of the disease burden in high- and middle-income regions.

Cultural patterns of drinking can also be a factor in the differential burden of alcohol-attributable health outcomes across societies. A broad measure of cultural variation is the "hazardous drinking score", which captures the extent to which drinking to intoxication predominates in the society's drinking culture. Prior analyses suggest that poorer societies tend to have higher hazardous drinking scores (*7*). This suggests that cultural differences in the safety of drinking practices help account for differential exposure to alcohol-related harms.

Turning next to within-society variations by gender, age and socioeconomic status, the literature is rather limited and tends to focus on Nordic and English-speaking societies, though the World Health Organization (WHO) has sponsored recent efforts to broaden the geographical base for studies (*12, 13*).

Gender. The health and social burden from women's drinking is everywhere substantially less than for men. It has been estimated that globally, alcohol accounted for 1.4% and 7.1% of the DALYs lost among women and men, respectively, in 2002. Alcohol-attributable deaths account for 1.1% of all deaths among women and 6.1% among men. The most obvious explanation for these differences is the large, universally observed, gender difference in alcohol consumption: compared to women, men are less often abstainers, drink more frequently and in larger quantities, and consequently experience more problems from drinking than women (*14–17*).

Age. The relationship between age and alcohol-attributable harm seems dependent, in part, on variations in drinking cultures. In some developed societies where alcohol is primarily viewed as an intoxicant, as in most English-speaking countries, younger people tend to experience relatively more harm. In most developing societies, alcohol consumption and related harm is highest in middle-aged adults. Worldwide, fatal injuries tend to be more prevalent among the young and young adults (*18*). Patterns of drinking again help explain these findings, with the proportion of young people's drinking that takes place during heavy drinking occasions tending to be large compared to that of older people. Another factor is cultural variations in "drunken comportment", or behaviour while drinking; young people tend to be less risk averse and may engage in more reckless behaviour while drinking (*4*).

Socioeconomic status. A general observation from different parts of the world is that alcohol-attributable health harm tends to be more prevalent in lower social strata, and that this is particularly the case for men. In Nordic countries, for example, groups of lower socioeconomic status have significantly higher rates of alcohol-attributable hospitalization (*19*). In established market economies, clinical populations of patients in treatment for alcohol problems typically have an overrepresentation of people of low socioeconomic status compared to the general population (*20, 21*). There are few studies of self-reported alcohol problems and socioeconomic position in developing countries, but those that exist point to a relatively strong negative social gradient. In a study in southern Brazil, the prevalence of alcohol use disorders was 2.7% in the group of high socioeconomic status and 13.7% in the lowest (*22*).

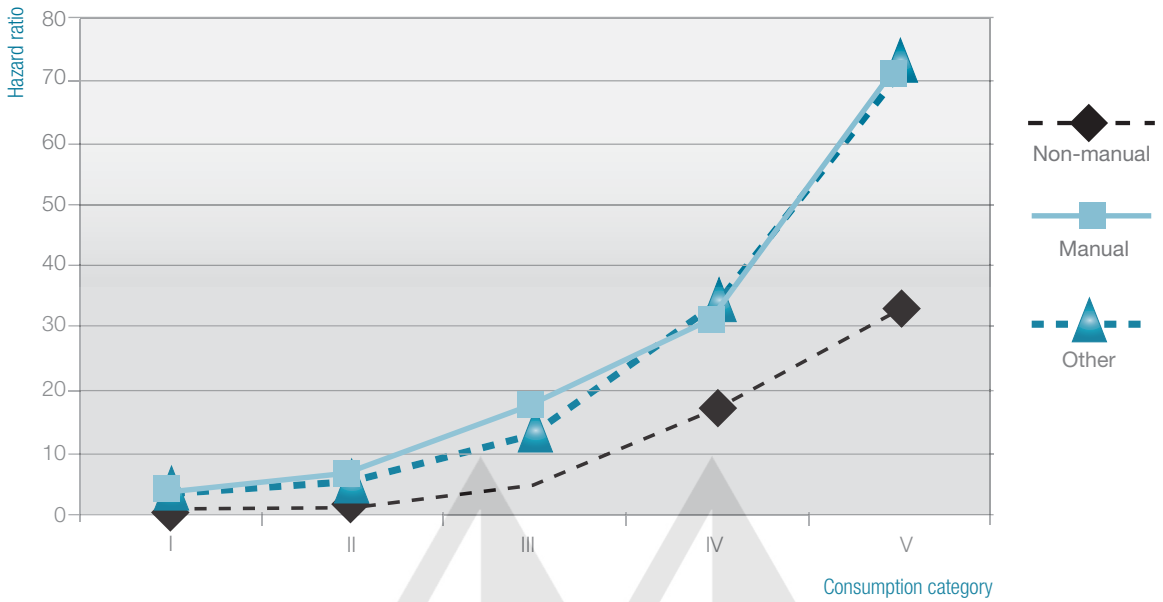
Studies in developed countries, with very few exceptions, have shown that deaths from alcohol-attributable causes are more common in lower than higher socioeconomic groups. For example, alcohol-attributable mortality ratios between 3.2 and 6.1 have been reported among men between lowest and highest educational, occupational and income groups in the Nordic countries and in Russia (*23–25*). Ratios often vary markedly by age and gender. This is illustrated by the case of the United Kingdom, where the ratio in alcohol-related mortality between the lowest and highest occupational categories has been as high as 15 among men aged 25–39, and as low as 0.3 among women aged 55–64 (*26*).

Drinking patterns, at least in part, may help account for this differential burden of harm. Individuals in higher socioeconomic groups are more likely to be drinkers, and they tend to have more drinking occasions, particularly more light-to-moderate drinking occasions, than their counterparts in lower social strata (*27, 28*), while the proportion of drinking occasions that involve binge drinking is typically greater for drinkers of low socioeconomic status (*27, 29*).

Education has also been shown to be a factor. Results from a comparative study (*30*) of Brazil, Israel, Mexico and 13 European countries found that among women educational differences in heavy drinking were small, while among men, in most countries, heavy drinking and heavy episodic drinking were more prevalent among those with a limited education. Other results from India imply a negative gradient between alcohol use and income, and alcohol use and education among men (*31, 32*). Overall, income, which is a measure of purchasing power, seems to have a special role with respect to alcohol use and heavy drinking, in that it increases the likelihood of consumption when other factors, such as education, are held constant (*33, 34*).

From the above results, it may be concluded that differences in alcohol-related health outcomes tend to be

FIGURE 2.4 Hazard ratios for alcohol-related mortality and hospitalizations by drinking category and socioeconomic status as measured by manual vs non-manual labour



Note: Consumption categories: (I) 1–26, (II) 27–116, (III) 117–364, (IV) 365–999 and (V) more than 1000 centilitres of 100 per cent alcohol per year. Model based on drinkers only.

more pronounced than differences in alcohol consumption across the social gradient. Differences in disease burden and mortality by socioeconomic status seem higher than would be expected on the basis of differences in alcohol use alone (*19, 24, 33*). Recent work in Finland has provided some of the first direct evidence that this may indeed be the case. In a new study (*35*), participants in a drinking habits survey were followed up to observe long-term alcohol-related mortality and hospitalization outcomes. As Figure 2.4 illustrates, the group with lower socioeconomic status experienced more severe health outcomes at all levels of consumption compared to the group with the highest status. A noteworthy finding was that even the pattern of drinking could not account for these differences between the groups.

Socioeconomic consequences of alcohol use

Thus far, evidence has been reviewed of differential alcohol consumption and health outcomes across social gradients within and between societies. Attention will now be turned to the socioeconomic consequences attributable to the harmful use of alcohol, including loss of earnings, unemployment, family disruption and stigmatization.

International evidence suggests that, in particular, the stigmatization of alcohol problems is a common thread linking societies throughout the world. In a 14-country WHO cross-cultural study of disabilities, key informants assigned "alcoholism" an average rank of 4th out of 18 conditions in terms of the degree of social disapproval or stigma in the society. In most societies, this amounted to greater disapproval towards alcoholism than for being "dirty or unkempt" or for having a "chronic mental disorder" (*36*). Particularly in affluent societies, there seems to be a strong overlap between the most marginalized population and those defined as having serious alcohol problems.

The effects of stigmatization often lead to other socioeconomic consequences, such as loss of earnings, unemployment, homelessness and poverty. Thus, a survey of those entering treatment for alcohol problems in Stockholm, Sweden, found that 77% were not in the workforce and 67% did not have a fully stable living situation (*21*). A particularly important consequence of stigmatization may be reduced access to health and welfare services. In many parts of the world, those perceived as "drunks" have difficulties obtaining health care services (*37–39*), and a summary of six studies from Australia, the United Kingdom and the United States reported that respondents felt that heavy alcohol users should receive less priority in health care (*40*). Often the justification given was the belief that the alcohol users' behaviour contributed to their own illness.

2.4 Discussion of causal pathways

In line with the priority public health conditions analytical framework, social determinants may be linked to alcohol-attributable health disparities through three causal pathways: socioeconomic context and position, differential vulnerability and differential exposure to risk factors. In all three cases, there is evidence supporting the applicability of these causal mechanisms to alcohol-attributable health disparities.

Socioeconomic context and position

The most important way that the broader socioeconomic context impacts alcohol-attributable health outcomes is by shaping the overall availability of alcohol (*41*). It is now widely accepted that rates of alcohol consumption and related problems are heavily influenced by the availability of alcohol, which is, in turn, largely determined by societal choices with respect to the production, importation, advertising, distribution and pricing of alcoholic beverages, which can have differential effects on groups along the socioeconomic gradient.

A general finding in English-speaking and Nordic societies over the last 50 years is that, as market liberalization, increased advertising and growing affluence have made alcohol more available in general (*42*), and to the poor in particular, rates of alcohol problems have climbed, particularly for those of lower socioeconomic status (*43*). For example, in the United Kingdom, alcoholic cirrhosis used to be a rich man's disease (*44*), but there was a shift (in England and Wales) in the relative index of inequality in male liver cirrhosis mortality by social class from 0.88 in 1961 to 1.4 in 1981 (i.e. from lower to higher mortality in lower socioeconomic categories). On the other hand, in southern Europe, where there has been a marked decline in wine consumption among the rural poor with urbanization and increased affluence, the traditional excess of cirrhosis mortality among poor men seems to have somewhat decreased (*45, 46*).

The dynamics of increasing affluence and alcohol availability are a particular concern for countries throughout the developing world. As shown earlier, developing countries currently have lower levels of per capita alcohol consumption, high levels of abstention by adult males, and consequently an overall lower burden of alcohol-attributable disease, though patterns in some cultures may sometimes gear drinkers towards consuming alcohol in more hazardous situations. In contrast, it is precisely in the fastest-developing regions in the recent past – central Asia and eastern Europe – that the highest rates of alcohol consumption are seen, along with a disproportionately high burden of alcohol-attributable harm. The experience of countries in central Asia and eastern Europe today may, in fact, foreshadow the future for developing countries, which, as they grow more affluent and susceptible to alcohol marketing, are likely to see substantial increases in alcohol consumption and resultant public health harms from drinking (*4*), with an inequitable impact falling on the poor.

Socioeconomic context and position also impact the availability of health and welfare services for alcohol-related health problems that, as shown, disproportionately impact populations of low socioeconomic status. Welfare states around the globe vary significantly in the degree to which they provide equal access to services for those affected by alcohol-related problems (*47*). Substantial barriers to health care access are present in both wealthier and poorer societies, although the reasons for the barriers differ. In the United States, for example, insurance exclusions may deny health care coverage for alcohol-related conditions (*48, 49*). In developing societies, in contrast, shortages of services pose a greater barrier; for example, deficiencies in health care for chronic diseases may mean that an alcohol-related illness becomes fatal when it need not be.

Differential vulnerability

In most parts of the world, vulnerability to alcohol-related harm differs across social groupings, as defined by gender, age and socioeconomic status. A number of factors impact this differential vulnerability. For example, more affluent drinkers are likelier to have a wider "social margin" or buffer that insulates them from the negative consequences of their actions, whereas drinking by groups of lower socioeconomic status takes place more often in public settings, where drunken behaviour is more likely to be noticed by the police or other authorities (*50*). Men in higher socioeconomic groups may also be more advantaged by the important social constraint of being accountable to a wife and family (*51*).

A compelling explanation for the differential vulnerability of groups of lower socioeconomic status to alcohol-related problems is cumulative disadvantage, which suggests that socioeconomic disadvantages occurring early in life can multiply, sometimes exponentially, over the course of time, contributing to adverse health outcomes. Thus in one Finnish study, education, occupational class, personal income, household net income and housing tenure each remained statistically significant as predictors of alcohol-attributable mortality after adjusting for other socioeconomic dimensions, with each showing a negative gradient (*23*).

The effects can be intergenerational; some studies find that, even when the subject's own socioeconomic status has been controlled, a low childhood socioeconomic position can increase the risk of alcohol-attributable death (*52, 53*). However, a review of the literature suggests that a similar generational effect for alcohol use and harmful use has not been found (*54*).

The cumulation of socioeconomic disadvantages over time also heightens the risk for alcohol problems that occur in combination with other health conditions. Nutritional deficiencies linked to low socioeconomic status may, for example, adversely affect the course of alcohol-related health outcomes by affecting the immune system, as has been shown for tuberculosis, HIV/AIDS and recovery from injury.

Differential exposure

Populations along the social gradient experience differential exposure to the harmful effects of alcohol. For example, those who are less affluent or of lower education are more likely to access non-beverage and other low-quality alcohol (*55, 56*). Throughout the developing world, heightened exposure to alcohol-related harm can occur due to poor-quality alcohol, which may be contaminated with harmful chemical additives, such as gasoline or methanol, to give an added "kick", occasionally with fatal consequences. Contamination of the water supply in making non-commercially produced alcohol is a related problem (*56*). However, contamination of alcoholic beverages is, overall, much less of a problem than the harmful effects of the alcohol itself.

There is also evidence that drinking cultures and contexts shape the differential exposure of groups along the social gradient to alcohol-related harms. People in developing countries, and in groups of low socioeconomic status in developed countries, are often specifically targeted by alcohol advertisers and distributors. Ecological research in the United States has thus documented that alcohol-related health and social problems are disproportionately high in those low-income communities that are heavily exposed to alcohol advertising and that have a high density of alcohol sales outlets (*57–59*).

Differential exposure may also result from variation in the safety of the drinking context and nature of the drinking culture. Groups of low socioeconomic status are more likely to consume alcohol in unsafe settings where the risks include violence, police encounters and unintentional injury (*60–62*), and exposure to certain infectious diseases, such as tuberculosis and HIV/AIDS, in public drinking places frequented by people at high risk.

2.5 Interventions: promising entry-points

From the perspective of public health policy, the causal pathways between social determinants and alcohol-attributable health outcomes represent potential entry-points for interventions that could prove effective in reducing health disparities. While there are many existing alcohol interventions that have been shown to be effective, few have been implemented with the specific goal of reducing health disparities. The following subsections propose a range of possible intervention strategies that flow from the analysis above of the causal pathways linking social determinants with alcohol-attributable health disparities.

Possible interventions related to socioeconomic context and position

Enhancing and protecting the ability of governments at various levels to act to reduce alcohol problems

As noted above, one of the most effective ways to prevent alcohol-attributable disease is by reducing the overall availability of alcohol, which can generally impact the average amount of alcohol consumed. Alcohol control policies, which involve alterations in legal rules for producing, distributing, taxing, marketing and pricing alcohol, are some of the most effective tools in the public health arsenal and may disproportionately impact populations of low socioeconomic status (*2, 5, 63, 64*).

While not explicitly focused on reducing social inequities, there is evidence that taxation and pricing policies can disproportionately impact lower-income drinkers by making alcohol less affordable for them and reducing their consumption (*65–68*). Consequently, reductions in the alcohol-attributable burden of disease will tend to be greater for the poorer than for the richer segments of the population, holding other effects constant. It has been argued that the relatively stringent alcohol policies of the Nordic countries have contributed to holding down health inequalities there (*69, 70*). The reverse effect has also been noted: data from Finland, where in 2004 alcohol taxes were decreased by an average of one third, show that increases in alcohol-related mortality in the two years following the tax cuts were, in absolute terms, most notable among those less privileged in society, such as those outside the workforce, or with a low income or education (*68*).

Taxation and pricing policies may be most effective when they gently discourage consumption by populations of low socioeconomic status and channel

consumption into less problematic forms. Appropriate measures might include licensing the production, import and sale of alcoholic beverages, and enforcing market controls; specifying what forms and strengths of alcohol may be sold; setting and collecting taxes on alcoholic beverages at rates sufficient to discourage overconsumption, and to favour consumption of less harmful, low-alcohol forms of beverage; and organizing and regulating the retail trade to limit the sales network density and hours of opening.

There are, however, political and ideological barriers to measures that would more strongly affect poorer than richer people. A common argument against increased alcohol taxation is that it is regressive, in that it confiscates a higher proportion of the poor drinker's than the rich drinker's income. The issue of regressiveness can be neutralized by earmarking the tax receipts for purposes that benefit the poor.

In an era of free markets and consumer sovereignty, the ability of governments to control the marketing of alcohol and contexts of drinking has been compromised, at the national level by courts or commissions enforcing internal free markets, and at the international level by regional trade agreements and activities to liberalize trade between nations, for example under the auspices of the World Trade Organization. One alternative to counter such trends is formulation of an international agreement based on consensus that alcohol is not an ordinary commodity that can be marketed without restriction (*71*). Such an agreement would respect the domestic laws and arrangements of individual nations, empowering governments to act in the interests of reducing health inequities, even when such actions cut across market interests.

The political feasibility of an international public health treaty on alcohol is likely to be hampered by the power relationships between government and commercial alcohol interests, including producers, distributors and retailers. In many countries, the production and sale of alcohol is an important economic activity that generates profits, jobs and foreign currency in a range of sectors, including agriculture and tourism. While these dynamics have limited the capacity of states and regional bodies to place formal controls on the marketing and advertising of alcohol (*4, 57*), the successful experience negotiating these dynamics with tobacco control provides some hope that similar efforts may be possible with respect to alcohol.

Another limitation is the technical capacity and administrative infrastructure required to successfully adopt alcohol control policies, both at national and international levels. Governments in developed countries have evolved a range of mechanisms for progressively establishing control over the alcohol market, but establishing such measures in developing countries can be more difficult for many reasons, such as a thriving informal market outside the tax system, although solutions do exist (*72*). Such topics are natural ones upon which to base cooperation between WHO and other international agencies, such as the World Bank and World Trade Organization (*4*).

Successful interventions of this kind may require policy-makers to take advantage of spontaneous cultural change rather than to try to initiate change. Some of the most dramatic changes in aggregate alcohol consumption and related health problems have occurred when governments have responded to shifts in public opinion, rather than the other way around, for example due to pressure from social and religious anti-alcohol movements (*4, 73*). In the context of developing societies, anti-alcohol movements have frequently coalesced when indigenous groups have come to see foreign alcohol as a tool of elite domination (*74–78*).

There are some notable cases in which governments have successfully capitalized on the shifting tides of public opinion to help bring about marked shifts in alcohol consumption and problems. In Poland, for example, per capita alcohol consumption decreased by 24% during 1980–1981 during an anti-alcohol campaign launched by the Solidarity trade movement, which was later coopted by national officials who instituted alcohol rationing (*79*). In a developing society context, social movements instigated by women, including temperance movements in the Pacific Islands and Africa, are further examples of how the momentum created by indigenous movements could be built upon by governments seeking to promote public health regulations (*4, 78*).

Shaping norms and the place of alcohol in the culture to decrease stigmatization

Changes in health, education and welfare policy can influence access to health and social services, with positive consequences for stemming alcohol's adverse effects on the course of existing health problems, including alcohol dependence and alcohol-attributable health conditions such as cirrhosis and coronary heart disease. Generic measures that promote good nutrition and diet among the poor, for example, can help to buffer heavy drinkers from cirrhosis mortality. With respect to reducing the burden of alcohol use disorders, national and local laws that mandate compulsory treatment via criminal justice and child welfare authorities have produced higher rates of treatment engagement and adherence in low-income populations (*80, 81*).

However, as has been shown, stigmatization is a major barrier to accessing health and welfare services, particularly among disadvantaged and dependent groups.

Reducing this stigma thus becomes a potential way of reducing alcohol-related health inequities. This is a relatively untapped field, and it is in fact a matter of experiment to see whether and under what conditions such reductions in stigma can be managed, and what their effects are.

Possible interventions to impact differential vulnerability

Community mobilization and empowerment

Community mobilization is one type of intervention that has proven successful in responding to the differential marketing of alcohol to vulnerable groups. Under this approach, prevention specialists target community leaders in a campaign to raise awareness of problems associated with drinking and to develop specific solutions that involve stakeholders in the community (*82, 83*). One outcome of community mobilization efforts in the United States has been to strengthen the enforcement of public drunkenness and alcohol outlet zoning ordinances in low-income communities (*84*). Unfortunately, the effectiveness and long-term sustainability of community mobilization approaches is unclear (*85, 86*).

Political barriers can interfere with attempts to curtail the selected commercial marketing of alcoholic beverages to vulnerable populations. Civil protections on commercial activity and freedom of speech can limit the capacity of government to regulate the marketing and advertising of alcohol products, even to populations that are vulnerable from a public health standpoint. Governments that seek to protect the public health through counteradvertising campaigns have met with limited success in the alcohol field, perhaps due to ineffective messages, low frequency and inappropriate placing in the media (*87*).

Enhancing access to services for groups of low socioeconomic status

Cumulative disadvantage may increase the vulnerability of populations of low socioeconomic status to alcohol-attributable health problems and consequences, suggesting a potentially greater need for health and welfare services that are integrated along a continuum of care. At the same time, stigmatization and economic barriers limit access to health and welfare services for those with the greatest need. The limited resources and numbers of health professionals in developing countries pose a particular challenge to meeting the needs of individuals with alcohol use disorders and related medical problems.

Policy interventions that target at-risk drinkers in medical and primary health care settings show particular promise for reducing health disparities and could help reduce the stigma associated with obtaining tertiary care for alcohol-related problems. Since 1980, WHO has focused on developing effective approaches to detect individuals with harmful alcohol consumption before the onset of adverse health consequences. Brief interventions, usually confined to a few sessions of counselling and education within a primary care context, have been shown to be effective in international clinical trials (*41, 88, 89*).

Mutual aid approaches, notably Alcoholics Anonymous (AA), also hold promise because they are free to all. The AA approach has demonstrated its ability to transcend cultural boundaries (*90, 91*) and provides an effective, low-cost alternative and adjunct to professional treatments for alcohol use disorders. It has been argued, with some evidence, that both the growth of AA and the provision of specialty care for alcohol use disorders can reduce rates of alcohol problems in the population; thus studies have found an association between decreased hospital discharges for liver cirrhosis and increased treatment and AA attendance (*92–94*). The provision of treatment and mutual help approaches may thus impact alcohol-related health outcomes.

Possible interventions to impact differential exposure

Controls on alcohol quality

The main strategy for controlling the quality of alcohol involves government safety regulations, applied to alcohol producers, on the potency and purity of alcohol products. Such interventions are likely to have a moderate effect on all health outcomes in all societies, but can be expected to disproportionately impact the health of poorer societies, particularly developing societies (*70*). However, harmful additives can be introduced at the level of alcohol distributors and retailers. For example, high rates of cirrhosis in regions of Mexico have been linked to the consumption of commercially sold *pulque*, a popular fermented beverage that is often contaminated at the retail stage (*95*). Interventions here may include providing assistance to subnational governments to tighten retailer licensing and enforcement mechanisms, improve quality and safety standards, and raise consumer awareness.

Using contextual controls to limit the harm from a given level of drinking

There are a variety of measures to reduce rates of alcohol-related problems in communities of low socioeconomic status that operate through pathways other

than cutting down the level of consumption. Harm reduction policies oriented to lower socioeconomic groups have a political advantage in that they seek little or no change in individual drinking behaviour, focusing instead on making the drinking context safer for those who do drink. They include planning requirements on the design of drinking places or off-sale outlets, controls on drink sizes and drink promotions, server interventions to deny service to those already intoxicated, random breath tests of drivers, and programmes that provide free transportation home to intoxicated bar-goers (*5*). Unfortunately, to date, there is little evidence that these strategies are effective (*96*).

A potentially effective approach for reducing alcohol consumption in poorer communities is to place regulatory controls on the number of alcohol sales outlets that can be opened (*97*), though to date there is little direct testing and evidence of the effectiveness of targeting poor communities for reductions in outlet density. However, researchers have shown that the density of retail alcohol outlets is related to acute alcohol-attributable health conditions, particularly auto fatalities and accidents (*58, 98, 99*). In developed countries the economically disadvantaged may do more of their drinking in public settings and may migrate to poorer neighbourhoods to drink (*100, 101*), further suggesting that environmental approaches could have a disproportionate impact on these groups.

Responsible beverage service programmes train bartenders, managers and other servers in skills for recognizing and refusing service to intoxicated people. Attempts to implement this approach have met with mixed success (*102–104*). Typically, these interventions are carried out in a context where there are laws in place, but they are poorly enforced (*105*), and enforcement has been shown to be crucial to the success of these programmes. A related approach holds servers legally liable for the consequences of providing alcohol to intoxicated or under-age individuals. When tried in the United States, this approach has had some efficacy with respect to reducing traffic fatalities and homicide (*106, 107*).

2.6 Implications and lessons learnt

Side-effects and resistance to change

The history of alcohol policy provides many examples of the potential hazards inherent in attempts to implement social policies targeting alcohol-attributable health disparities (*108, 109*). This section discusses some of the unintended consequences, or side-effects, that have arisen when alcohol interventions of the kind considered in the previous section have previously been implemented.

Trading one alcohol problem for another

Experience shows that aggressive restrictions on alcohol availability through prohibition, alcohol bans, taxation and rationing can lower alcohol consumption and reduce alcohol-attributable health harms, but often with adverse side-effects in the form of increased violence and criminality associated with illicit production and trade (*5, 110*). Also, in complex markets, alcohol tax increases may be partially neutralized by strategic changes in pricing by alcohol producers and sellers, effectively substituting consumption of one type of alcohol for another (*59*). Price variation and substitution can, however, be geared to serve public health goals, as demonstrated in Nordic countries that have taxed more concentrated ethanol products, such as distilled spirits, at a higher rate than less concentrated ones, such as wine and beer (*64, 111, 112*).

Moreover, what seems to be an effective taxation policy for society in general can still have negative collateral effects on low-income drinkers and their families. While poor consumers do often change their drinking habits in the face of regressive alcohol taxation (*5, 70*), there may well be adverse effects on family income and well-being if they do not (*32*). For example, a study in Karnataka, India, found that per capita expenditures on food, health and education were significantly lower in households where men drank than in non-drinking households (*113*).

Symbolic politics and enforcement failures

History shows that alcohol problems often creep into debates over poverty and inequity for symbolic reasons (*114–116*). In some cases, the public debate over an alcohol policy may be more important than its actual implementation for the policy-makers involved; in the United States, for example, many of the federal guidelines to address alcohol problems in poor people receiving welfare payments have not actually been implemented by welfare agencies despite the existence of formal regulations (*117, 118*). On a symbolic level, however, the emphasis on addiction in the welfare reform debate played a key role in discrediting long-term welfare dependency and the open-ended system of public entitlements that welfare reformers hoped to replace.

Without active enforcement, most alcohol policies are likely to have, at best, minimal effects. Of course, the corollary of this statement is: potentially effective alcohol policies that are failing may be rendered effective through more active enforcement. This was vividly demonstrated by a study in Scotland that documented a

20% reduction in arrests resulting from a simple change in enforcement, that of having police occasionally visit alcohol retailers to ensure that local alcohol policies were being observed (*119*). On the other hand, in much of the developing world, only a portion of alcohol production and sales is subject to official controls, and it may be difficult for a government to enforce tax collection or other sales restrictions on the unofficial and unreported market (*57*).

Intergovernmental and intragovernmental conflicts

It is clear from the history of public health policy-making that governments have divided interests when it comes to alcohol: on the one hand, alcohol is an industry that can provide societies with a source of production and commodity for retail sales, and governments with tax income; on the other hand, alcohol is a source of public disorder and harm that falls within the mandate of government protection (*120*). The dynamics of alcohol policy in the developing world exemplify such conflicts. In some developing countries, alcohol taxation is an important source of government revenue; for example, in some states of India, alcohol taxes account for as much as 23% of total taxes, compared to 2.4% of taxes in European Union countries (*4*). Dependence by governments on the liquor trade can ultimately tie policy-makers' hands when it comes to implementing control policies to reduce alcohol-attributable harm.

Monitoring change: generating an evidence base for effective action

The alcohol literature is blessed with substantial traditions of policy evaluation studies, which have been collated and summarized in a number of publications (*4–6, 70*). Unfortunately, the literature is derived primarily from a relatively limited range of countries; also, alcohol-related health inequities have often not been a central concern of studies undertaken. Data and measures should accordingly be promoted in the areas described in the following subsections.

Alcohol consumption

While data are often available at the national level on alcohol on which tax has been paid, in much of the developing world this is a relatively small proportion of the alcohol consumed. Alcohol consumed by the poor is particularly likely to be unrecorded. In 2008, WHO initiated several new activities to improve its data collection, for example from Member States via the Global Survey on Alcohol and Health. Where possible, alcohol consumption statistics should also be collected and collated at subnational and socioeconomic levels; such smaller-area statistics are potentially important in tracking and studying alcohol-related health inequalities. Also needed are regular surveys (at least every five years) of general populations, and subpopulations of interest, concerning types of alcohol consumed, amounts and patterns of drinking, attitudes to abstention, drinking and drunkenness, and attitudes to alcohol policy interventions.

Alcohol-related problems

The main data available in this area internationally are found in WHO's annual accumulation of mortality data to the three-character level, which has assisted in establishing the broad dimensions of alcohol-related health problems. However, there are major causes of death where alcohol plays a substantial role, including injuries, cardiovascular disease and infectious diseases, but that connection is not recorded, making it difficult to establish the alcohol-attributable fraction and its variability by social class, marginality and other factors. Thus there is a need for studies in particular cultures and social groups of the extent of the role of alcohol in specific causes of death. There is also a strong need to move beyond mortality in building an evidence base on alcohol-related health inequalities. Efforts should be made to improve the recording of alcohol-specific codes in multiple-cause hospitalization records. In implementing this, the results of WHO's international collaborative study of alcohol in emergency departments should be drawn on.

Analysis from a health equity perspective

Analysing the survey data on drinking from a health equity perspective will require attention to the social location of drinking patterns and drinking problems. What is important from a health inequities perspective, however, is to move beyond these analyses to examine the question of harm per litre, cross-tabulating drinking patterns and the occurrence of drinking problems. Such analysis can be carried out at the individual level in survey data, or at the level of population subgroups – for instance, by age, gender, social class and marginalization – by collating results from different datasets. As implied above, the differential harm from a given amount of drinking is a crucial variable in tackling alcohol problems among the poor and particularly the marginalized. Finally, monitoring and analysis of the harm done to others in the social context of problems drinkers would give a more complete picture of the impact on low-income families.

2.7 Conclusion

There is a substantial research literature on policies that are effective in reducing or holding down rates of

alcohol-attributable problems. However, relatively few interventions are designed to target social inequities within societies or between societies, and there remains plenty of unexploited terrain for applying existing and evolving evidence-based approaches to groups of low socioeconomic status and the developing world. There is an urgent need for a programme of strategically chosen demonstration projects on alcohol policy initiatives targeting health disparities, with full evaluation, in the context of developing societies and low-income populations living within developed ones, paying close attention to measuring differences in effects by social class, income and other social differentiations.

Stimulating and enforcing measures to reduce alcohol-related harm will typically involve a variety of government departments, and often reach across them. In sum, there is a need for a comprehensive alcohol strategy with an agency centrally responsible for coordinating the actions of different government departments. This agency should have the task of evaluating national experience in the diverse areas, and transmitting that experience to an international clearing house provided by WHO or other international agencies.

There is also a serious need for close monitoring of the increased affordability of alcoholic beverages in developing countries, which is likely to increase alcohol consumption and harm. To do so, researchers will need to develop measures of the social harm and health disparities that capture alcohol's impact on economic development and its contribution to inequity within any given country, and better strategies for monitoring unrecorded consumption. This is likely to require closer cooperation between WHO and other international bodies responsible for development policy, using a specially developed toolkit to support alcohol policy development in developing countries.

The existing literature on alcohol policy impacts is primarily composed of "natural experiments", where researchers study the effects of a policy change that had been decided on beforehand. Indeed, a majority of studies of the effect of alcohol availability controls have been carried out as the controls were loosened. Public health agencies need to take a more proactive stance on studying how to reduce alcohol-related health inequities. This will mean adding new types of studies, for example studies of the acceptability of particular approaches to the population that inform the most appropriate framing of these measures.

Given the significance of alcohol consumption to health, policy evaluation studies inside and outside the health sector, and at national and global levels, should give more attention to alcohol-related health inequities. In recent years, WHO has prioritized continuous monitoring and providing technical support and guidance to control health problems attributable to alcohol. Since 1997, the Management of Substance Abuse team in the WHO Department of Mental Health and Substance Abuse has been building the Global Information System on Alcohol and Health (GISAH). This provides a reference source of information for global epidemiological surveillance of alcohol use, alcohol-related problems and alcohol policies. GISAH should serve as a starting-point for developing a necessary epidemiological base for tackling inequities in health related to harmful use of alcohol.

In a broader perspective, there is a clear need for the promotion of a global approach to reduce alcohol-related harm. WHO is in a strong position to play a significant role in formulating and implementing an evidence-based global approach aimed at supporting Member States and regions in their work to reduce the harmful use of alcohol and associated inequities. WHO has particularly important roles to play in providing scientific and statistical support, administrative capacity building, support for tackling issues across regions more effectively, disseminating evidence-based strategies, and collaborating with other international organizations and institutions. WHO should take the responsibility for leading this global process in order to build consensus around values, interventions and policies that would contribute to reducing inequities in the harmful use of alcohol.

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Cardiovascular disease: equity and social determinants

3

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3.1 Summary

Cardiovascular disease (CVD) is a leading public health problem that contributes 30% to the annual global mortality and 10% to the global disease burden. While there are downward trends in CVD mortality in most developed countries, the mortality trends in low- and middle-income countries are rising. Evidence on social determinants and inequities related to CVD, mainly from developed countries, indicates an inverse relationship between socioeconomic status and CVD incidence and mortality.

CVD includes coronary heart disease, cerebrovascular disease, rheumatic heart disease and Chagas disease. Rheumatic heart disease and Chagas disease are caused by infections. They continue to be major public health problems in low- and middle-income countries, particularly in poorer social classes. Coronary heart disease and cerebrovascular disease make the largest contribution to the global CVD burden. They develop slowly through life due to atherosclerosis of blood vessels caused by lifelong exposure to behavioural risk factors, tobacco use, physical inactivity and unhealthy diet. An individual's social status influences behavioural risk factors, the development of CVD and outcomes of CVD. Other material and psychosocial factors also have an impact on CVD, operating differentially through the life course. They include limited access to social support, lack of perception of control and job stress, lower health-seeking behaviours, less access to medical care and greater comorbidity.

A balanced combination of cost-effective approaches, targeted at the whole population and particularly at high-risk segments, is required for prevention and control of CVD. Many determinants of behavioural risk factors and CVD lie outside the health domain and have a strong link to root social causes, such as poverty and illiteracy, that also impact health in general. Policy action and structural interventions are needed to address these root social causes so that the exposure and vulnerability of disadvantaged groups to CVD and inequitable CVD outcomes may be reduced. Research is needed to study the impact of interventions to reduce inequities and to understand their political feasibility.

Protecting the cardiovascular health of those in lower socioeconomic strata through population-based prevention strategies is a priority. The needs of those at high risk of CVD should be addressed, with a special focus on disadvantaged sectors. A policy continuum that takes in all sectors that have an impact on cardiovascular risk factors and their determinants, including finance, transport, education, agriculture, social security and youth affairs, is vital. The most appropriate health service entry-point identified for addressing equity issues is primary care. Other components of a public health strategy that addresses inequities in CVD include a life course approach to prevention of risk factors of CVD and their social determinants; measures to ensure equity in the utilization of limited public sector resources; recognition of the participatory role of civil society; and commitment by government to place equity and health at the centre of all government policies.

3.2 Introduction: the global CVD burden

Noncommunicable diseases (NCD) were responsible in 2005 for 35 million deaths (60% of all deaths) worldwide; 80% of these deaths occurred in low- and middle-income countries. Between 2006 and 2015, noncommunicable disease deaths are expected to increase by more than 20% in low-income countries, with the greatest increase in sub-Saharan Africa (Table 3.1) (*1*).

CVD (heart disease and stroke) is the leading noncommunicable disease, measured by global mortality and morbidity, and is projected to remain so for the foreseeable future. An estimated 17.5 million people died from CVD in 2005, representing 30% of all global deaths. Of these, 7.6 million were due to coronary heart disease (heart attacks) and 5.7 million to cerebrovascular disease (stroke). Around three quarters of these deaths occurred in low- and middle-income countries (*2*). The conventional risk factors of CVD are tobacco use, raised blood pressure, raised blood cholesterol and diabetes mellitus. Many other factors increase the risk of CVD, including low socioeconomic status, unhealthy diet, physical inactivity, obesity, age, male sex, family history of early onset of coronary heart disease and insulin resistance (*3, 4*). Other social determinants include income distribution, education and literacy, housing and living conditions, employment and employment security, social exclusion and health care services. The relationship between the various causative pathways is complex and gives rise to a number of inequities in cardiovascular health status within and between populations. Certain types of CVD, such as rheumatic heart disease and Chagas disease, are directly linked to poverty, undernutrition, overcrowding and poor housing (*5, 6*).

Although CVD usually manifests itself in middle age, it is a condition with a long incubation period. Changes in blood vessels begin in early childhood and gradually progress to manifest as heart attacks and strokes in later life (*7–9*). Socioeconomic status can influence cardiovascular health differentially along the life course (*10, 11*). In childhood, poor living conditions and the parents' social class have a strong impact on cardiovascular health status. In middle age, risk factors such as

smoking, physical inactivity, unhealthy diet, obesity, hypertension, raised cholesterol and diabetes increase the risk of CVD, which may be counteracted by material conditions that make healthy behaviours affordable and facilitate health information seeking, and education (*12–15*). In later life access to medical care, social and family support, and a sense of control over life and health have an impact on cardiovascular health (*16*). In middle-income societies where basic material needs are available, the psychosocial components of the socioeconomic status framework (a sense of control over healthy behaviour and life in general, perceived status in social hierarchy) are likely to be relatively more important for cardiovascular health than material factors (*17*).

Differences in socioeconomic status have been consistently associated with CVD incidence and mortality across multiple populations (*18–23*). CVD and its risk factors were originally more common in upper socioeconomic groups in the developed world, but CVD has gradually become more common in lower socioeconomic groups over the last 50 years (*24–26*). In a recent Swedish study, age-standardized incidence of coronary heart disease was found to be high in high-deprivation neighbourhoods (*27*). The inverse association between socioeconomic status and CVD is strongest for mortality and incidence of stroke, with low socioeconomic groups showing lower survival (*8*) and higher stroke incidence in many populations in developed countries (*26, 28–31*).

Coronary heart disease and cerebrovascular disease are among the 10 leading causes contributing to the disease burden in better-off developing countries and in developed countries, as measured by disability-adjusted life years (DALYs), which reflect a combination of number of years lost from premature deaths and fractional years lost when a person is disabled by illness or injury. Even in low-income countries coronary heart disease is among the 10 leading causes contributing to the disease burden (Table 3.2). The proportions attributable to CVD mortality and the disease burden (Table 3.3) are higher in developing than in developed countries (*32*).

3.3 Analysis: inequities and CVD

Differential (health and health care) outcomes

There are substantive equity gaps in the implementation of cost-effective interventions and provision of quality care for CVD and noncommunicable diseases in general (*33, 34*). They are particularly pronounced in low-income countries where health systems are not geared to providing chronic care and the per capita expenditure is inadequate even to cover the cost of a basic set of health care interventions (*4, 35*). In low income countries, these gaps can be addressed only if there is at least a modest increase in public spending coupled with efficient use of resources and investment in strong prevention programmes (*2, 32*). Such measures will particularly benefit the poor segments of the population, who suffer most from the consequences of the high cost of diagnostic tests and drugs and inadequate accessibility to health care in general.

TABLE 3.1 Comparison of trend of deaths from noncommunicable and infectious diseases in high-income and low- and middle-income countries, 2005 and 2006–2015

	2005		2006–2015 (cumulative)		
Geographical regions (WHO classification)	**Total deaths (millions)**	**NCD deaths (millions)**	**NCD deaths (millions)**	**Trend: Death from infectious disease**	**Trend: Death from NCD**
Africa	10.8	2.5	28	+6%	+27%
Americas	6.2	4.8	53	-8%	+17%
Eastern Mediterranean	4.3	2.2	25	-10%	+25%
Europe	9.8	8.5	88	+7%	+4%
South-East Asia	14.7	8.0	89	-16%	+21%
Western Pacific	12.4	9.7	105	+1	+20%
	58.2	35.7	388	-3%	+17%

Source: World Health Organization (*1*).

Some low-income countries meet more than two thirds of their total health spending through out-of-pocket expenditure. In low-income families, people are often unable to pay for needed care, particularly for non-communicable diseases such as CVD. They fail to seek timely treatment when it is still effective and thus risk deterioration of their health condition. For example, a hypertensive patient may postpone seeking treatment due to lack of affordability and develop a stroke or a heart attack as a result. Such an acute major illness will compel the household to pay for the patient's care using a large portion of the household income, drastically increasing the risk of impoverishment.

TABLE 3.2 Major burden of disease (leading 10 diseases and injuries) in high mortality developing countries, low mortality developing countries and developed countries

	Poorest countries in Africa, America, South-East Asia, Middle East	**Better-off countries in America, South-East Asia, Middle East, Pacific**	**Developed countries of Europe, North America, Western Pacific**
	Countries with high child and adult mortality, or high child and very high adult mortality[a]	**Countries with low child and adult mortality[a]**	**Countries with very low child or adult mortality, or low child and adult mortality, or low child and high adult mortality[a]**
	AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D[b]	**AMR-B, EMR-B, SEAR-B, WPR-B[b]**	**AMR-A, EUR-A, EUR-B, EUR-C, WPR-A[b]**
		% DALYs	
HIV/AIDS	9.0		
Lower respiratory infections	8.2	4.1	
Diarrhoeal diseases	6.3		
Childhood cluster diseases	5.5		
Low birth weight	5.0		
Malaria	4.9		
Unipolar depressive disorders	3.1	5.9	7.2
Coronary heart disease	3.0	3.2	9.4
Tuberculosis	2.9	2.4	
Road traffic injury	2.0	4.1	2.5
Cerebrovascular disease		4.7	6.0
Chronic obstructive pulmonary disease		3.8	2.6
Birth asphyxia and trauma		2.6	
Alcohol use disorders		2.3	3.5
Deafness		2.2	2.8
Dementia and other central nervous system disorders			3.0
Osteoarthritis			2.5
Trachea bronchus and lung cancers			2.4

a. World Health Organization (WHO) child and adult mortality strata range from A (lowest) to E (highest).

b. Key to WHO regions: AFR Africa, AMR Americas, SEAR South-East Asia, EUR Europe, EMR Eastern Mediterranean, WPR Western Pacific. The appended letters A–E give subregions based on mortality strata.

Source: World Health Organization (*32*).

TABLE 3.3 Economic development status and cardiovascular mortality and CVD burden, 2000

	Poorest countries in Africa, America, South-East Asia, Middle East	Better-off countries in America, South-East Asia, Europe, Middle East, Western Pacific	Developed countries of Europe, North America, Western Pacific
	Countries with high child and adult mortality, or high child and very high adult mortality[a]	Countries with low child and adult mortality, or low child and high adult mortality[a]	Countries with very low child and adult mortality, or low child and adult mortality[a]
	AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D[b]	AMR-B, EMR-B, EUR-C, SEAR-B, WPR-B[b]	AMR-A, EUR-A, EUR-B, WPR-A[b]
Mortality			
Deaths (000) (sequenced by subregion)	482, 503, 100, 757, 3226	773, 280, 2171, 571, 3350	1106, 1760, 1111, 395
% of global CVD deaths (sequenced by subregion)	2%, 3%, 0.6%, 4.6%, 19.4%	4.7%, 1.7%,13.1%, 3.4%, 20.2%	6.7, 10.6%, 6.7%, 2.3%
% of global CVD deaths (subtotal)	29.6%	43.1%	26.3%
Burden of disease in DALYs			
DALYs (000) (sequenced by subregion)	5388, 5976, 1001, 8855, 35427	7194, 2935, 16440, 6104, 28115	6950, 9201, 8495, 2391
% of global CVD DALYs (sequenced by subregion)	3.7%, 4.1%, 0.7%, 6.1%, 24.5%	4.9%, 2%, 11.4%, 4.2%, 19.4%	4.8%, 6.4%, 5.9%, 1.7%
% of global CVD DALYs (subtotal)	39.1%	41.9%	18.8%

a. World Health Organization (WHO) child and adult mortality strata range from A (lowest) to E (highest).

b. Key to WHO regions: AFR Africa, AMR Americas, SEAR South-East Asia, EUR Europe, EMR Eastern Mediterranean, WPR Western Pacific. The appended letters A–E give subregions based on mortality strata.

Source: World Health Organization (*32*).

Differential consequences

A higher case fatality of myocardial infarction has been reported in persons of low socioeconomic position (*33, 36*). People of higher socioeconomic status have been found more likely to receive treatment in larger or specialist hospitals, and have been reported to be prescribed medications for secondary prevention more often than those of low status (*35, 37, 38*). Further, there is poor access to revascularization for people of low socioeconomic status due to its expense (*34*). Differential stress among socioeconomic tiers and social isolation have also been shown to play a part in the causation and prognosis of myocardial infarction in patients after the acute stage (*39*). Sociodemographic factors and social support can have a positive impact on exercise tolerance in men attending cardiac rehabilitation (*40*).

Those of low socioeconomic position have a poorer risk factor profile at stroke onset, including greater levels of hypertension, diabetes and a trend towards higher rates of smoking compared to those of higher socioeconomic position (*41*). Stroke units seem to considerably improve patient outcomes in the long term, and the observed benefits are not restricted to any particular subgroup of patients or model of stroke unit care (*42*). However, access to stroke unit care is limited for low-income countries and for low-income groups within countries (*43*).

Comorbidity could also be a potential explanation for the higher case fatality and worse prognosis of patients in low social categories. It is probable that diseases other than coronary heart disease may accumulate among persons of low socioeconomic position and influence the case fatality and prognosis after myocardial infarction and stroke. Poorer patients are more likely to smoke or have undetected and uncontrolled hypertension or diabetes (*44*) and have a higher case fatality from myocardial infarction as a result (*45*).

Socioeconomic factors such as occupational status and income have been shown to have an effect on mortality through their impact on lifestyle-related risk factors both before and after a stroke (*46*). After stroke, those of lower socioeconomic status seem to have significantly worse long-term health outcomes in terms of disability and handicap six months after the event (*41*).

Although differences in access to inpatient rehabilitation services between different ethnic and social classes were not found in studies conducted in the Netherlands and the United States (*41, 47*), patients of lower socioeconomic status were more likely to be admitted to institutional care for long-term management. Low socioeconomic status has also been reported to be an independent predictor of five-year health-related quality of life after stroke (*29, 48*).

Complications of CVD, such as myocardial infarction and stroke, are serious illnesses that require prolonged periods of care and rehabilitation, resulting in loss of productivity and loss of income, with particular impact on economic development in developing countries (*49*). Also, those in lower socioeconomic strata are less likely to have insurance coverage and may be driven into catastrophic expenditure as a result (*50*).

Differential exposure

Part of the variation in coronary heart disease incidence across the social gradient is explained by established risk factors (*18, 51, 52*). Associations have also been reported between social support, health-seeking behaviour, job stress and incidence of coronary heart disease (*53–55*), though not all studies have supported this association (*56, 57*).

Indices showing low socioeconomic status, education, occupation and income are associated with higher mortality from coronary heart disease (*58–60*). Further, studies conducted in high-income countries have reported that certain environmental factors associated with residing in neighbourhoods with socioeconomic deprivation affect coronary heart disease mortality (*61*), including poor availability and accessibility of health services; infrastructure deprivation (lack of parks, sports centres, public spaces with smoking bans); the prevailing attitudes towards health and health-related behaviours in the community; and lack of social support (*62*).

The social gradient in stroke could be driven by variation in stroke risk factors, health-seeking behaviours or psychosocial risk factors by social status. Most studies attempting to explain the socioeconomic gradient in stroke suggest that it is largely driven by conventional stroke risk factors such as hypertension, diabetes, smoking and alcohol (*28, 31*). Any excess risk in lower socioeconomic groups that persists after adjusting for risk factors in different studies has been attributed to psychosocial factors such as work stress, low job control, lack of social support or confounding (*23, 57*).

Investigations of the cross-country relations between income inequality and CVD morbidity, mortality and risk factors are sparse. Table 3.4 shows the summary prevalence of cardiovascular risk factors in developed and developing countries, based on WHO comparative risk factor survey data (*32*). Findings are consistent with those of higher socioeconomic status in the developing world having higher mean cholesterol levels and systolic blood pressure and greater tendency to be overweight than those of lower socioeconomic status. However, if the trends seen in the developed countries are repeated these patterns will reverse with economic development.

A recent study found that in the industrialized world, countries in the middle and highest (vs lowest) tertiles of income inequality demonstrated positive associations between higher income inequality and mean body mass index, mean systolic blood pressure, obesity prevalence and coronary heart disease DALYs and mortality rates. Overall, the findings were compatible with harmful effects of income inequality at the national scale on CVD morbidity, mortality and selected risk factors, particularly obesity (*63*).

The adverse impact on cardiovascular health of both globalization and urbanization is greater for poorer countries and for the poor within countries (*64, 65*), for example through the increase in disposable income spent on tobacco products (*66*), growth of the fast food industry and increased availability of processed foods rich in salt (*66*) and urban infrastructures placing barriers to healthy behaviours such as physical activity (*67, 68*). Exposure to tobacco use and unhealthy diet is inversely related to social position (see Chapter 11). Consumption of high-salt and high-calorie food contributes to the high prevalence of intermediate risk factors such as raised blood pressure and diabetes in lower middle social classes living in urban areas in developing countries (*69*). There is increasing evidence of differential exposures of people in disadvantaged positions, for example with respect to availability of healthy food such as fruits and vegetables (*70*), quality of food (*71, 72*) and constraints to adopting healthy behaviours, such as lack of access to physical activity facilities (*67*).

Social stratification and differential vulnerability

Most existing data suggest that low childhood socioeconomic status negatively impacts levels of adult cardiovascular risk factors (*73*). Several studies have attempted to examine the effect of childhood or adolescent socioeconomic status on risk of adult CVD (*73, 74*). Pollitt, Rose and Kaufman (*74*) outline four types of life course model to describe the impact of socioeconomic status on CVD risks and outcomes: the latent effects model, which suggests that adverse life experiences during early "sensitive periods" increase the risk

TABLE 3.4 Economic development and summary prevalence of cardiovascular risk factors in WHO subregions

	Poorest countries in Africa, America, South-East Asia, Middle East	Better-off countries in America, Europe, South-East Asia, Middle East, Western Pacific	Developed countries of Europe, North America, Western Pacific
	High child and adult mortality, or high child and very high adult mortality[a]	Low child and adult mortality, or low child and high adult mortality[a]	Very low child and adult mortality, or low child and adult mortality[a]
	AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D[b]	AMR-B, EMR-B, EUR-C, SEAR-B, WPR-B[b]	AMR-A, EUR-A, EUR-B, WPR-A[b]
Overweight (body mass index)	21.3, 21.8, 26.0, 22.3, 19.9	26.0, 25.2, 26.5, 23.1, 22.9	26.9, 26.7, 26.5, 23.4
Physical inactivity (proportion with no physical activity)	12%, 11%, 23%, 18%, 17%	23%, 19%, 24%,15%, 16%	20%, 17%, 20%, 17%
Low fruit and vegetable intake: average intake per day (grams)	350, 240, 340, 360, 240	190, 350, 220, 220, 330	290, 450, 380, 410
Blood pressure (mean systolic pressure mmHg)[c]	133, 129, 128, 131, 125	128, 133, 128, 128, 124	127, 137, 138, 133
Mean cholesterol (mmol/l)[d]	4.8, 4.8, 5.1, 5.0, 5.1	5.1, 5.0, 5.8, 4.7, 4.6	5.3, 6.0, 5.1, 5.2

a. World Health Organization (WHO) child and adult mortality strata range from A (lowest) to E (highest).

b. Key to WHO regions: AFR Africa, AMR Americas, SEAR South-East Asia, EUR Europe, EMR Eastern Mediterranean, WPR Western Pacific. The appended letters A–E give subregions based on mortality strata.

c. mmHg = millimetres of mercury.

d. mmol/l = millimoles per litre.

Source: World Health Organization (*32*).

of CVD in later life, independent of other risk factors (*75*); the pathway model, which hypothesizes that early life events and circumstances place an individual onto a certain "life trajectory", eventually impacting adult health (*76*); the social mobility model, which holds that "social mobility across the life course impacts adult health" (*74, 77*); and the cumulative life course model, which hypothesizes that "psychosocial and physiological experiences and environments during early and later life accumulate to influence adult disease risk" (*74, 78*). Of these, the cumulative life course model is the most consistently supported (*79*).

Marmot has defined 10 major social determinants of health: social gradient, unemployment, stress, social support, early life, addiction, social exclusion, food, work and transport (*80*). Different studies have linked them to cardiovascular health and disease (*81*). However, more research is required to improve the understanding of how these determinants affect the pathogenesis and progression of CVD. Potential pathways that may play a role in mediating social differences in cardiovascular risk include the pathogen burden and differences in risk factor prevalence (*82–84*).

The same level of exposure may have different effects on different socioeconomic groups depending on their socioeconomic environments and life course factors or lack of early detection of risk factors. Being born to an undernourished mother of a poor family increases the chances of developing cardiovascular risk profiles in later life due to programming in utero (*85*). Children in poor families also have a higher likelihood of developing Chagas disease or rheumatic fever due to poor living conditions and undernutrition (*5, 6*).

Adult socioeconomic status (as indicated by, for example, levels of education, occupational status and income) affects CVD outcomes by association with the cardiovascular risk factors and the overall cardiovascular outcome measures. In developed countries diabetes, which is a major cardiovascular risk factor, is associated with low socioeconomic status and poverty (see Chapter 5). Other cardiovascular risk factors associated with lower socioeconomic status include smoking, raised blood pressure, dislipidaemia, central obesity and inflammatory markers (*20, 73, 86–88*). It has also been reported that low socioeconomic status exerts a stronger adverse influence on cardiovascular risk factors of women than it does on those of men (*89*).

Some ethnic groups have been found to be at higher risk of CVD. There is a high prevalence of coronary artery disease among urban and migrant Asian Indians,

who are vulnerable to type 2 diabetes mellitus, which is a powerful risk factor of coronary heart disease (*2*). Preliminary investigations indicate that psychosocial adversity contributes to increased vulnerability to coronary heart disease in male South Asians resident in the United Kingdom. Compared with white males, they live in significantly more crowded homes and experience lower job control, greater financial strain, lower neighbourhood social cohesion and more racial harassment (*90*). Greater CVD risk factor clustering is also seen among non-Hispanic blacks of low socioeconomic status than among other ethnic groups and certain ethnic minorities (*91*).

3.4 Discussion of entry-points for tackling inequities in cardiovascular health and CVD outcomes

This chapter explores the social determinants of CVD based on a hierarchical model of causation. This model is summarized in Figure 3.1 and is based on several different levels: social stratification leading to differences in exposure, leading to differences in vulnerability to CVD and its health outcomes, leading to differences in consequences for quality of life. Inequities in CVD may be addressed within the WHO Global Strategy for the Prevention and Control of Noncommunicable Diseases (see section 3.6) through interventions targeting causal pathways (section 3.5), based on the framework proposed by the Commission for Social Determinants of Health (*92, 93*). Such interventions could be targeted to: (a) decrease social stratification; (b) reduce exposure to risk factors; (c) lessen vulnerability; (d) reduce unequal consequences; and (e) reduce differential outcomes.

As alluded to in previous sections, there are different patterns of social gradient (Table 3.5), and complex links of CVD and cardiovascular risk factors to poverty, literacy, employment and other social determinants, which give a key to possible entry-points to address CVD inequities. Two complementary approaches are required: first, strategies for primary and secondary prevention must pay special attention to disadvantaged groups; and second, policy and structural interventions must also address root social causes such as poverty, illiteracy, unemployment and deprived neighbourhoods. It is only then that disadvantaged segments of the population will be able to utilize opportunities to make choices that protect and promote cardiovascular health.

Table 3.6 (next section) shows how the entry-points arising from consideration of the factors discussed in this chapter might be linked with particular intervention to address CVD inequities.

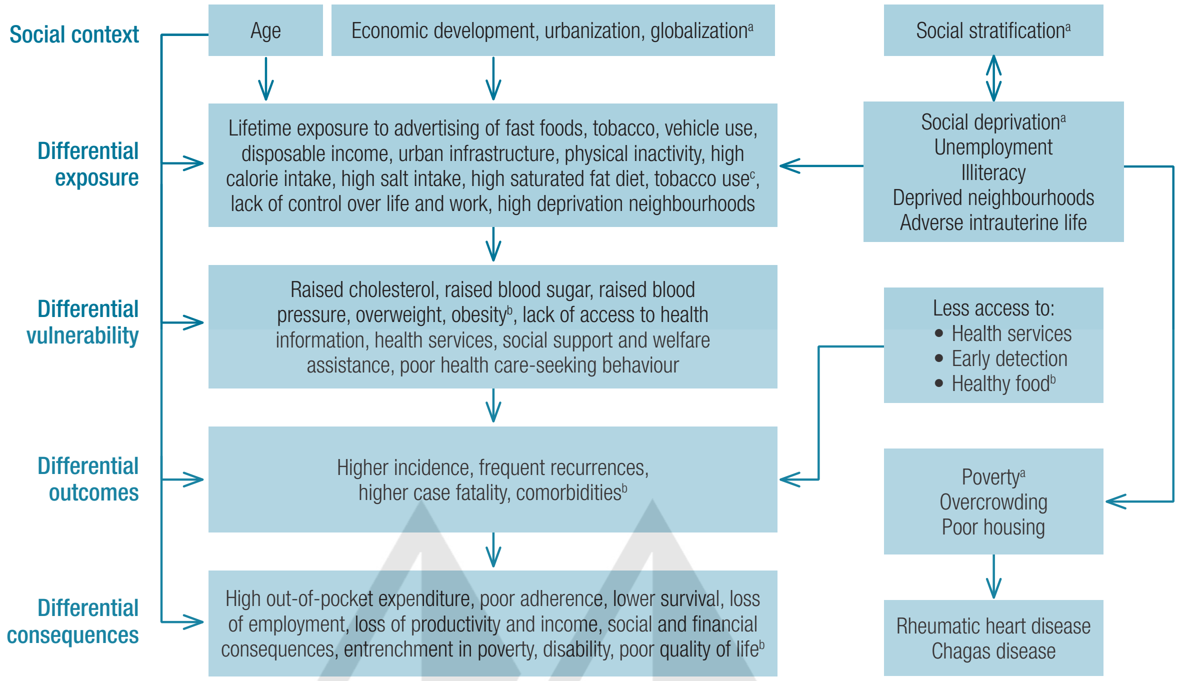
3.5 Interventions: addressing the entry-points

At present, the evidence base on interventions that have been implemented to reduce inequities in the determinants, outcomes and consequences of CVD is limited, and more research is needed to unravel the exact mechanisms through which social determinants contribute to the social gradient of CVD and what works to reduce these inequities (*100*). For example, there is evidence that individuals who live on a low income are more likely to smoke, become overweight and suffer coronary heart disease (*100, 101*), but exactly how living on a low income impacts health behaviour is still poorly understood. Similar considerations apply to such factors as employment, educational attainment and housing tenure (*22, 92*). Table 3.6 outlines a number of possible interventions to address CVD inequities (many of which also have relevance to general health) within the context of the pathways and entry-points discussed thus far in this chapter, and suggests the measurements that might be applied to guide interventions and assess outcomes.

From a public health perspective, it is important to recognize that for people to take on board messages advocating lifestyle changes (tobacco cessation, healthy diet, weight loss, physical activity) they need at least to have primary education. It is only then that they will be in an intellectual position to receive such messages, understand them and act upon them. Further, measures such as housing and poverty alleviation may also be important for addressing the social gradient of CVD because there is evidence that personal lack of control over life and environment increases risk of morbidity from coronary heart disease (*102*). Rheumatic heart disease and Chagas disease are types of CVD that are directly linked to socioeconomic status and housing (*5, 6*).

As outlined in Figure 3.1, from the moment of conception, during intrauterine life and over the course of an individual's lifetime, the cumulative risk of coronary heart disease and cerebrovascular disease develops by way of a complex interplay of genetics, in utero environment, biological risk factors and social determinants (*103, 104*). To address CVD inequities, social protection therefore needs to be extended to all people throughout their life courses. The social gradient of CVD may be attributed to multiple interacting factors, including cardiovascular risk factors, social determinants, comorbid conditions, general health status, health-seeking behaviours, use of specialized cardiac and stroke services, access to health care services and clinical practice patterns (*59, 105–107*).

FIGURE 3.1 Conceptual framework for understanding health inequities, pathways and entry-points



Determinants:

a. Government policies: influencing social capital, infrastructure, transport, agriculture, food.

b. Health policies at macro, health system and micro levels.

c. Individual, household and community factors: use of health services, dietary practices, lifestyle.

TABLE 3.5 Main patterns of social gradients associated with CVD

Main patterns	Examples
Changing direction of gradient	In the past CVD was considered to be a disease of affluent countries and the affluent in low-income countries. While CVD trends are declining in developed countries, the impact of urbanization and mechanization has resulted in rising trends of CVD in developing countries. With economic development the prevalence of cardiovascular risk factors will shift from higher socioeconomic groups in these countries to lower socioeconomic groups, as has been the case in developed countries (*94*).
Monotonous	The risk of late detection of CVD and cardiovascular risk factors and consequent worse health outcomes is higher among people from low socioeconomic groups due to poor access to health care. This gradient exists in both rich and poor countries (*95, 96*).
Bottom-end	People with coronary heart disease of a lower socioeconomic status are more likely to be smokers and more likely to be obese than others. They usually have higher levels of comorbidity and depression and lower self-efficacy expectations, and are less likely to participate in cardiac rehabilitation programmes (*97*).
Top-end	In some countries, upper-class people gain preferential access to services even within publicly-funded health care systems compared to those with lower incomes or less education (*98*).
Threshold	Some types of CVD, such as Chagas disease and rheumatic heart disease, are associated with extreme poverty due to poor housing, malnutrition and overcrowding (*5, 6*).
Clustering	In low- and middle-income countries cardiovascular risk profiles are more unhealthy in urban than in rural populations because of the cumulative effects of higher exposure to tobacco promotion, unhealthy food and fewer opportunities for physical activity due to urban infrastructure (*2, 32*).
Dichotomous	In some populations women are much less exposed to certain cardiovascular risk factors, such as tobacco, due to cultural inhibitions (*99*).

TABLE 3.6 Inequity and CVD: social determinants and pathways, entry-points for interventions, and information needs

Priority public health conditions level	Social determinants and pathways	Main entry-points	Interventions	Measurement
Socioeconomic context and position (entry-points and interventions are common to other areas of health)	Social status Education Occupation Poverty Parents' social class Ageing of populations Poor governance	Define, institutionalize, protect and enforce human rights to education, employment, living conditions and health Redistribution of power and resources in populations	Universal primary education Programmes to alleviate undernutrition in women of childbearing age and pregnant women Tax-financed public services, including education and health Multifaceted poverty reduction strategies at country level, including employment opportunities	Access to employment opportunities, poverty alleviation schemes and education Level of investment in interventions that improve health (including cardiovascular health) that lie outside the health sector
Differential exposure	Poor living conditions in childhood Community structures Control over life and work Attitudes towards health Marketing Television exposure Psychosocial and work stress Unemployment High-deprivation neighbourhoods Availability of preventive health services Health-related behaviours Residence: urban/rural	Strengthen positive and counteract negative health effects of modernization Community infrastructure development Reduce affordability of harmful products Increase availability of and accessibility to healthy food	International trade agreements that promote availability and affordability of healthy foods International agreements on marketing of food to children Use tobacco tax for promotion of health of the population Develop urban infrastructures to facilitate physical activity Government legislation and regulation, e.g. tobacco advertising and pricing Voluntary agreement with industry, e.g. trans fats and salt in processed food User-friendly food labelling to help customers to make healthy food choices	Information on policies and structural environment measures conducive to healthy behaviour, e.g. tobacco cessation, consumption of fruits and vegetables, reduce salt in processed food, regular physical activity Information on legislative and regulatory frameworks to support healthy behaviour Measurement of gaps in implementation of policies and legislative and regulatory frameworks

Continues…

Continued from previous page

Priority public health conditions level	Social determinants and pathways	Main entry-points	Interventions	Measurement
Differential vulnerability	Access to education Comorbidity Lack of social support Access to welfare assistance Health care-seeking behaviours Accessibility of health services Undernutrition Physical inactivity Access to health education Gender	Subsidize healthy items to make healthy choices easy choices Compensate for lack of opportunities Empower people	Provide healthy meals free or subsidized to schoolchildren Subsidize fruits and vegetables in worksite canteens and restaurants Facilitate a price structure of food commodities to promote health, e.g. lower price for low-fat milk Improve early case detection of individuals with diabetes and hypertension by targeting vulnerable groups, e.g. deprived neighbourhoods, slum dwellers Improve population access to health promotion by targeting vulnerable groups in health education programmes Combine poverty reduction strategies with incentives for utilization of preventive services, e.g. conditional cash transfers, vouchers Provide social insurance and fee exemptions for basic preventive and curative health interventions Education and employment opportunities for women	Access to media, e.g. print, radio and television and health education programmes broadcast through these media Affordability of fruits, vegetables and low-fat food items Population coverage of screening and early detection of high-risk groups Access to treatment and follow-up including to essential drugs, basic technologies and special interventions, e.g. bypass surgery
Differential health care outcomes	Cost of appropriate care Differential utilization by patients Prescription practices not based on evidence Poor adherence Discriminating services Poor access to essential medicines Frequent recurrences and hospitalizations Life stress and social isolation Lack of education Comorbidity	Medical procedures Provider practices: compensate for differential outcomes	Increase awareness among providers of ethical norms and patient rights Provide universal access to a package of essential CVD interventions through a primary health care approach Provide incentives within public and private health systems to increase equity in outcomes, e.g. fees and bonuses for disadvantaged groups Provide dedicated services for particular groups, e.g. smoking cessation programmes for people in deprived neighbourhoods	Access to essential medicines and basic technologies in primary health care Levels of population coverage related to essential CVD interventions Support for smoking cessation for high-risk groups among low socioeconomic segments of the population
Differential consequences	Lower survival and worse outcomes Loss of employment Social and financial consequences Lack of access to welfare assistance Heavy health expenditure Lack of safety nets	Social and physical access	Policies and environments in worksites to reduce differential consequences Increase access of services for people with specific health conditions, e.g. cardiac rehabilitation Improve referral links to social welfare and health education services	Social and economic effects of health outcomes Access to cardiac rehabilitation Policies for linking health and social welfare

Disadvantaged populations are more exposed to risk due to lack of power and knowledge. Choices that a person makes regarding smoking, physical activity or diet and outcomes of CVD are influenced by the "opportunity" that society offers to an individual (*108, 109*). Economic and social policies that decrease social stratification can offer people freedom of opportunity to utilize their capabilities and make healthy choices in relation to behavioural risk factors such as tobacco use, physical activity and diet (*22, 110*). Appropriate government legislation (*32*) can support this process, for example through action on tobacco advertising and pricing, voluntary agreements with industry to reduce trans fats and salt in processed food, and user-friendly food labelling (*32*). Environmental policies can make the infrastructure of deprived neighbourhoods conducive to regular physical activity through the establishment of cycle paths, sports centres and safe spaces for socializing.

Policy interventions are also needed to shield disadvantaged groups from differential health care outcomes due to their social position by targeting medical care delivery strategies, for example those that integrate primary and secondary prevention of heart attacks and strokes, given their common pathogenesis, risk factors, prevention and treatment approaches (*2, 43*). A primary health care focus will help to address issues of equity-related service delivery for CVD prevention and control. Further, all primary and secondary prevention activities, from smoking cessation support to exercise and diet programmes and services for detection and treatment of CVD, should be delivered within a framework of universal health care.

Social determinants also have a substantial impact on the uptake of services by poorer individuals (*111*). In addition to affordability and accessibility, these include the effect of social distance on the quality of the doctor–patient interaction; differences in health knowledge, beliefs and behaviour; and "professional control", whereby cardiologists may control the consultation process. Steps need to be taken to strengthen the capabilities of the health care workforce to address inequities. For example, provision of simple adequate information to patients and increased awareness among health workers of the importance of the participatory role of patients in care decisions, are key components of care for CVD.

Several studies have also identified that differences in the distribution of resources can lead to inequitable uptake of services. Difficulties associated with maintaining ongoing support for and close monitoring of the chronically ill, domiciliary health care services and community care provision (*112*) have been seen to vary substantially according to socioeconomic status. Resource constraints experienced by medical personnel working among disadvantaged communities, such as chronic staff shortages, lack of time to perform professional duties and lack of resources to provide necessary aids and adaptations, also promote inequities (*113*). Local policies must rectify all such fiscal and structural factors that perpetuate the disadvantages experienced by individuals of low socioeconomic status.

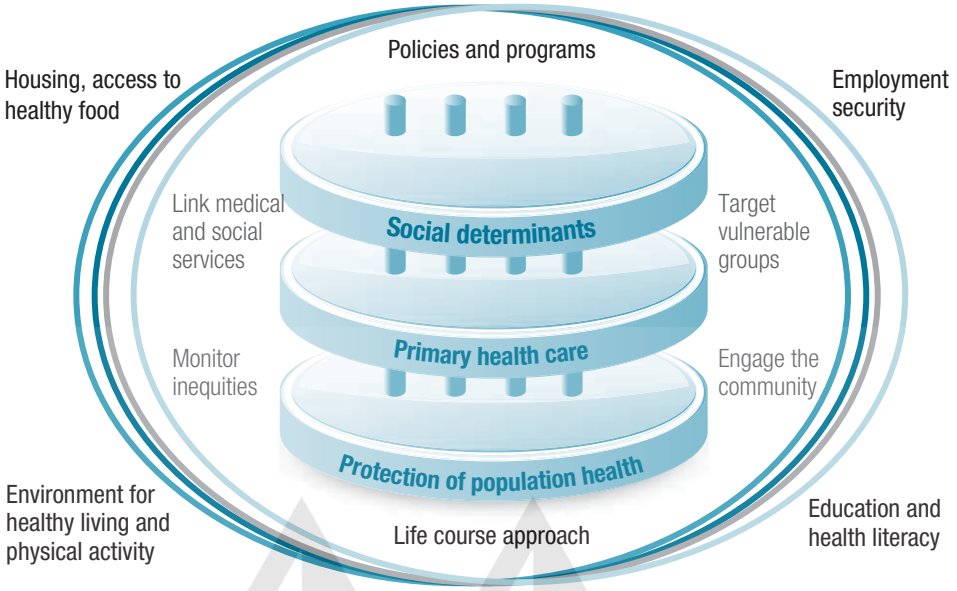
Policy measures to address gaps in both primary and secondary prevention can play an important role in preventing excess prehospital deaths from coronary heart disease among persons of low socioeconomic position (*2, 43*). Improved investments in coordinated cardiac and stroke rehabilitation services and community-based rehabilitation can also alleviate the unfavourable health situation of disadvantaged groups.

Health care policies and structural interventions are essential to reduce differential consequences and to prevent further socioeconomic degradation among disadvantaged people who develop CVD (*92*). Inequities are exacerbated by health care systems that do not provide essential noncommunicable disease services through a primary health care approach. Potential entry-points for action include provider incentives for equitable services and shifting of public resources from high-technology, high-cost interventions that benefit a few people to interventions that have a high impact and a high public health effect, for example a package of essential CVD and noncommunicable disease interventions for primary health care financed by public funds.

Lack of health care support, for example for people with hypertension and diabetes, may expose them to catastrophic health care costs due to acute cardiac events or stroke. Potential entry-points for action include coverage of the disadvantaged populations for early detection of high-risk individuals, health care financing mechanisms that reduce out-of-pocket expenditure on health and proper design of the social welfare system to compensate for loss of employment due to illness. In a universal health system in which medical services are available to all citizens regardless of income, a patient's age and the presence of pre-existing CVD and traditional vascular risk factors accounted for most disparities in mortality rates between income groups (*114*). This finding suggests that the socioeconomic gradient in cardiovascular mortality may be partially ameliorated by more rigorous management of known risk factors among less affluent people.

There are other interventions that can help to reduce inequities in CVD through a general impact on health. Most of these interventions empower people by giving them educational and economic opportunities and removing barriers to healthy choices. They include universal health insurance (*114, 115*), empowerment for

FIGURE 3.2 Prevention and control of noncommunicable diseases: public health model



self-care (*116*), adequate investment in health to provide public health services (*117*), balanced investment in preventive and curative care (*118*), regulation and governance of the private health sector (*119*), monitoring social responsibility of pharmaceutical and technology companies (*120*) and social welfare schemes for people with long-term illnesses (*121*). Coherent government action across education, finance, housing, employment, industry, urban planning and agriculture, as well as health, is important for achieving equity in cardiovascular health.

While the need for more evidence remains, action to address social inequities in cardiovascular health needs to be based on already available evidence. Such action needs to progress from a business-as-usual, medical model to application of a public health model (Figure 3.2). Changes based on this transition are likely to meet many sources of resistance. For example, addressing the determinants of exposure related to CVD will require interventions to influence availability and accessibility of certain products and will therefore encounter powerful commercial interests. Other potential sources of resistance to change include health professionals, peer groups, family, households and individuals themselves.

3.6 Implications

Programmatic implications

In order to achieve the above, social determinants approaches need to be mainstreamed across CVD and noncommunicable disease programmes. Many managerial and organizational issues need to be addressed to make this a reality. Dedicated human and financial resources need to be identified within CVD and noncommunicable disease programmes to deal with social determinants across promotion, prevention and management areas of work in an integrated fashion. The shared nature of social determinants and the interventions that address them also calls for effective collaboration mechanisms across clusters within WHO, for example those related to communicable diseases, noncommunicable diseases, environmental health and health systems. To make such collaboration operational, dedicated funds need to be identified and linked to common products with a focal point coordinating the work across clusters. Further, social determinant approaches should be explicitly identified and addressed in all treatment guidelines, policy documents, training modules and implementation research related to CVD. At the country level, policy dialogue and public discourse are essential to deal with the intersectoral collaboration and social, economic and political change processes required for prevention and control of CVD through an equity lens. Capacity strengthening efforts at country level need to impart knowledge and skills to managers and policy-makers so that they can

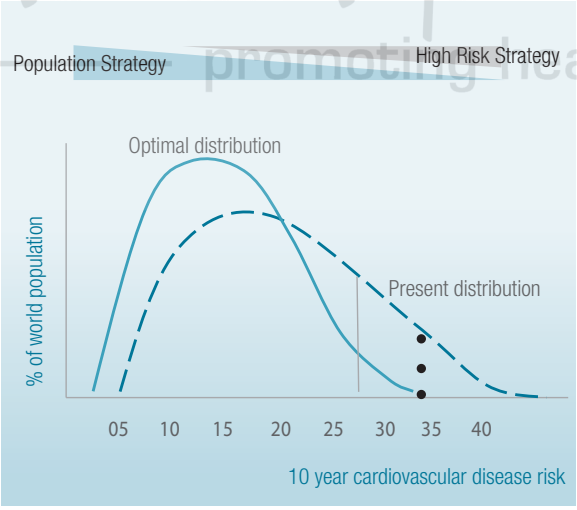
competently deal with the complex challenges related to policy dialogue and public debate for addressing the social gradient of CVD.

WHO strategy for prevention and control of CVD

A promising framework for addressing the challenges outlined in the previous paragraph is the WHO Global Strategy for the Prevention and Control of Noncommunicable Diseases, which was developed in response to the rising burden of noncommunicable diseases, including CVD. The strategy was adopted in May 2000 by the World Health Assembly at its 53rd session, and the action plan for its implementation was endorsed by the World Health Assembly at its 61st session in May 2008 (*122*). It calls for a comprehensive approach to the prevention and control of CVD through a combination of complementary and synergistic strategies, targeting both the whole population and those with disease or at high risk of developing disease (Figure 3.3) (*2, 123*).

WHO has also provided guidance and support to the efforts of countries for populationwide prevention of CVD through the Framework Convention on Tobacco Control (*124*) and the Global Strategy for Diet, Physical Activity and Health (*125*). Such strategies support efforts to combat CVD and other major noncommunicable diseases, including cancer, chronic respiratory disease and diabetes. It is essential that individual strategies targeting people at high cardiovascular risk be introduced in parallel with, and complementary to, populationwide strategies. Individual strategies might focus, for example, on reducing cardiovascular risk in people with obesity, tobacco addiction, diabetes, hypertension or high lipid levels. In those with established CVD or those who are at high risk of developing the disease, aspirin, beta-blockers, angiotensin-converting enzyme inhibitors and lipid-lowering therapies reduce the risk of future cardiovascular events by about a quarter each (*43*). The benefits of these interventions are largely independent, so that when used together with smoking cessation about three quarters of future vascular events could be prevented. Primary health care offers the best approach to deliver all cost-effective interventions equitably.

FIGURE 3.3 Complementary strategies for prevention and control of CVD



Source: Mendis (*123*).

3.7 Conclusion

Social injustice is contributing to inequities in cardiovascular health. Many of the possible interventions to address CVD inequities also have relevance to general health. Reducing inequities in cardiovascular health is an ethical imperative that can best be achieved through a public health approach. Key components of such an approach are:

- a life course approach to prevention of CVD risk factors and their social determinants, protecting cardiovascular health by supporting the health of pregnant women, early child development, universal primary education, healthy behaviours, fair employment conditions and social protection for the elderly;
- improvement of the health status of the whole population through health promotion and upstream policies that address the needs of those at high risk and with CVD through health care systems that focus on equity through a primary health care approach;
- balanced investment in prevention and curative care;
- ensuring equity and social justice in the utilization of limited public sector resources through fair financing, good governance, attention to social norms, and policies and actions that enable equitable allocation of resources to prevention and control of CVD;
- recognition of the participatory role of patients with CVD and the community in general, and their empowerment to participate in health decisions by giving them educational and economic opportunities and removing barriers to healthy choices;
- intersectoral collaboration and partnerships to address social determinants outside the health sector that drive the CVD epidemic;
- public sector leadership and commitment of government to place equity and health at the centre of all government policies across education, finance, housing, employment, industry, urban planning and agriculture;
- regulation of goods and services (tobacco, certain foods, alcohol) that have a negative impact on cardiovascular health, and monitoring the social responsibility of pharmaceutical and technology companies in the private sector.

Further research is needed to better understand the exact mechanisms through which social determinants contribute to the social gradient of CVD and what is effective in reducing inequities. While the need for more evidence remains, steps to address social inequities in cardiovascular health need to be taken based on already available evidence.

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Health and nutrition of children: equity and social determinants

4

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Contents

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1 The authors would like to acknowledge the following people for their invaluable assistance: Joanna Armstrong Schellenberg, Carmen Casanovas, Denise Coitinho, Valerie Cromwell, Don de Savigny, Darcy Galluccio, Gerry Killeen, Steve Lindsay, Jo Lines, Elizabeth Mason, Thomas Smith and Sergio Spinaci.

4.1 Summary

Children under 5 years of age are especially susceptible to the effects of socioeconomic inequities, due to their dependence on others to ensure their health status. This review relies on the framework developed by the Priority Public Health Conditions Knowledge Network of the Commission on Social Determinants of Health (see Chapter 1). The main data sources included over 100 national surveys and a systematic review of the post-1990 literature on child morbidity, mortality, nutrition and services utilization in low- and middle-income countries.

Poor children and their mothers lag systematically behind the better-off in terms of mortality, morbidity and undernutrition. Such inequities in health outcomes result from the fact that poor children, relative to those from better-off families, are more likely to be exposed to disease-causing agents; once they are exposed, they are more vulnerable due to lower resistance and low coverage with preventive interventions; and once they acquire a disease that requires medical treatment, they are less likely to have access to services, the quality of these services is likely to be lower, and life-saving treatments are less readily available. There were very few exceptions to this pattern – child obesity and inadequate breastfeeding practices were the only conditions more often reported among the rich than the poor.

Health services play a major role in the generation of inequities. This is due both to inaction – lack of proactive measures to address the health needs of the poor – and to pro-rich bias – such as geographical accessibility of services and user fees. Evaluations of the equity impact of health programmes and interventions are scarce. Nevertheless, those available show that innovative approaches can effectively promote equity through, for example, prioritizing diseases of the poor; taking the pattern of inequity into account; deploying or improving services where the poor live; employing appropriate delivery channels; removing financial barriers; and monitoring implementation, coverage and impact with an equity lens.

Tackling inequities requires the involvement of various programmes and stakeholders, both within and outside the health sector, that can help address social determinants. This review shows that there are many intervention entry-points, providing room for different sectors to contribute. Actors involved in any given approach need to realize that their efforts constitute only part of the solution, and they must support the work of those promoting complementary approaches. Finally, there is a need for a general oversight function to ensure that all relevant issues are considered.

In light of the mandate of the World Health Organization (WHO), this review was purposefully biased towards health sector interventions. Policy-makers, planners and health workers should be aware that the way in which they plan and implement preventive and curative interventions often contributes to further increasing inequities. Mainstreaming equity considerations in the health sector is essential for ensuring that those involved become part of the solution, rather than part of the problem.

4.2 Introduction

Background to inequities in child health and nutrition

Equity in health implies that ideally all individuals should attain their full health potential. Socioeconomic inequities include differences that are "systematic, socially produced (and therefore modifiable) and unfair" (*1, 2*). "Health inequities result from unequal distribution of power, prestige and resources among groups in society" (*3*). Because the physical and mental development of young children is still under way and they depend on others to ensure their health, they are particularly susceptible to socioeconomic inequities that lead to marked differentials in morbidity and mortality.

Most deaths of children under 5 years of age in the world are caused by a few conditions, namely neonatal causes, pneumonia, diarrhoea, malaria, measles and HIV/AIDS (*4*), with malnutrition being an underlying cause in about a third of these deaths (*5*). Child deaths are usually the result of the joint action of several risk factors (*4*), a fact that has to be taken into consideration when understanding their determination and planning their prevention.

The deaths of children are not evenly distributed, but occur mainly in poor countries; 90% of these deaths take place in only 42 countries (*4*). Between-country differentials in child undernutrition are also unacceptably large (*6*). Although under-5 mortality rates have declined recently in most low- and middle-income countries, equity analyses have shown that the mortality gap between rich and poor countries, and between rich and poor children within most countries, is widening, as reductions tend to be greater among the better-off (*7–9*).

Addressing socioeconomic inequities in child health and nutrition will be essential for achieving the first (poverty and hunger), fourth (child survival) and sixth (malaria, HIV and other diseases) Millennium Development Goals. A mathematical simulation showed that

it is possible – albeit undesirable – to achieve those goals without improving the stake of the children belonging to the poorest 20% of all families through rapid progress restricted to the better-off (*10*). This is not an implausible scenario, given that wealthy families are more likely to adopt preventive and therapeutic innovations (*11*). Such an approach, however, would be unfair and lead to greater inequity. It is possible to both achieve the goals and improve equity concomitantly (*12*).

Whereas current rates of progress in most low- and middle-income countries are insufficient for reaching the Millennium Development Goals (*13*), countries can get on track "if they can combine good policies with expanded funding for programs that address both the direct and the underlying determinants of the health-related goals" (*14*), that is, effective programmes that take equity considerations into account.

Socioeconomic factors are not the only type of inequities that are relevant to child health. Gender inequities are important in specific societies (*8*) and urban/rural inequities are also relevant, particularly as these affect the availability of health care (*15*). In addition, the magnitude of socioeconomic inequities is often different between urban and rural areas (*15*). Although this review will concentrate on socioeconomic inequities, other disparities will be discussed when relevant.

Methods

To properly understand socioeconomic inequities and to design interventions to reduce them, a conceptual model is required. In the early 1980s, Mosley and Chen (*16*) proposed that the determinants of child health and survival should be divided into proximate factors, which are directly responsible for the health problems, and underlying factors, which affect the child indirectly through their effect on the proximate causes. In this latter group are the socioeconomic variables, usually evaluated through family income, parental education and family assets, and access to health services. More recently, the factors contributing to inequities in the health and nutrition of children in low- and middle-income countries were reviewed by Victora et al. (*8*) and by Wagstaff et al. (*9*).

The priority public health conditions analytical framework (Chapter 1) builds upon these previous models by systematizing the role of social determinants of health into five major hierarchical categories, which are applied to child health and nutrition in Table 4.1, along with their availability in Demographic Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). Like all models, this framework is a simplified version of reality. For example, low birth weight and undernutrition, outcomes at the fourth level (differential health care outcomes), can also be determinants of vulnerability (third level) because of the long-recognized interaction between nutritional status and disease severity (*5, 17*). This model, however, is extremely useful for a systematic discussion of inequities in child health and nutrition. This review provides such a systematic analysis and focuses on:

- socioeconomic inequities (rather than gender, ethnic group, urban/rural or other inequities);
- within-country inequities in low- and middle-income countries (rather than between-country inequities);
- major causes of mortality and morbidity, including malaria, in children under 5 years of age;
- nutritional status in under-5 children;
- evidence-based interventions impacting on nutritional status and mortality of children under the age of 5;
- data since 1990 (except for classical references).

Table 4.2 describes the priority public health conditions analytical framework with links to potential structural interventions, entry-points and barriers.

This review relies primarily on the description of socioeconomic inequities. Wealth quintiles based on household assets have been used as a stratification variable to understand differentials between population subgroups. No attempt has been made to disentangle the roles of distal social determinants such as income, parental education, power structures or social capital. Asset quintiles were used because they are available in a comparable format for almost 100 countries, providing data on tens of health indicators, and they relate directly to the first level of the priority public health conditions analytical framework, namely socioeconomic context and position.

The review starts with a description of differentials in terms of socioeconomic context and position, differential exposure and vulnerability, and access to health services and coverage of health interventions. It then addresses differentials in child morbidity and nutritional status, and finally differentials in survival and the long-term consequences of inequities, in terms of human capital (section 4.3). Entry-points for interventions against unfavourable social determinants of health, in particular wealth inequities, are then described, and actual evaluations of existing programmes are reviewed (section 4.4). Implementation issues are discussed in section 4.5, and finally monitoring and evaluation approaches with an equity lens are described in section 4.6.

The study of social determinants of child health and nutrition requires information on household economic status. Because income and expenditure data are difficult and time consuming to obtain and are often unreliable,

TABLE 4.1 Framework for the analysis of inequities in child health and nutrition: indicators and their availability in DHS, MICS or from the published literature

Category (level)	Relevant factors for child health/nutrition	Indicators	DHS	MICS	Literature review
Socioeconomic context and position	Family income, assets	Asset index	X	X	X
	Parental education	Education among women	X	X	X
		Education among men	X		X
Differential exposure	Water, sanitation, handwashing	Water supply		X	X
		Sanitation	X	X	X
		Handwashing facility in household	X		X
		Sanitary disposal of children's stools			X
	Crowding, housing, air pollution	Solid fuel for cooking		X	X
		Crowding	X		X
	Disease vectors	Exposure to disease vectors			X
Differential vulnerability	*Factors affecting incidence*:	Timely initiation of breastfeeding			X
	Infant and young child feeding	Exclusive breastfeeding	X	X	X
	Immunization[a]	Bottle-feeding	X	X	X
		Timely complementary feeding	X		X
	Antenatal and delivery care	Antenatal care	X	X	X
	HIV prevention	Skilled delivery care	X	X	X
		Postnatal visit			
	Insecticide-treated mosquito nets	Use of bed net, insecticide-treated mosquito net	X	X	X
	Factors affecting severity:	Vitamin A intake	X	X	X
	Poor nutrition (breastfeeding, complementary feeding, micronutrients – vitamin A, zinc, iron, iodine)	Zinc supplementation		X	X
		Iron supplementation			X
		Use of iodized salt			X
	Case management (access to first-level and referral care) of diarrhoea, pneumonia, sepsis, malaria (including intermittent preventive treatment), measles, HIV, severe malnutrition, neonatal morbidity	Care-seeking for acute respiratory infection	X	X	X
		Antibiotics for pneumonia	X	X	X
		Care-seeking for diarrhoea	X	X	X
		Oral rehydration therapy to treat diarrhoea	X	X	X
		Care-seeking for fever			X
		Antimalarial treatment			X
		Quality of care			X
		Referral care			X
Differential health and nutrition outcomes	Morbidity	Diarrhoea prevalence	X	X	X
		Acute respiratory infection prevalence	X	X	X
		Fever prevalence	X	X	X
	Undernutrition: stunting, wasting, underweight	Anaemia	X		X
		Low birth weight	X	#	X
		Stunting	X	X	X
		Underweight	X	X	X
		Wasting		X	X
	Overweight, obesity	Overweight, obesity		X	X

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Category (level)	Relevant factors for child health/nutrition	Indicators	DHS	MICS	Literature review
Differential consequences	Mortality	Neonatal mortality	X		X
		Infant mortality	X	X	X
		Under-5 mortality	X	X	X
		Cause-specific mortality			X
	Disability	Prevalence of disability			X
	Human capital (height, reproductive performance, schooling, income)	Human capital			X
	Economic consequences to the family	Economic losses			X

Data available but quality of the information is questionable.

a. Not covered in this review

an alternative is to use information on household possessions and the characteristics of a family's house (*18*). Such information, which is available in data from DHS and MICS (*19, 20*), can be combined into a single index of wealth through principal component analysis. The index can then be used to construct asset quintiles, and the ratios of lowest and highest quintiles are reported as low:high ratios.

Asset indices present some limitations. First, different choices of assets used in the index can result in changes in the classification of families (*18*). Second, those in the wealthiest quintile in some countries tend to reside in urban areas, particularly in the capital city (*21*), so that wealth inequities are closely associated with urban/rural disparities. A third limitation is that the poorest quintile in a middle-income country, for example, may be better off than one of the wealthier quintiles in a low-income country, so that only relative differences are being studied. Other limitations include the fact that asset quintiles do not fully address inequities conferred by age, gender, ethnic group or position within the household family structure (*22*). These limitations, however, do not preclude the use of asset indices for documenting the wide gaps between rich and poor that are present in most low- and middle-income countries.

The World Bank's PovertyNet initiative (*23*) has collaborated with DHS to produce tables of a variety of indicators of child health and nutrition for 56 countries, broken down by asset quintiles (*21*). Additional data were obtained from MICS. All 59 country reports or standard tables from the second (circa 2000) and third (circa 2005) rounds of MICS available by April 2007 were reviewed. DHS and MICS results by country and region are presented in Webannex1 (*24*). DHS and MICS datasets usually include thousands of children, and the consistent equity gradients observed in most countries leave little doubt that the associations are not due to chance.

In addition to the analyses of national surveys, a systematic review of the literature was performed in PubMed, covering the period 1990–present, using several keyword combinations of "socioeconomic factors" or synonyms with terms related to child morbidity, mortality, nutrition, services utilization and coverage. The search was restricted to articles from low- and middle-income countries or global analyses.

This led to the identification of over 10 000 articles, and after revising the titles and summaries 244 articles were found to be potentially relevant to the review. These were obtained in full and read. Additional references were identified by examining articles cited by these papers. This search located only five programmes or strategies for improving child health and nutrition for which an effect on equity was reported; these are described in section 4.4 below. The literature search was essential for completing the conceptual framework, presented in Table 4.2 and Webannex2 (*25*), upon which the rest of this chapter is based.

TABLE 4.2 Structural interventions, entry-points and barriers relevant to child health and nutrition

Determinants/pathways	Potential interventions	Entry-points	Potential barriers
Socioeconomic context and position *Lack of protective legislation for mothers and children* *Economic inequity* *Inequities in education* *Gender inequity*	Laws that regulate availability and advertisement of breast-milk substitutes, baby bottles, etc. Legislation for food fortification with micronutrients Laws that regulate maternity and paternity leave Regulation of health services, e.g. universal care Promote human rights, etc. Equal rights/preferential treatment, e.g. for ethnic minorities, girls Universal women's education Voluntary industry codes of conduct, e.g. for breast-milk substitutes Redistribute resources, e.g. through tax, minimum wages, welfare systems or direct cash transfers Redistribute power, e.g. through land reforms, title deeds Microcredit for women	National legislative bodies and political lobbies Country offices of international organizations Food industry High-level decision-makers in the ministries of health, finance, education, food/agriculture and others Civil society: community groups, women's groups, faith-based organizations, consumer protection groups and other nongovernmental organizations or public–private partnerships Political parties Legal system Professional organizations	Resistance from the food industry to changing marketing practices or food fortification Resistance from employers regarding maternity and paternity leave Resistance from the private medical sector and medical professional bodies to health care reform Resistance from the ruling classes regarding legislation on human rights, redistribution of wealth or land reform Resistance from politicians and political lobbies regarding empowerment of the poor Perceived cost implications of changing legislation to protect health
Differential exposure *Social and physical environment* *Unemployment* *Poor housing, water supply and sanitation* *Exposure to advertising and marketing of unhealthy products and practices* *High cost of essential commodities (water, soap, antibiotics, antimalarials, insecticide-treated mosquito nets, etc.)* *Lack of incentives for appropriate behaviours*	Elimination of malaria vectors Avail/subsidize means, e.g. for indoor pollution control Provision of sanitation and clean water Improved housing to prevent crowding Targeted availability of tools and means, e.g. antimalarials, oral rehydration treatment, antibiotics for sepsis/pneumonia Standards for advertising of specific products, e.g. infant foods Reversal of the burden of proof, e.g. with respect to foods marketed for children	National, provincial and local governments, including departments of health, water/sanitation, housing, environment, finance, food/agriculture and others Civil society: community groups, women's groups, faith-based organizations, consumer protection groups, social marketing initiatives and other nongovernmental organizations or public–private partnerships Political parties Legal system Industry: medicines, infant foods, hygiene products, chemicals, textiles	Costs of providing housing, water and sanitation services Resistance from industry regarding regulation and changes in pricing or production practices Resistance from the population regarding changes in established behaviours

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Determinants/pathways	Potential interventions	Entry-points	Potential barriers
Differential vulnerability *Population group* *Poverty* *Inability to pay user fees* *Illiteracy* *Low status of women* *Lack of access (geographical, economic, cultural) to adequate health care by poor families* *Mismatch between burden of disease and available health services* *Lack of knowledge about adequate hygiene and feeding practices* *Limited access to safe contraception* *Low coverage with effective interventions* *Poor health care-seeking behaviours* *Lack of knowledge about key family and community practices*	Budgeting health services and interventions according to burden of disease Threshold coverage of e.g. insecticide-treated mosquito nets, micronutrients and immunizations Social marketing for soap, insecticide-treated mosquito nets Dedicated maternal and child health services near to where disadvantaged population groups reside, e.g. outreach facilities, community health workers, nongovernmental organizations Provision of referral care facilities Availability of contraception Work with community and religious leaders etc. to change health-damaging norms and practices, particularly in vulnerable population groups Infant and young child feeding education and promotion Promotion of early child development Improving care-seeking behaviours Counter-advertising Role modelling, portraying of conducive norms, e.g. on television Hygiene education Empowerment of e.g. women in families or communities to make better health choices, such as improved diets Targeted social and health services based on need Interventions that combine economic and behavioural interventions, e.g. cash transfers conditional on utilization of maternal and child health services Improved transportation systems for ensuring access to maternal and child health services	National, provincial and local health authorities Nongovernmental and private sector involved in providing health services Civil society: community groups, women's groups, faith-based organizations, consumer protection groups and other nongovernmental organizations or public–private partnerships Mass media and advertising firms Schools and educators Transportation authorities Social services administrators	Resistance of health workers at different levels to new priorities and work practices Cost implications of providing new services and inputs Resistance of professional organizations Resistance of industry and commerce to a perceived reduction in profits due to lower costs of commodities or free provision of inputs Resistance of ministries and departments of finance, and budgetary constraints relative to cash transfers and similar interventions Cultural resistance of the population to educational interventions, empowerment of women, and other behavioural interventions

4.3 Analysis: socioeconomic differentials in child survival and nutritional status

This section reviews differentials across socioeconomic strata in determinants of child survival and associated major risk factors.[2] The results are presented according to the framework outlined in Table 4.1 (*22*). The review starts with differentials in socioeconomic context and position, continues with factors that lead to differential exposure and differential vulnerability, and moves downstream to the effects on morbidity and poor nutrition in childhood, and finally to the consequences for mortality and human capital. The focus is on nationally representative results, but findings from other studies identified in the literature review are included in topics for which national studies provide inadequate information. Table 4.1 shows which of the relevant indicators are available from DHS and MICS, or from the literature.

Socioeconomic context and position

Global-level determinants of health inequities related to the globalization process were addressed in a separate report of the Commission on Social Determinants of Health (*26*). Key distal determinants of inequities in child health at country level, including economic, educational and gender inequities, and lack of protective legislation for mothers and children, are listed in Table 4.2 and Webannex2 (*25*).

In this review, asset indices were used to stratify families with young children according to their relative wealth in each country and to document inequities at different levels of determination. There is a close association between wealth and parental education. For all regions, the percentage of women with five years or more of education was close to 80% for the wealthiest compared to about 30% for the poorest quintile; for men, the corresponding figures were about 85% and 45% (*24*). Consistent patterns were observed within each region.

No attempt was made to disentangle the effects of education from those of wealth (*27*). Nevertheless, several studies show that maternal education is strongly associated with child health (*28, 29*). Improvements in parental education account for part of the progress in child survival in past decades (*30*). Maternal education may impact child survival through several pathways, including ability of the mother to contribute to the family's income, to reinforce her authority and make decisions in the family, to make better use of existing services and to provide better childcare.

Differential exposure

Environmental conditions are important determinants of child health. Poor water, sanitation and hygiene conditions are associated with increased incidence of waterborne diseases, particularly diarrhoea; crowding is associated with increased incidence of pneumonia, measles and other airborne infections; indoor pollution increases the risk of respiratory conditions; and vector density affects many diseases, particularly malaria (*31*).

There is a clear association between the wealth of a country and the availability of water and sanitation to its population (*32, 33*). The literature also shows direct associations between adequate water and sanitation and socioeconomic indicators such as maternal education (*34*) and family income (*35*). Several MICS provide supporting data.

Two behavioural practices – handwashing and sanitary disposal of infant faeces – affect exposure to pathogens. Sixteen DHS provide information on handwashing prior to food preparation. In 12 countries, nine or more out of ten informants reported that they washed their hands, in all asset quintiles. This raises the possibility of reporting bias (*36*). Twenty-five DHS provided information on sanitary disposal of children's stools. All but one survey show that these practices tend to be more frequent among the rich than the poor.

The use of solid fuels for cooking increases the risk of pneumonia in children (*37*). Information from five countries shows that poor households are consistently more likely to use solid fuels for cooking than wealthy households. Analyses of 11 WHO low- and middle-income subregions confirm this association (*33*).

Crowding within households is well known to increase the risk of infectious diseases (*38*). Crowding at community level is also important, as demonstrated by increased infectious morbidity in slums (*39*). As DHS and MICS have no specific information on crowding, this analysis uses a close proxy to crowding – the total fertility rate. DHS shows that the total fertility rate is twice as high in the poorest quintile as in the wealthiest one. A Brazilian study shows that the number of persons per bedroom also presents important socioeconomic gradients (*35*).

Disease vector concentration is another environmental factor that seems to be higher in poor than in wealthy households. Several studies in Africa and Asia report significantly higher densities of *Anopheles* mosquitoes

2 The full version of the original review on which this chapter is based, with 51 data tables supporting the findings of the review, is available in Webannex1 (*24*).

in the more loosely constructed types of houses that poorer families tend to live in (*40–45*). House location is also a risk factor: mosquito densities have been found to be higher in houses near to breeding sites (*46*) and in those around the periphery of villages, where the poorest families tend to live (*47*).

Summing up, children from poor households are at consistently higher risk of being exposed to inadequate water and sanitation, crowding and indoor pollution than are children from wealthy families. Their caregivers are also less likely to adopt behaviours associated with reduced risk of exposure to infectious agents, such as handwashing or safe disposal of stools. There is also evidence on higher exposure of poor children to *Anopheles* mosquitoes.

Differential vulnerability

According to the Priority Public Health Conditions Knowledge Network model, the concept of vulnerability is based on the premise that "the same level of exposure may have different effects on different socioeconomic groups, depending on their social, cultural and economic environments and cumulative life-course factors". Two levels of exposure are distinguished in this review: factors affecting disease incidence and factors affecting disease severity.

Vulnerability: factors affecting disease incidence

Poverty affects how vulnerable children are to diseases. This subsection focuses on factors associated with disease incidence, such as behaviours (breastfeeding), home practices (use of insecticide-treated mosquito nets) and utilization of health services (antenatal, delivery and postnatal care), and then discusses variables associated with severity. Data on disease incidence are presented in the differential health and nutrition outcomes subsection.

Immunization coverage is a major factor affecting the incidence of selected diseases. Although this topic is not covered in the present review, clear socioeconomic differentials have been described elsewhere for most countries (*21*).

Exclusive breastfeeding reduces both the incidence and severity of infectious diseases, such as diarrhoea. With the exception of sub-Saharan Africa, where the frequency of exclusive breastfeeding does not show an association with wealth, in all other regions this practice is more common among the poor than among the better-off (Figure 4.1). On the other hand, children from wealthy families, in all regions, are much more likely to be bottle-fed than those from poor families.

Regarding timely complementary feeding (breastfeeding plus complementary foods among children aged 6–8 months) the picture is not consistent. In countries where breastfeeding at age 6–8 months is nearly universal, timely complementary feeding tends to be more prevalent among the rich. In regions where breastfeeding duration is short, children from wealthy families are taken off the breast earlier and do not comply with the timely complementary feeding recommendations.

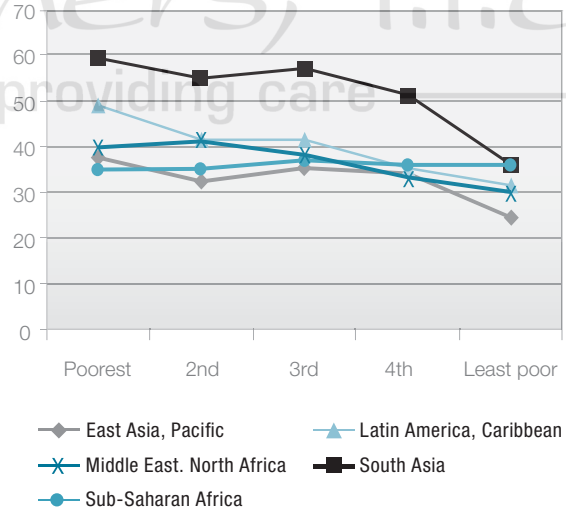
These analyses confirm earlier observations that breastfeeding is the only beneficial practice that is generally more prevalent among the poor than the rich (*48*). The exception to this pattern is seen in sub-Saharan Africa, where there are no clear socioeconomic differentials.

Early initiation of breastfeeding is an important behaviour for neonatal health (*49*). The standard equity analyses of DHS do not include this variable, but tabulations by maternal education are available for Benin, where the highly educated are more likely to practise early initiation (*50*), and in Brazil, where the opposite trend is observed (*51*).

While appropriate breastfeeding practices tend to be more frequent among the poor than the rich, promotion of exclusive breastfeeding can still contribute to reducing mortality inequalities, because fewer than half of the poorest children in low- and middle-income countries are exclusively breastfed.

Antenatal care and delivery by a skilled attendant are essential for preventing a large number of neonatal and

FIGURE 4.1 Prevalence of exclusive breastfeeding in children 0–3 months, by wealth quintile and region of the world



Source: Data from Gwatkin et al. (*21*).

child conditions (*52*). A great amount of information is available on inequities in these two indicators. DHS and MICS consistently show very clear gradients in all regions of the world (Figure 4.2 shows these gradients for skilled delivery care). Antenatal and delivery care show "top inequity" (*53*) in Africa, where access in the top wealth quintile is considerably greater than for the rest of the population, whereas in regions with high overall coverage, such as Europe, East Asia and Latin America, a "bottom inequity" pattern is observed, where the poorest are considerably worse off.

Gwatkin, Bhuiya and Victora analysed inequities in antenatal and delivery care in the private and public sector, showing that these are considerable greater among women relying on private services (*12*). Access to emergency obstetric and neonatal care can represent the difference between life and death for mothers and neonates. Using DHS data, Ronsmans, Holtz and Stanton (*54*) found that in 38 out of 42 countries, women belonging to the poorest socioeconomic quintile had caesarean sections rates below 5%, which is regarded as the minimum required for saving maternal and neonatal lives (*55*).

Several studies from Brazil show that although coverage with one or more visits for antenatal care is high, poor mothers are likely to have fewer visits and to start visits at advanced gestational ages (*56, 57*). The quality of care provided to poor women tends to be worse than that received by the rich (*58, 59*). Prevention of mother-to-child transmission of HIV through antenatal care is an important aspect in reducing overall under-5 mortality in high HIV prevalence areas. A postnatal visit around the third day after delivery is essential for the health of mothers and neonates. In Ghana (*60*) and Bangladesh (*61*), socioeconomic inequities were observed for both variables.

Insecticide-treated mosquito nets are the main preventive measure against malaria. DHS results from 18 countries show that overall net use by children (not necessarily insecticide-treated) is more common among the rich than the poor in 13 countries. Information on whether the child slept under a treated net, available from 21 MICS, shows that equity gaps seem to be bigger for treated nets than for any bednet use.

The information above focuses on socioeconomic differences, whereas geographical differences in behaviours, home practices and utilization also affect disease incidence, with certain behaviours usually resulting in higher risk for rural children (*15, 62*). Differential strategies for urban and rural areas may be required.

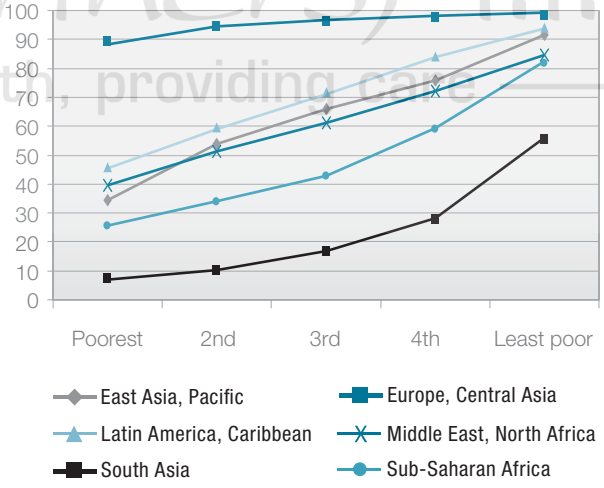
Vulnerability: factors affecting disease severity

Once a child acquires an infectious illness, the severity of the episode is largely determined by the child's general nutritional status and specific nutrient deficiencies, as well as by the coverage of effective curative interventions. Undernutrition is both a contributing cause and a consequence of morbidity. Breastfeeding helps reduce the severity of infectious diseases by providing active and passive immunity and antimicrobial substances.

Zinc and vitamin A play important roles in reducing the severity of infectious diseases (*5*). In non-malarious areas, iron is also a key micronutrient; however, recent research has shown that where malaria is prevalent iron supplementation can increase severe morbidity (*63*). Data on anaemia prevalence are discussed in the subsection on malnutrition (below).

Animal-based foods are excellent sources of dietary zinc and iron. Low intake of these foods is part of the causal pathway leading from poverty to undernutrition. An analysis of 12 DHS showed that children from poor families were consistently less likely to eat meat, poultry, fish or eggs (*5*). Low vitamin A intake due to poor diets is another determinant of undernutrition, and many countries have adopted vitamin A supplementation programmes to correct this deficiency. With a few exceptions in 50 different surveys, vitamin A coverage was higher among the rich than the poor (*24*).

FIGURE 4.2 Skilled delivery care, by wealth quintile and region of the world



Source: Data from Gwatkin et al. (*21*).

Iodine deficiency is considered an area where interventions are highly needed, as it is the most preventable cause of mental retardation in children (*64*). Most countries have salt fortification programmes. In 20 of the 25 countries with available MICS data, iodized salt use was directly related to wealth. Information is also available from DHS showing equity gaps in nearly all countries studied, the exceptions being three Latin American countries (Bolivia, Guatemala and Haiti).

In the above analyses, each intervention was considered separately. How many of these essential interventions each child receives may also be assessed – in other words, the co-coverage of interventions (*53*). An analysis of DHS datasets showed that the nine interventions studied – including three vaccines (BCG, DPT and measles)[3], tetanus toxoid for the mother, vitamin A supplementation, antenatal care, skilled delivery and safe water – were clustered on wealthy children, who often received most available interventions, whereas many poor children received few or none.

The analysis of co-coverage also showed variability in the patterns of inequity (Figure 4.3). Whereas in countries with high coverage, such as Brazil and Nicaragua, the poorest quintile lagged significantly behind the other four, in low-coverage countries, such as Cambodia and Haiti, the richest quintile tended to be substantially ahead of the rest. These patterns were described as "bottom inequity" and "top inequity" (*53*), or alternatively as "marginal exclusion" or "massive deprivation" (*65*). These patterns are relevant to the choice of strategies for reducing inequities that are discussed in section 4.4.

Curative interventions will now be considered. In order to have access to curative care, families should be able to recognize signs and symptoms requiring professional care, and have geographical and economic access to health care. A survey in rural areas of the United Republic of Tanzania (*66*) showed that mothers from the top quintile were more likely to know about danger signs, to live near a health facility and to attend such a facility when ill.

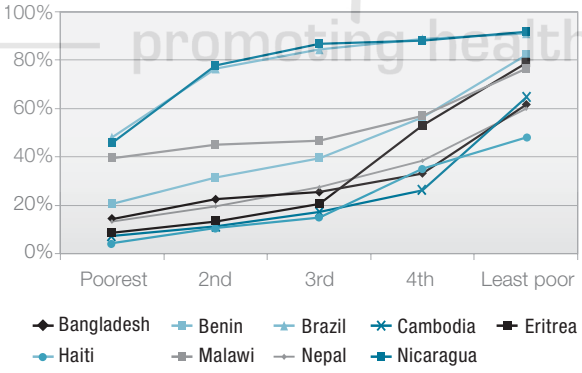
Data on oral rehydration therapy during diarrhoea are available for several DHS and MICS. DHS results (Figure 4.4) are consistent for all regions of the world, with higher use among the better-off, a pattern that is also evident in 17 of the 26 MICS. DHS data also show that care seeking for diarrhoea from a health facility was clearly higher for children from wealthier families.

Care seeking from a qualified provider during acute respiratory infections was studied in DHS and again clear socioeconomic gradients were observed. This was confirmed in 20 of the 26 MICS. The latter also provide information on coverage with antibiotic treatment for probable pneumonia for four countries, three of which showed direct associations with wealth.

As regards treatment of fever with antimalarials in children under 5, in 17 of the 20 countries studied, antimalarial treatment coverage increased with wealth. Care-seeking for fever from a health provider was markedly greater among the better-off.

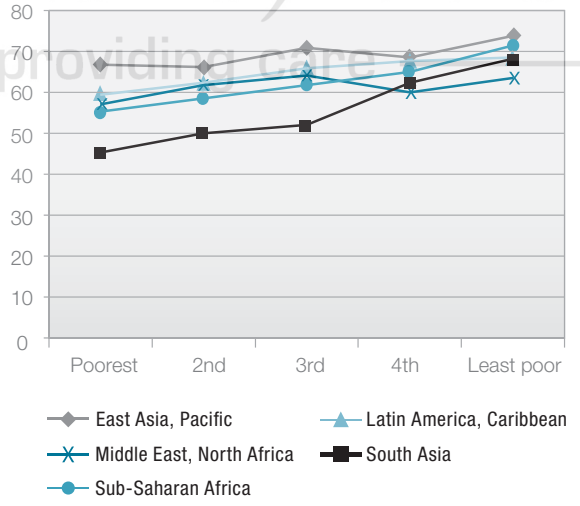
The DHS and MICS tabulations do not discriminate between types of provider. A survey in Bangladesh showed that children from wealthy families

FIGURE 4.3 Percentage of under-5 children receiving six or more child survival interventions, by wealth quintile and country



Source: Victora et al. (*53*).

FIGURE 4.4 Oral rehydration therapy during diarrhoea, by wealth quintile and region of the world



Source: Data from Gwatkin et al. (*21*).

3 BCG = bacille Calmette–Guérin vaccine; DPT = diphtheria–pertussis–tetanus vaccine.

are substantially more likely to be brought to a medical doctor, while poorer children were often taken to unqualified practitioners (*67*).

Compliance with the advice provided by health workers is also essential. In Sudan, compliance with referral was greater among more educated mothers (*68*), but in rural areas of the United Republic of Tanzania reported compliance with advice on follow-up visits, referral or treatment was similar in all socioeconomic groups (*66*).

This subsection has documented important socioeconomic differentials in vulnerability to severe illness. Poverty is associated with lower dietary quality and lower coverage with vitamin A supplementation. Once a child is ill, care-seeking and treatment practices tend to be worse among children from poor families. Less evidence is available on the quality of care received by poor and wealthy children within a facility, but isolated studies suggest that the better-off are more likely to be taken to qualified providers.

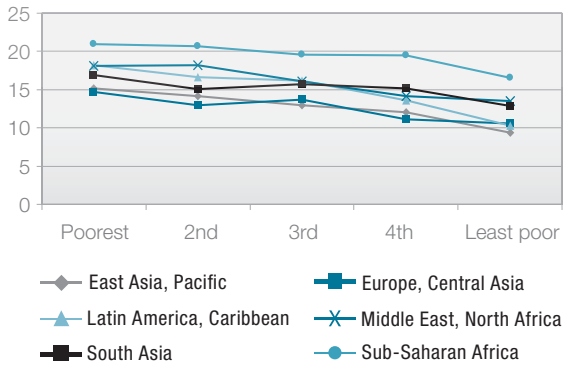
Differential health and nutrition outcomes

This subsection provides evidence on socioeconomic differentials in terms of health outcomes other than mortality, which is discussed in the next subsection.

Morbidity

Both DHS and MICS provide information on the prevalence of diarrhoea, acute respiratory infections and fever in the two weeks preceding the survey. In the great majority of DHS and MICS, caregivers of poor children reported that diarrhoea prevalence was 30% or more above the rate in the top quintile (Figure 4.5). Also, 20 of 26 MICS countries reported that cough – a proxy for acute respiratory illness – was more frequent among the poor than among the better-off. DHS results confirm the MICS findings in all regions except Europe and central Asia. Fever prevalence was higher for poor than for rich children in most countries, although differences were often small. A review of the literature on malaria incidence – mostly based on reported fever – and poverty showed mixed results (*69*), while several large-scale cross-sectional surveys have higher frequencies of malaria infection among the poor in Asia and Africa (*70–73*).

FIGURE 4.5 Prevalence of diarrhoea, by wealth quintile and region of the world



Source: Data from Gwatkin et al. (*21*).

In short, reported morbidity tended to be more common among the poor, but the magnitude of the differences was often small, with a 20–40% excess risk relative to the better-off.

Malnutrition

The term malnutrition covers undernutrition – expressed either as anthropometric deficits or micronutrient deficiencies – as well as overweight or obesity.

Micronutrient deficiencies tend to be more common among the poor. Anaemia – for which the main causes are iron deficiency and malaria – shows clear inverse socioeconomic gradients with wealth, as shown in 18 countries by DHS. Vitamin A deficiency has been historically associated with poverty (*74*).

Low birth weight in low- and middle-income countries is an indicator of fetal malnutrition (*75*). A study by WHO and the United Nations Children's Fund (UNICEF) showed a strong inverse correlation between low birth weight and level of development (*76*). In countries where a high proportion of neonates are weighed, such as Brazil, there is convincing evidence of a direct association between birth weight and wealth (*77, 78*).

Stunting and underweight are substantially more prevalent among poor than rich children in all regions of the world, usually by a factor of 2. As observed for mortality, African children in the top quintile present a sharp reduction in undernutrition compared to the other four wealth groups, whereas in the other regions patterns are more or less linear.

Childhood overweight is a growing global concern (*79*). Only four national MICS surveys – from the Dominican Republic, Ghana, Sierra Leone and Tajikistan – reported on this outcome, which was systematically more common among the rich than among the poor (*24*). Other studies – mostly from middle-income countries – reveal similar trends (*80, 81*).

The analysis demonstrates that, with the single exception of overweight, indicators of nutritional and

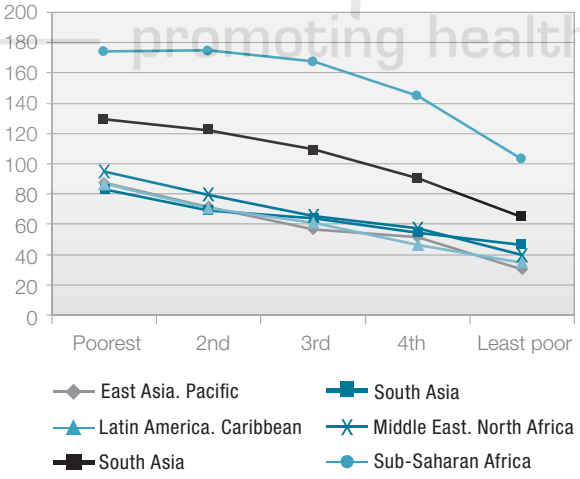
morbidity outcomes are considerably worse among poor than among better-off children. Because inadequate nutritional status is part of the vicious cycle of malnutrition and infection, higher prevalence of undernutrition further contributes to the incidence, severity and case fatality of childhood illnesses.

Differential consequences: mortality and human capital

Socioeconomic differentials in child death rates are consistently found throughout the globe. Wide socioeconomic differentials in infant and under-5 mortality exist (Figure 4.6) (*24*). Inequities are slightly more marked for under-5 than for infant mortality, suggesting that deaths of children 1–4 years old are more strongly socioeconomically determined. The magnitude of poor:rich mortality ratios tends to be inversely related to the overall mortality rate in the country. In Africa, mortality in the better-off quintile is considerably lower than in the other four, poorer quintiles. In the other regions, inequity patterns are quite linear, but when countries are analysed separately (*21*), a common pattern in low-mortality countries is the poorest quintile showing considerably higher mortality than the other four.

The importance of neonatal mortality as a major component of under-5 deaths has received growing attention (*82*). DHS data reveal consistently higher neonatal mortality rates for those in the poorest 20% of households than for those in the top quintile (*83*). Although aggregate national-level estimates of cause-specific under-5 mortality are now available (*62*), neither DHS nor MICS provide breakdowns by socioeconomic indicators. Isolated studies, however, suggest that the inequities observed for all-cause mortality also apply to different causes, as for malaria in the United Republic of Tanzania (*84*) and infectious diseases in Brazil (*29, 85*).

FIGURE 4.6 Under-5 mortality rate, by wealth quintile and region of the world



Source: Data from Gwatkin et al. (*21*).

Inequities in mortality are closely related to differentials in nutritional status, as poor nutrition is an underlying cause of about a quarter of all under-5 deaths (*5*). In addition, socioeconomic differentials in under-5 mortality are much wider than those observed for morbidity. This suggests that mortality gaps are largely due to differences in disease severity and case management, rather than differences in incidence.

Finally, the long-term consequences of growing up in poverty, suffering from ill-health and undernutrition, are addressed. Recent analyses of five cohort studies from low- and middle-income countries showed strong associations between poverty in childhood and adult human capital outcomes, including attained height, achieved schooling, income and offspring birth weight (*86*), as well as with low cognitive development at later ages (*87*). Disease and undernutrition are definitely major pathways leading to reduced human capital, as studies of iron deficiency in Costa Rica show (*88*).

The next section focuses on potential interventions against social determinants of health.

4.4 Discussion: review of interventions addressing social determinants

This section focuses on those components of the causal pathways of the priority public health conditions analytical framework, under each level of social determination, that are amenable to modification (*22*), and considers potential entry-points for interventions that can help reduce inequities (Table 4.2) in child health and nutrition (*8, 9, 25, 89*).

Entry-points and interventions

Interventions related to socioeconomic context and position include universal women's education, preferential treatment for minority groups, redistribution of resources (for example welfare systems or cash transfers) and microcredit for women. Entry-points include political parties, governmental institutions (executive, legislative and judiciary) and civil society. These interventions are by definition broad, and also include measures such as income redistribution through taxation or increasing minimum wages, and land reform. Because these measures will affect multiple health

outcomes, not only those related to maternal and child health, they are not covered in detail in the present chapter.

As regards reduction of environmental hazards, most potential interventions affect availability, including provision of sanitation and clean water, elimination of vectors, improved housing to prevent crowding and control of indoor pollution. The entry-points are multisectoral and include governmental institutions, civil society and nongovernmental organizations.

Marked disparities in access to preventive services and interventions suggest that key interventions for reducing inequities (Table 4.2) must include improved access to, utilization of and coverage of antenatal, delivery, postnatal and child health services (*25*). The main entry-points include working within the health sector at different levels (national, district, local) and with other health providers. Many preventive interventions, however, are more likely to reach high and equitable coverage if delivered through outreach or community channels. For example, several innovative entry-points have been tried for improving insecticide-treated mosquito net coverage, including integration with immunization and micronutrient supplementation in national immunization or health days, social marketing, and subsidized or free insecticide-treated mosquito nets for pregnant women and children.

Micronutrient deficiencies markedly increase vulnerability to disease, and also show marked social disparities. Three key approaches for improving micronutrient status are fortification, supplementation and dietary diversification (*5*). Interventions that may reduce inequities in micronutrient status at different levels of determination include legislation for food fortification, threshold coverage (for example delivery of supplements with vaccinations), education on infant and young child feeding, empowerment of women, cash transfers leading to improved child diets, and training staff in nutrition counselling. Different actors will need to be involved, including legislators, the food industry and pressure groups.

Entry-points for interventions to improve disease management show considerable overlap with those aimed at preventing disease, and include provision of antenatal, delivery and child health care facilities, provision of referral care facilities, targeted availability of tools and means (for example antimalarials, oral rehydration, antibiotics for sepsis and pneumonia), improved care-seeking behaviours, dedicated services near to where disadvantaged population groups reside (for example outreach facilities, community health workers, nongovernmental organizations), improved quality of services (for example training staff on nutrition counselling), fee exemption, voucher systems for children, universal health care and free provision of medicines for sick children. Entry-points include governmental and private providers, and involvement of civil society is also essential for improving utilization and accountability of existing services.

Whereas understanding the multiple levels of social determination is essential, this does not imply that only solutions that tackle all different levels are effective. Successful interventions may address a single level – for example within health services – and yet contribute to improving equity. This seems to be particularly true for child health and nutrition, where the pathways linking poverty to disease are relatively well known and where effective biological and behavioural interventions are plentiful.

Actors operating at a given level need to realize that their efforts constitute only part of the solution, and they therefore need to support the work of those dealing with other issues rather than focus exclusively on their own. Because health sector interventions in childhood often contribute to exacerbating rather than reducing inequities, mainstreaming equity considerations in the health sector is particularly relevant and falls well within the mandate of WHO and its national-level counterparts. For these reasons, this review is strongly focused on what the health sector can do to reduce inequities.

Evaluations of existing programmes and interventions

Criteria for selecting interventions

There are many potential interventions (Table 4.2) against social determinants (*25*). Identification of those interventions that had been properly evaluated in the field was guided by the distinction made by Graham and Kelly (*90*) and adopted by the WHO Measurement and Evidence Knowledge Network (*91*):

> The factors which lead to general health improvement – improvements in the environment, good sanitation and clean water, better nutrition, high levels of immunizations, good housing – do not reduce health inequity. This is because the determinants of good health are not the same as the determinants of inequities in health.

Therefore, no attempt was made to summarize the ample evidence on interventions aimed at improving child health or nutrition in whole populations (*52, 92, 93*). Rather, the focus was on the lessons learned from interventions or programmes identified in the literature review, which were specifically evaluated in terms

of their contribution to equity. These are listed in Table 4.3, according to their position in the priority public health conditions matrix.

This list is not intended to be exhaustive in terms of potential interventions against social determinants of health and nutrition, but it is limited by the availability of equity-oriented evaluations. These studies addressed one or more of three related questions: (a) whether the programme preferentially reached the poor; (b) whether it reduced inequities in access or coverage; and (c) whether it reduced inequities in outcomes (mortality or nutritional status). Most evaluations addressed the first two questions, whereas only two – Integrated Management of Childhood Illness (IMCI) and cash transfers – addressed inequities in nutritional status.

The programmes or interventions selected are reviewed in the following subsections.

Integrated Management of Childhood Illness

The Integrated Management of Childhood Illness (IMCI) programme was designed in the mid-1990s to address five major causes of death among poor children: pneumonia, diarrhoea, malaria, measles and undernutrition (*94*). It included three components: improving health worker performance, health systems support and family and community practices. Victora and colleagues assessed whether IMCI was effective in reaching the poorest areas of Brazil, Peru and the United Republic of Tanzania (*95*). The results suggested that although IMCI addressed diseases of the poor, it was not successful in preferentially reaching poor communities.

A separate evaluation was carried out in four districts of the United Republic of Tanzania, where two districts that implemented IMCI showed overall reductions in mortality and improvements in nutritional status. Inequities in six child health indicators (underweight, stunting, measles immunization, access to treated nets, access to untreated nets, treatment of fever with antimalarials) were significantly reduced in IMCI districts compared to control districts, while inequities in four other indicators (wasting, DPT coverage, caregivers' knowledge of danger signs and appropriate care seeking) improved more in the comparison districts (*96*).

The lesson learned from these two separate studies is that IMCI, when implemented under routine conditions, is not preferentially reaching the poor. However, once it is strongly implemented, as in the United Republic of Tanzania – with high training coverage of facility-based workers and health systems strengthening, in a setting where services utilization is high – it may contribute to reducing inequities. Resistance to change – that is, to IMCI implementation – included the perceived long duration of training (the original course takes 11 days) and professional corporate behaviours (for example, doctors being against antibiotic prescription by non-medics) (*97, 98*).

Promotion of insecticide-treated mosquito nets

There has been heated debate regarding whether insecticide-treated mosquito nets should be sold or distributed free of cost to poor families. A review of national surveys in 26 African countries found that inequities in untreated nets were considerably lower than for treated nets, and concluded that "the public-health value of commercial net markets has been greatly underestimated, and that these markets have so far contributed more to equitable and sustainable coverage of mosquito nets, and hence to the prevention of malaria in Africa, than have the insecticide-treated mosquito nets delivered by public-health systems and projects" (*99*). These findings are supported by a study in the United Republic of Tanzania, which concluded that social marketing in the presence of an active private sector was associated with increased equity in mosquito net coverage (*100*).

On the other hand, there is also considerable evidence that free mass distribution increases equity. Grabowsky et al. studied distribution of insecticide-treated mosquito nets linked to vaccination campaigns in Ghana and Zambia, concluding that inequities were virtually eradicated by this approach (*101*). A study in Kenya found that inequities were reduced when subsidized nets were introduced, and near-perfect equity achieved with free distribution (*102*). Side-effects from the use of treated nets are rare, though some subjects report headaches related to the smell of the insecticide (*103*). In a broader view of side-effects, free distribution of nets has been criticized for its dependence on the public sector, and potential lack of long-term sustainability (*104*). The debate regarding subsidized or free nets continues, but it is reassuring that both approaches seem to be able to reduce inequities, at least in the short term.

Conditional cash transfers

Several governmental programmes that provide cash to families conditional on their use of health and educational services have been implemented, particularly in Latin America. These programmes address social determinants of health at several different levels (see Table 4.3). In Mexico, the PROGRESA[4] programme was subjected to a high-quality evaluation in which over 500 communities were randomized to receive or not to receive the programme (*105*). The intervention

4 Programa de Educación, Salud y Alimentación: Programme for Education, Health and Food.

TABLE 4.3 Matrix of interventions for which equity impact evaluations are available

Interventions / Determinants	Availability interventions	Acceptability interventions	Accessibility interventions	Compliance interventions	Adherence interventions
Socioeconomic context and position	Family Health Programme, Brazil (universal care)	Conditional cash transfers (mandatory school attendance, including girls)	Conditional cash transfers (cash transfers to the poorest)		
Differential exposure					
Differential vulnerability	Contracting (e.g. Cambodia) (family planning) Integrated Management of Childhood Illness (IMCI) (health education) Family Health Programme (health education) IMCI (prioritizing burden of disease; providing micronutrients, insecticide-treated mosquito nets, medicines) Insecticide-treated mosquito nets (subsidized prices; linked to vaccination campaigns) Family Health Programme (provision of maternal and child health services; free medicines) Contracting (provision of facilities; antenatal and delivery care; micronutrients) Conditional cash transfers (food supplements; mandatory facility attendance for preventive interventions; mandatory birth registration)	IMCI (feeding counselling; care-seeking behaviours; compliance with health workers' advice) Insecticide-treated mosquito nets (health education) Conditional cash transfers (health and nutrition education; regular contact with health facilities)	Insecticide-treated mosquito nets (community promotion) Conditional cash transfers (empowerment of women through direct payment to mothers)		
Differential health care outcomes	Family Health Programme (targeting of poorest areas, community health workers, staff incentives) Contracting (targeting of the poorest) Conditional cash transfers (targeting of the poor)	IMCI (improved quality) Family Health Programme (improved quality)	IMCI (free medicines) Family Health Programme (free medicines; universal access)	IMCI (supervision) Family Health Programme (provider incentives) Contracting (provider incentives)	IMCI (first dose given in facility) Family Health Programme (compliance advice by community health workers)
Differential consequences	Family Health Programme (child development; nutrition rehabilitation)				

consisted of providing fortified nutrition supplements to children and nutrition education, health care and cash transfers to their families. PROGRESA was associated with faster growth in height among the poorest and younger infants and a reduction in anaemia prevalence. PROGRESA and its successor, the Oportunidades programme, were shown in other studies to be efficiently targeted at the poorest families (*106*). Among all programmes evaluated in this review, PROGRESA/Oportunidades is the one with the strongest scientific evidence of a pro-poor impact.

A similar programme, Bolsa Familia, operates in Brazil, where the 30% poorest families in the country receive 80% of the benefits (*107–109*). There is strong evidence that the programme is well targeted at the poorest and that dietary quality improved as a result, though the results of impact and coverage evaluations are mixed (*110, 111*).[5] In Nicaragua, increases in growth monitoring and immunization coverage were reported as a consequence of the conditional cash transfer programme (*112*).

Taken together, the items of evidence for conditional cash transfer programmes suggest that they are one of the most promising initiatives for addressing social determinants of child mortality and malnutrition, and improving equity. Conditional cash transfer programmes, however, may have negative aspects, including an increase in fertility in order to qualify for the benefits (*113*), and cash benefits being paid to families who should not qualify because of their high socioeconomic status (*114*).

Family Health Programme

In Brazil, the 1989 Constitution established a universal health system without any type of user fees. Because health facilities were concentrated in the urban and wealthier areas, the Family Health Programme was launched in 1994 to deploy teams of doctors, nurses and community health workers in the country's poorest areas. Equity-oriented evaluations of the programme have showed that targeting was effective and programme uptake was markedly higher in poor municipalities and in poor neighbourhoods in urban areas (*115, 116*). Several ecological analyses suggest that the programme had a positive impact on infant mortality (*116, 117*), particularly through reduction of diarrhoea deaths (*118*), but studies are lacking on whether or not the programme reduced inequities in mortality or nutritional status. Resistance to introduction of the programme has come from medical specialists (such as paediatricians) who complain that family doctors are unable to provide optimal care to children (*119*). Resistance also includes the high cost of the programme, about US$20 per person-year (*120*).

Contracting to provide primary health care

To address the problem of poor access to public health care facilities in Cambodia, the government, with the Asian Development Bank, devised alternative health care delivery models: contracting in (reinforcing government primary health care services) and contracting out (hiring nongovernmental organizations to provide these services). These two options were compared to traditional government centres (*121*). Emphasis was given to reaching the poorer half of the population. Contracting out appears to have led to higher coverage of immunization, vitamin A and antenatal care, but not of delivery care, than government services, with contracting in being between these two in most indicators. An equity impact assessment found that compared to routine services, contracting out was significantly associated with reduced inequalities in immunization, skilled delivery, use of facilities and contraceptive knowledge. Contracting in was associated with greater equity in immunization and contraceptive knowledge. Government services continued to be primarily directed at the non-poor. The statistical methods used in the analyses are not fully laid out in the report (*121*) and it is unclear if the units of analyses were the geographical areas – as they should have been – or individual children and women. The authors concluded that "the contracted districts outperformed the government districts in targeting services to the poor".

While contracting appeared to have an effect on reducing inequitable coverage levels, the effect on quality of care was not reported in the study. To assess the quality of care, a standardized health facility survey (*122*) was carried out in three types of Cambodian facilities: with IMCI training and additional health system support by partners; with IMCI training but limited additional health system support by partners; and with health system support but without IMCI training. Most contracting areas were in the third group. The results of the surveys showed that health workers performed less well in assessment, case management and particularly in counselling in the areas with system support alone compared to the areas with IMCI (*123*).

Programmes and interventions: summary and typology

Summing up, the priority public health conditions analytical framework was used to lay out the different types of programmes or interventions that may address the social determinants of health. Based on the literature review, five programmes were identified that had been field-tested in terms of their equity performance.

5 Olinto P, personal communication.

TABLE 4.4 Typology of interventions acting on equity, with examples from the five programmes reviewed

	Type of intervention	Level of intervention	Explicitly targets poor	Effect on inequities	Effect on mortality, nutritional status coverage
IMCI	Medical	Programme	–	+	+ (stunting)
Insecticide-treated mosquito nets	Medical	Programme	–	++	?
Family Health Programme	Medical and financial	Health sector	++	?	+ (infant mortality rate)
Contracting	Medical and financial	Health sector	–	+	+ (coverage)
Conditional cash transfers	Financial	Multisectoral	++	+++	± (nutrition coverage)

– no effect; + small effect; ++ moderate effect; +++ major effect; ± uncertain; ? unknown

Most of these programmes have multiple components (see Table 4.3) that address different levels of social determinants (from differential socioeconomic context to differential consequences) as well as addressing different intervention dimensions (from availability to adherence). Whereas none of the programmes tackled the differential exposure level of the framework, the other four levels were contemplated.

The review of the literature and the five case studies described above suggest a typology of three groups of programmes against social determinants of ill-health and malnutrition in children (Table 4.4). There are medical interventions delivered by the health sector through programmes (IMCI, promoting insecticide-treated mosquito nets) that – although not targeted exclusively to the poor – have an effect on inequities. There are also health interventions that incorporate a strong financial component (Family Health Programme, contracting). Finally, there is a purely financial intervention with a multisector delivery approach that explicitly targets the poor with a strong impact on inequities.

Emerging lessons

The emerging lessons from this review, directed to health sector managers and policy-makers, are summarized below. Innovative approaches are required to ensure that programmes effectively promote equity. These include the needs to prioritize diseases of the poor; take the pattern of inequity into account; deploy or improve services where the poor live; employ appropriate delivery channels; abolish any type of user fees; and monitor implementation, coverage and impact with an equity lens.

Prioritize diseases of the poor. When choosing which interventions should be prioritized in a given geographical area, it is essential to match them closely to the local epidemiological profile of conditions affecting the poor (*124*). Prioritizing diseases of the poor requires assessing the burden of disease and allocating resources on the basis of need. Decision-making tools for matching health sector investments to the local burden of disease are available and should be widely promoted (*125*). The IMCI experience, however, showed that prioritizing diseases of the poor is not enough, if the services are primarily implemented in better-off areas.

Consider the pattern of inequity. This should be taken into account when deciding how to deliver interventions. For a "bottom inequity" or "marginal exclusion" pattern, programmes that are targeted at the family level are appropriate because the poorest children are lagging behind all others. If on the other hand there is a pattern of "massive deprivation" or "top inequity" – when all groups except the wealthiest are affected – individual targeting does not make sense and widespread interventions are needed. Geographical targeting may still be advisable, even when individual-level targeting is not recommended.

Deploy or improve services where the poor live. Poverty maps have been prepared in a large number of countries by the World Bank, the United Nations Development Programme (UNDP) and other national and international agencies (*126*). These serve as important inputs for assessing how well the distribution of current services matches the neediest areas, and provide a basis for deployment of new services or improving the quality of existing services. The usual logic of programme implementation may have to be subverted. Rather than introducing new interventions or programmes initially in the capital and nearby districts, the remote areas of the country, where mortality and malnutrition are usually highest, should be prioritized (*127*).

Employ appropriate delivery channels. Even when a health facility-based approach is favoured, the same

biological intervention may be delivered through more than one channel (*124*). Micronutrients or nutritional counselling may be delivered to mothers and children who spontaneously attend the facilities, through outreach sessions in communities by facility staff, or through community health workers (paid or voluntary) on a door-to-door basis. Equity considerations are fundamental in choosing the most appropriate delivery channel for reaching the poorest families, who often live far away from the facilities and require community or household delivery strategies. Appropriate delivery channels must also ensure that provider compliance and recipient adherence are optimized. Understanding sociocultural norms and practices, both of providers and users, is essential for this purpose.

Reduce financial barriers to health care. Out-of-pocket payments are the principal means of financing health care in most of Africa and Asia (*128, 129*). This heavy reliance on out-of-pocket payments means that pooling of risks is reduced and health care costs fall more directly on the sick, who are most likely to be poor, children or elderly. Evidence suggests that out-of-pocket payments for public and private health care services are driving more than 100 million people into poverty every year (*130*). The introduction of user fees in governmental health facilities in the late 1980s and early 1990s contributed to this situation. As WHO has found, "experience suggests that even where official user fees are well-regulated and help revitalize previously moribund services, the drawbacks for the poor usually exceed the benefits" (*131*). In these cases where fees have not worked, there is clear need for reform through one or more of the several mechanisms available: reducing or abolishing fees, finding some way of exempting the poor from them or developing insurance programmes to cover the cost of fees incurred by disadvantaged as well as by better-off groups. User fees would probably not have been instituted in most countries had equity considerations been high in the health agenda. Countries adopting a universal health system without any type of user fees, such as Brazil, have effectively removed inequities in access to first-level health facilities (*115*).

Monitor implementation, coverage and impact with an equity lens. This is an essential component that will be discussed in section 4.6.

4.5 Interventions and implementation

This section relies heavily on the experience of programmes that have been evaluated from an equity perspective (see previous section). These programmes constitute only a small fraction of pro-equity interventions listed in Table 4.2 (*25*), but they do cover multiple levels of the social determinants and require strong involvement of the health sector. By focusing this discussion on programmes that were rigorously evaluated, it is possible to identify common issues that will apply more broadly to programmes and interventions in general. Relevant upstream interventions include legislation on the availability and advertisement of breast-milk substitutes and on maternity leave, setting standards for advertisement of infant foods, and provision of breastfeeding education and promotion to population groups. Downstream interventions are aimed at individual mothers and children and include general improvements in the availability of mother and child health services and training health staff in face-to-face nutrition counselling (*93*).

Ensuring access to essential health services for poor children is a complex task involving a number of different ministries and agencies in implementing interventions (Table 4.5). Implementation responsibilities will vary from country to country. Some will fall outside the scope of disease-specific programmes, mainly issues related to non-health sector interventions such as education or women's empowerment. Broader public health responsibilities related to general health policies and planning – such as targeting the poor or the deployment and quality of services – will generally fall under the responsibility of ministries of health as a whole, rather than under specific programmes within the ministry. Disease programmes may assume responsibility for provision of specific services such as health worker training, distribution of equipment and supplies, and dissemination of specific information, education and communication materials and health messages.

As health depends on multiple social determinants, many responsibilities are shared between programmes, within the health sector and between different ministries. The ministries of agriculture, education, finance, interior, planning and social affairs are natural partners of the ministry of health. Nongovernmental and civil society institutions must also be involved.

When assessed against the benchmarks of replicability, sustainability, scalability, political feasibility, economic feasibility and technical feasibility, the five programmes reviewed in the preceding section do well as a whole (Table 4.6). With regard to replicability of the Family Health Programme, there is no evidence other than from Brazil; however, the four other interventions are implemented in at least three countries. If implementation history is used as an indicator for sustainability, two out of five interventions have been implemented for more than 10 years. Most of the five interventions have been scaled up to cover more than 250 000 people. With regards to political feasibility, all five interventions required some form of government involvement,

TABLE 4.5 Examples of responsibilities for various intervention components

Intervention component	Responsibility of a specific health programme	Responsibility of the health sector as a whole	Non-health sector or multisector responsibility (ministry)
Mandatory school attendance	No	No	Yes (education)
Empowerment of women	No	No	Yes (interior, social affairs)
Mandatory birth registration	No	No	Yes (interior, planning)
Cash transfer policies	No	Yes	Yes (finance, social affairs)
Provision of facilities	No	Yes	Yes (finance, planning)
Provider incentives	No	Yes	Yes (finance, planning)
Targeting of poorest areas	Yes	Yes	Yes (finance, planning)
Universal access policy	Yes	Yes	Yes (finance, planning)
Family planning	Yes	Yes	Yes (planning)
Provision of micronutrients	Yes	Yes	Yes (agriculture, finance)
Provision of food supplements	Yes	Yes	Yes (finance)
Free provision of medicines	Yes	Yes	Yes (finance)
Free provision of insecticide-treated nets	Yes	Yes	Yes (finance)
Health education	Yes	Yes	Yes (education, interior)
Care-seeking counselling	Yes	Yes	Yes (education, interior)
Feeding counselling	Yes	Yes	Yes (education, interior)
Community promotion	Yes	Yes	Yes (interior, social affairs)
Integrated service delivery	Yes	Yes	No
Ensuring quality of health services	Yes	Yes	No
Ensuring supportive supervision	Yes	Yes	No
Ensuring provider user-friendliness	No	Yes	No
Ensuring adequate opening hours	No	Yes	No

initiative or collaboration, and are therefore likely to be politically feasible. Cost-effectiveness evaluations exist for IMCI and insecticide-treated mosquito nets only, and for two other interventions (conditional cash transfers and contracting) there seems to be a reasonable return on investment. Availability of tools, considered to be important for technical feasibility, is not an implementation barrier for most of the interventions reviewed.

The small number of programmes for which equity-oriented evaluations are available makes it difficult to generalize these findings to other interventions to reduce inequities in child health. On the other hand, the above results suggest that it is possible to implement initiatives to improve equity that are affordable, effective, feasible and sustainable.

4.6 Implications: measurement

The availability of reliable information at country level on child health and nutrition is second to none. Surveys such as DHS and MICS are carried out every four to five years in most low- and middle-income countries. Country data are compiled and published annually by UNICEF (*136*). Widespread use of socioeconomic stratification variables, in particular asset quintiles, allows monitoring inequities in coverage and impact indicators on a regular basis. Most surveys are representative for subnational areas, thus also allowing the study of regional inequalities.

TABLE 4.6 Testing the implementability of interventions

	IMCI	Insecticide-treated mosquito nets	Conditional cash transfers	Family Health Programme	Contracting
Replicability	**Yes:** more than 100 countries have adopted IMCI	**Yes:** many malaria-endemic countries have adopted insecticide-treated mosquito nets	**Yes:** reported from Brazil, Mexico and Nicaragua	**Maybe:** reported from Brazil only	**Yes:** reported from Cambodia only, but 13 contracting sites were identified in a recent review (*132*)
Sustainability	**Yes:** exists since 1995. Countries have incorporated IMCI in their national health sector plans and budgets	**Yes:** countries have incorporated insecticide-treated mosquito nets in their national health sector plans and budgets	**Yes:** exists since 2003. Countries have incorporated conditional cash transfers into their national health sector plans and budgets	**Yes:** exists since 1994	**Maybe:** requires substantial donor support
Scalability	**Yes:** 10 countries have more than 75% of districts where IMCI was initiated	**Yes:** more than 358 210 insecticide-treated mosquito nets distributed in 27 countries (*133*)	**Yes:** large national programmes in more than 10 countries	**Yes:** covers over half of the population in Brazil	**Yes:** the 13 identified contracting sites cover between 250 000 and 15 million people
Political feasibility	**Yes:** more than 100 countries have adopted IMCI	**Yes:** many malaria-endemic countries have adopted insecticide-treated mosquito nets	**Yes:** in Brazil originally linked to the President's Office, now interministerial management	**Yes:** endorsed by successive governments with different ideological positions	**Maybe:** requires substantial donor support
Economic feasibility	**Yes:** IMCI costs as much as current care, and is cost-effective (*134*)	**Yes:** one of the most cost-effective interventions against malaria (*135*)	**Yes:** in Brazil, while costing a small share of total income, it produced a 21% fall in Gini index	**Maybe:** high costs were considered a barrier to implementation	**Maybe:** in Bangladesh the cost of contracting was $0.65 per capita. In Costa Rica and Pakistan less costs were incurred for more efficient services. Overall cost-effectiveness is unknown
Technical feasibility	**Yes:** tools available	**Yes:** tools available	**Yes:** tested in rigorous evaluations in several countries	**Yes:** relies on evidence-based algorithms for managing common diseases	**Maybe:** reportedly more an art than a science. Tools available

The framework proposed by the Measurement and Evidence Knowledge Network report comprises five elements (generating an evidence base for effective action; creating evidence-based guidance; collecting and collating evidence for how to implement effective policies; learning from practice; and policy monitoring and evaluation). Specific issues that arise when using this framework are described next.

Importance of measurements and targets

As mentioned above, the first prerequisite is that health information tools – both surveys and routine reporting systems – should incorporate measurement of socioeconomic position. If collecting information on household assets is too complex, as may be the case for vital registration, then simpler indicators such as schooling or broad occupational categories (as in the English "social class" classification) may be adopted (*137*). Supervision and feedback are necessary to ensure that these data fields are filled in correctly. An alternative is to use surveys to assess socioeconomic position in samples of vital registration events or of service users that can be later compared to the population distribution (*138*).

The next step is to ensure that health information is disaggregated by socioeconomic indicators, disseminated widely and fed back to policy-makers and

managers. It has been argued (*12*) that "an obvious way to start in orienting health systems toward the poor is to establish objectives whose achievement requires that the poor benefit fully from the services provided, and to monitor progress in terms of those goals. For example, one could set targets in terms of progress, not among all people in the population, but among those people within the population who live in poverty." For example, instead of reaching 80% coverage with skilled delivery, one would set a target of 80% coverage among the lowest wealth quintile, or for families living below the poverty line.

When information is presented to policy-makers and managers it is important to discuss the implications of the shape of the equity curves, rather than concentrating just on the ratio or difference between the poorest and better-off groups. As discussed above, different shapes of curves may lead to different intervention approaches.

Incorporation of the socioeconomic dimension in information systems is essential for mainstreaming equity considerations in health. This applies not only to the national or district level, but also to international institutions such as WHO and UNICEF.

Data shortcomings

As mentioned, more data seem to be available for child health and nutrition than for any other health outcome. Nevertheless, several important gaps have been identified, including indicators related to neonatal health and quality of case management. Also, although data on coverage are plentiful, little information is available on delivery channels – for example, from what type of provider did a child receive a given intervention. This information is essential for better understanding inequities and for proposing remedial actions. Another limitation is that, for the main outcome indicator – mortality – estimates are retrospective and usually refer to a time period a couple of years before the survey, so that recent changes are not picked up by surveys. Finally, the fact that surveys are carried out every five years or so has recently been criticized due to the demand for timely data on the Millennium Development Goals; as a result UNICEF has decided to carry out MICS every three years.

Data needed for management, monitoring and evaluation

This issue has two dimensions: design and measurement. Regarding design, programmes are seldom implemented in a way that allows rigorous evaluation; an exception was PROGRESA in Mexico, where randomized allocation during the scaling-up phase allowed a unique evaluation. This example should be more widely used by other programmes. The second set of issues relates to the measurement of indicators. The evaluation of large-scale programmes such as IMCI showed that even basic data on implementation, such as the number and location of trained staff, were not kept in any of the countries studied, a fact that made its evaluation rather difficult (*139*). Data on quality of IMCI care is even harder to obtain, because health facility surveys tend to be restricted to small portions of each country and to be carried out irregularly. Furthermore, many evaluations address overall change in outcomes rather than trying to assess changes in equity as well, which is possible with small investments in further data collection (*96, 100*).

Data needed to manage and monitor possible side-effects of interventions

There are huge gaps in this area, because this objective requires measurement of outcomes other than those in the main interest area. For example, initiatives such as the United States President's Emergency Plan for AIDS Relief (PEPFAR) or polio eradication campaigns have been accused of detracting attention from child survival, but unless evaluations of these programmes also include measurement of child survival indicators, no evidence on this possible side-effect will be available. The issue of side-effects definitely requires greater attention.

Solutions where data are absent or limited

The widespread use of survey data for estimating under-5 mortality levels and differentials constitutes a response to the absence of reliable vital statistics in most low- and middle-income countries. Reliance on surveys, however, does not preclude the need for continued efforts to improve vital registration. For estimating coverage, a mixture of routine reporting and small-scale surveys has been used with success for monitoring immunization levels and trends. Surveys have the added advantage of easily incorporating socioeconomic indicators, which is often difficult to do when routine data or vital statistics are used. Finally, small sample sizes reduce the precision of estimates for subgroups (for example wealth quintiles) but use of statistics that rely on the entire sample distribution – for example concentration indices – can help reduce the variability of equity assessments (*140*). New approaches have been proposed when data on inequities do not exist – for example, the comparison of simplified asset indices collected from mothers and children attending a facility with those obtained from national censuses for the same geographical area (*138*).

Approaches where capacity to generate data and information is limited

Interim approaches for collecting data and estimating health indicators when information systems are underdeveloped include targeted questions in population censuses, sample registration systems, demographic surveillance sites and household surveys (*141*). A major global effort – the Health Metrics Network – is under way to build national capacity for collecting, processing, disseminating and using health statistics (*142*). Incorporating an equity dimension in health information systems does not necessitate waiting until the system is fully developed, but should instead become an integral component of the capacity-building process. The Global Equity Gauge Alliance, an initiative involving 12 centres in low- and middle-income countries, is an example of a low-technology approach combining research and monitoring of inequities, advocacy and public participation in promoting use of information for change, and community involvement (*143*).

4.7 Conclusion

In this chapter the priority public health conditions analytical framework has been used to search the published literature and databases from two major survey initiatives (DHS and MICS) on the topic of socioeconomic differentials in child health and nutrition. Data from nearly 100 countries suggest that poor children and their mothers lag well behind the better-off in terms of mortality and nutrition. These inequities in health outcomes result from the fact that poor children, relative to those from wealthy families, are more likely to be exposed to disease-causing agents. Once they are exposed, they are more vulnerable due to lower resistance and low coverage with preventive interventions; and once they acquire a disease that requires medical treatment, they are less likely to have access to services, the quality of these services is likely to be lower, and life-saving treatments are less readily available. The odds are stacked against poor children in each of these steps. There were very few exceptions to this pattern: child obesity and inadequate breastfeeding practices were the only conditions more often reported among the rich than the poor.

Health services play a major role in the generation of these differentials. This is due both to inaction – lack of proactive measures to address the health needs of the poor – and to pro-rich bias – such as user fees. Evaluations of the equity impact of health programmes and interventions are scarce. Nevertheless, those that are available show that innovative approaches can effectively promote equity. These include the needs to prioritize diseases of the poor; take the pattern of inequity into account; deploy or improve services where the poor live; employ appropriate delivery channels; abolish any type of user fees; and monitor implementation, coverage and impact with an equity lens.

Ensuring access to essential health services for poor children is a complex task, requiring assignment of responsibility to various programmes and stakeholders, both within and outside the health sector, that can help address social determinants. Understanding the multiple levels of determination of inequity is essential for improving the health and nutrition of poor children globally. This review shows that there are many intervention entry-points, providing room for different sectors to contribute. This does not imply that only solutions that involve multiple institutions and tackle all levels of determination are effective. Nevertheless, it suggests that actors involved in any given approach need to realize that their efforts constitute only part of the solution, and they must support the work of those promoting complementary approaches. Finally, there is a need for a general oversight function to ensure that all relevant issues are considered.

In light of WHO's mandate, this review was purposefully biased towards interventions that can be delivered within the health sector. At the very least, health workers should be aware that the way in which they implement preventive and curative interventions often contributes to further increasing inequities (*11, 53*). Mainstreaming equity considerations in the health sector is essential for ensuring that those involved become part of the solution, rather than part of the problem.

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Diabetes: equity and social determinants

5

David Whiting, Nigel Unwin and Gojka Roglic

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5.1 Summary

Three to four percent of the world's population has diabetes, which leads to a markedly increased risk of blindness, renal failure, amputation and cardiovascular disease, and reduces average life expectancy by 10 or more years. Currently, 70% of people with diabetes live in low- and middle-income countries, and while diabetes is increasing the world over, its greatest increase will be in these countries, more than doubling over the next 25 years.

There is strong social patterning in the incidence of type 2 diabetes, which accounts for over 90% of all diabetes. This arises through differential exposure to "obesogenic environments", leading in particular to lower levels of physical activity and the consumption of excess calories. Some ethnic groups, for reasons that are not fully understood, are particularly vulnerable to such environments. In the poorest countries type 2 diabetes tends to be commoner in the better-off, but with economic development this is soon reversed, with the incidence being highest in the poor. The incidence of type 1 diabetes, the etiology of which is not well understood, is not socially patterned. The outcomes and consequences of both type 1 and type 2 diabetes tend to be worse in the poor in all countries. This is particularly the case in countries where access to health care is dependent on the ability to pay.

The evidence base for the prevention of type 2 diabetes and the prevention of complications in all types of diabetes is relatively strong. However, evidence on how to intervene to reduce socioeconomic inequalities in diabetes incidence, outcomes and consequences is much less comprehensive. Coordinated action will be needed from the level of international and national policy, particularly to reduce exposure to obesogenic environments, down to local measures, such as improving access to and the quality of care in individual health facilities. Interventions will need to be fully evaluated for their impact on reducing socioeconomic inequalities, and redesigned and re-evaluated accordingly.

5.2 Introduction

Background

There is a tendency to think of some conditions as diseases of poverty, and conversely others as diseases of affluence. Causes of maternal and infant mortality, malaria and tuberculosis are strongly related to extreme poverty. In contrast, diabetes (type 2 diabetes in particular) is often thought of as a disease of affluence, affecting rich countries more than poor, and within poor countries affecting the better-off sections of the population more than the less well off. While this characterization of diabetes is not entirely without basis, it is a deeply misleading oversimplification. For example, over 70% of the world's population with diabetes live in low- and middle-income countries; the prevalence of diabetes in some of the world's poorest cities is as high, or higher, than in high-income countries; and the impact of diabetes on individuals and their families is greatest in situations with poor access to health care and no or limited social security.

This chapter begins with a brief description of diabetes and its complications and known risk factors. Next is summarized what is known of the social and economic distribution of diabetes, from international comparisons down to socioeconomic groups within countries. The rest of the chapter is structured around the hierarchical causal model of the social determinants of health described in Chapter 1. The diabetes-specific version of this model is shown in Figure 5.4 of this chapter.

Diabetes: description, classification and risk factors

Diabetes is a disease in which reduced insulin secretion and insulin action lead to chronic hyperglycaemia. This in turn has adverse catabolic effects on carbohydrate, fat and protein metabolism (*1, 2*). Diabetes is classified according to etiological type. There are four main groups: type 1, type 2, gestational and other types (*1*). Most cases of diabetes (95–99%) fall into types 1 and 2, with type 2 the most prevalent form of diabetes, accounting for 80% to over 95% of cases, depending on the population.

In type 1 diabetes insulin secretion is reduced or absent as a result of destruction of the pancreatic beta cells by autoimmune or idiopathic processes. In most populations type 1 diabetes accounts for around 5–10% of cases of diabetes and is usually diagnosed in childhood. Untreated, the total absence of insulin leads to ketoacidosis, which can cause loss of consciousness and, without intervention, death. More than 90% of people who develop type 1 diabetes carry known genetic markers for the disease. Yet, the vast majority of people with genetic markers do not develop type 1 diabetes (*3*). It seems clear that exposure to environmental triggers in genetically susceptible individuals is needed. At present, with poor knowledge of the environmental triggers of type 1 diabetes, there are currently no effective approaches to its prevention.

Type 2 diabetes is characterized by both a reduction in insulin action and a relative deficiency of insulin secretion. The extent of the reduction in action or secretion can vary considerably between individuals. It is clear from family and twin studies that the risk of type 2

diabetes is strongly influenced by genetic background, although until recently the genetic markers that had been identified could account for only a few percent of the risk.

There are well-defined biological and behavioural risk factors for type 2 diabetes, most of which are thought to operate through increasing insulin resistance. The most important of these are overweight and obesity, particularly abdominal obesity, and physical inactivity (*4–6*). Other behavioural risk factors include certain dietary patterns (over and above any effect on obesity), such as diets low in whole grains and other sources of fibre (*7*), and smoking tobacco (*8*). The risk of type 2 diabetes in adulthood is increased in babies who are small for their gestational age (*9*). It has been hypothesized that lower birth weight represents poorer fetal nutrition and that this has a programming effect on aspects of physiology and metabolism, producing a so-called "thrifty phenotype" that enables the child and adult to survive better in a situation of nutritional scarcity. The risk of type 2 diabetes and cardiovascular diseases is increased when instead of nutritional scarcity there is relative excess.

There have been several highly successful trials showing that prevention, or at least delaying the onset, of type 2 diabetes is possible. In individuals at high risk a combination of moderate weight loss, increased physical activity and dietary advice lead to a 60% reduction in incidence (*10, 11*).

Gestational diabetes refers to diabetes that is first recognized during pregnancy (*1*). Although type 1 diabetes may occasionally present in pregnancy, gestational diabetes is largely a form of type 2 diabetes. Around 90% of women with gestational diabetes return to normal glucose tolerance within a few weeks of delivery, though they are at markedly increased risk of developing type 2 diabetes over the coming years (*12, 13*). Gestational diabetes is associated with increased risks to the fetus, including increased fetal death, malformation and macrosomia (*13, 14*). In addition, babies from mothers with gestational diabetes appear to be at increased risk of type 2 diabetes and cardiovascular disease as an adult.

Much of the suffering that is caused by diabetes is the result of complications, with a markedly increased risk of disease of large and small blood vessels, and of the peripheral and autonomic nervous system. At least 50% of people with diabetes die from cardiovascular disease (*15*); diabetic nephropathy is the leading single cause of end-stage renal disease in the United States of America and Europe (*16*); and diabetes is the leading cause of blindness in people under 60 years of age in industrialized countries (*17*) and the leading cause of lower limb amputation (*18*). While diabetes remains for many a cause of morbidity and premature mortality, there are some highly effective health care interventions to substantially reduce the incidence of diabetes-related complications (*19*). Differential or lack of access to good diabetes education and health care is therefore an important cause of differential outcomes in people with diabetes.

5.3 Analysis: equity and social determinants

Equity issues: between- and within-country distribution of diabetes

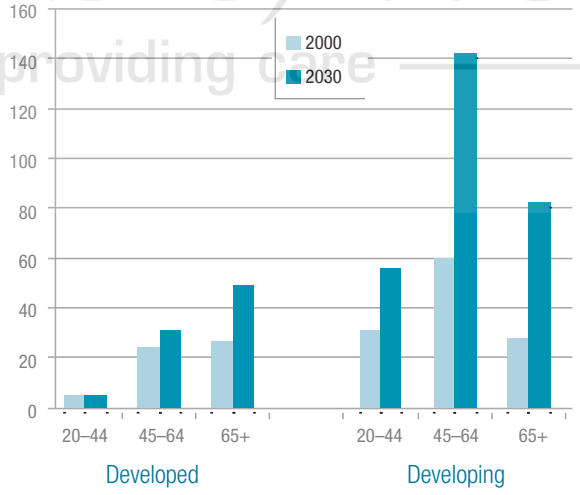
Distribution between low-, middle- and high-income countries

The World Health Organization (WHO) estimates that in the year 2000 around 171 million people, roughly 3% of the total world population, had diabetes, with the prevalence increasing with age (*20*). This number is projected to increase to 366 million by 2030, by when more than 80% of people with diabetes will live in low- and middle-income (developing) countries, where most new cases will occur in people aged 45 to 64 (Figure 5.1) (*20*).

Distribution within countries

Within low- and middle-income countries, but not in high-income countries, the prevalence of diabetes tends to be higher in urban than in rural areas, largely due to greater levels of obesity and physical inactivity in urban areas (*21*). There is also evidence from a variety

FIGURE 5.1 Estimated number of people with diabetes in developed and developing countries



Source: Wild et al. (*20*).

of settings that the prevalence and incidence of type 2 diabetes is related to socioeconomic position within a country. In most high-income countries the prevalence and incidence is inversely related to socioeconomic position, with the highest prevalence in those of lowest socioeconomic position (*22–28*). Examples from low- and middle-income countries show a different picture, with a higher prevalence in groups of high socioeconomic status (*29, 30*), though it is likely that the impact of diabetes is greatest in the groups of lower socioeconomic status, as reviewed later.

There is little evidence that the incidence of type 1 diabetes varies by socioeconomic status, and for this reason only type 2 diabetes is considered in the following two subsections examining the social determinants of the distribution of diabetes. However, for anyone who has diabetes, type 1 or type 2, its impact is strongly related to socioeconomic status, as the subsections on differential vulnerability and impact show.

Societal and environmental determinants of obesity and type 2 diabetes: economic development, urbanization and globalization

Human and economic development has taken place at different rates in different countries and populations, but generally involves the same major themes: mechanization; urbanization and the way towns and cities are organized; changes in the type of work we do and the way we work; and changes in the way we produce, process and consume our food. These changes, along with developments in health care, help to drive demographic and epidemiological transitions in which reduced mortality rates, particularly in infants and children, followed by reduced fertility rates lead to an ageing population (*31*). Ageing of the population will of itself increase the prevalence of type 2 diabetes and other age-related diseases. With economic development, the age-specific risks of type 2 diabetes also increase as environments become more urbanized and "obesogenic", promoting the consumption of more energy-dense foods and lower levels of physical activity (*32*).

Economic development is strongly associated with agricultural mechanization and urbanization (*33*). Between the years 2000 and 2030 it is estimated that the percentage of the world's population living in urban centres will increase from 47% to 60%, with the most dramatic increases in Africa and Asia (*34*). Urban living is often associated with lower levels of physical activity than traditional rural living (*35–37*), increasing the risk of overweight and obesity, metabolic syndrome, diabetes, cardiovascular disease and certain cancers (*38, 39*). In addition to the changing living and physical activity patterns associated with urbanization, aspects of globalization strongly promote other factors that directly contribute to the risk of obesity, diabetes and other noncommunicable diseases.

The trend towards increased consumption of energy-dense foods, high in saturated fat, sugar and salt, that is associated with urbanization in the vast majority of low- and middle-income countries has been referred to as the "nutrition transition" (*40, 41*). A factor encouraging this trend is increasing foreign direct investment[1] by transnational corporations. In the food sector, transnational corporations penetrate new markets in developing countries by buying shareholdings in local food industries, concentrating particularly on, and further developing, the lucrative processed food sector (*42–44*).

Studies of the relationship between neighbourhood socioeconomic position and access to healthy food, for example from supermarkets (*45*), and of the relationship between fast-food consumption and being heavier (*46, 47*), have not produced consistent results, and further examination of the issues is required (*45*).

Beliefs about what is a desirable body size and shape, a healthy diet and appropriate levels of physical activity may interact positively or negatively with the obesogenic environments created by urbanization and globalization. For example, a study from Cameroon (*48*) found that it was generally considered desirable for men and women to be large, a sign of wealth and health. More research is needed in this area, including to what extent, if at all, different beliefs contribute to socioeconomic inequities in obesity and type 2 diabetes. It is likely that globalization can have both positive (such as the spread of knowledge on healthier lifestyles) and negative (such as the promotion of highly processed foods) influences on the risk of diabetes (*49*) and other chronic diseases.

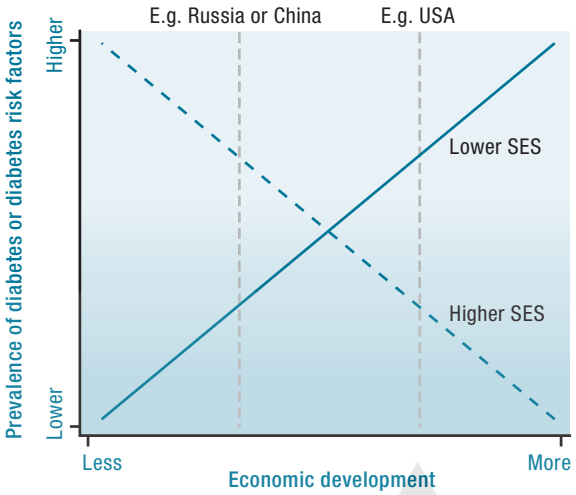
Differential vulnerability to type 2 diabetes

Obesity and body fat distribution by socioeconomic status

Underlying the distribution of type 2 diabetes by socioeconomic status is the distribution of obesity. In general, it has been found that in more developed economies obesity is associated with lower socioeconomic status while in less developed economies it is associated with higher socioeconomic status, though

1 Foreign direct investment: "Investment by an enterprise from one country into an entity or affiliate in another, in which the parent firm owns a substantial but not necessarily majority interest" (*42*).

FIGURE 5.2 Changing associations between economic development, socioeconomic status (SES) and prevalence of diabetes or diabetes risk factors



this picture is changing rapidly (*40, 50*) (Figure 5.2). There is evidence from richer countries that for a given level of obesity, lower socioeconomic status is related to a greater tendency to store fat within and around the abdomen (*51*), a risk factor for type 2 diabetes (*52*). Factors affecting body fat distribution include genetic make-up and certain behaviours, such as smoking and excessive alcohol intake (*53*). Neuroendocrine mechanisms may also be a factor but their relative importance is unclear (*54–57*). Obesity is often associated with a low level of physical activity, which tends to be distributed by socioeconomic status in the same way as obesity.

Dietary factors and smoking

Both dietary patterns and smoking tend to be strongly related to socioeconomic status, and typically will follow the same socioeconomic pattern as obesity. As noted in section 5.2, there is evidence that aspects of diet, over and above the calorie content of the diet, are related to the risk of type 2 diabetes. These include diets that are low in whole grains and other sources of fibre and high in saturated fat (*58*). There is also evidence that tobacco smoking independently increases the risk of type 2 diabetes (*8*).

Age

The prevalence and incidence of type 2 diabetes is strongly associated with age. There is some evidence that lower socioeconomic status is associated with an earlier onset of type 2 diabetes (*25*). It may simply be that in socioeconomic groups at highest risk of type 2 diabetes the onset tends on average to occur at younger ages than for those at lower risk. One of the implications of this is that they spend a greater length of time exposed to the risk of diabetes-related complications.

Population groups at particularly high risk of type 2 diabetes

Some groups have much higher rates of diabetes than others. For example, at a country level it is estimated that over 30% of adults in Nauru, 20% in the United Arab Emirates and 10% in Mexico have diabetes, compared to 2.9% in the United Kingdom (*59*). Within countries, higher rates of diabetes have been found among indigenous peoples and minority ethnic groups. The reasons for these differences are not fully known. Poorer socioeconomic circumstances among marginalized groups may contribute to higher levels of obesity and other risk factors, such as smoking and alcohol excess. Differences in genetic susceptibility may also play a role. It has also been postulated – the "thrifty phenotype hypothesis" (*60*) – that poor nutrition in early life can leave individuals vulnerable to obesity and type 2 diabetes if they grow up in an environment of relative excess, as may occur in a society undergoing rapid economic development.

Differential vulnerability over the life course

There is some evidence to support the notion that the thrifty phenotype leads to increased vulnerability to other risk factors over the life course. For example, in women in the United States, those most at risk of coronary heart disease and stroke were those who had low birth weight and were overweight as adults (*61*). While longitudinal datasets to assist investigation of the relative influence of exposures from birth through to adulthood on the risk of adult disease are relatively rare, those that have been analysed generally support a cumulative risk model, which hypothesizes that risk accumulates in an additive way over the life course (*62*).

Differential vulnerability through differential access to health care

Overview of the care needed for diabetes

Diabetes care and management requires a partnership between health care providers and people with diabetes. The chapter on diabetes (*19*) in the joint World Bank and WHO publication *Disease control priorities in developing countries*, 2nd edition (*DCP2*) (*63*) divides interventions into three levels based on an assessment of their cost-effectiveness and feasibility. The document helps to provide countries that have different health system capabilities with a structured approach to the establishment of effective and affordable care for diabetes.

Illustrative overview of global issues related to access to care

While the diabetes chapter of *DCP2* (*19*) does not explicitly address issues of inequality, the proposed levels of care are an acknowledgement that there are inequalities in the current capabilities of countries to deliver care for people with diabetes. Developed countries, such as the United Kingdom, attempt to deliver almost all of the recommended interventions. At the other extreme, access to and quality of diabetes care in Africa is very limited (*64*).

Likely expenditure on diabetes care in various countries was estimated by the International Diabetes Federation and reported in "international dollars" (ID) to allow for purchasing power in each country (*59*). Huge differences were found in health care resources likely to be spent on diabetes care in different countries. For example, the United States is estimated to spend 24 times more money per person on diabetes care than India (*59*).

For people with type 1 diabetes (and for some with type 2) the supply of insulin is crucial for survival. In many countries in Africa the supply of insulin has been erratic, even at large hospitals, for many years (*65–70*), and the prospects for people with type 1 diabetes are poor (*67*). Exemption from import duty and local production may reduce costs (*66*) and lessons could be learned from the arrangements made to make antiretroviral drugs available in developing countries (*67*). A second supply issue is the poor availability and high cost (often borne by the patient) of materials for blood glucose monitoring.

The result of differential access to health care for diabetes can be differences in outcomes for people with diabetes, and complication prevalence has been found to be inversely related to fairness (access) (*71*).

Socioeconomic status and access to health care within countries

Inequalities in access to diabetes care within countries can result from various factors, including the level of education of those who need care; the geographical distribution of health services and therefore the distance needed to travel to access them; and how health care for diabetes is paid for. The incidence of diabetes has been shown to be higher in low-education groups, and people with lower levels of education are less likely to be diagnosed and to adhere to treatment (*72*). Self-management is an important component of diabetes care and in the United States adherence to medication is related to education, possibly mediated through higher-level reasoning (*72*).

In countries without universal access to health care, ability to pay, whether for health insurance or directly for health care, is likely to play an important role in access to care for diabetes. Several surveys in the United States have shown that people without health insurance have less frequent examinations (for example of eyes and feet) and worse outcomes (poorer blood glucose control and more eye disease) (*73*). Health care for diabetes in some countries in Africa is very limited (*64*), and tends to be concentrated in urban centres and in secondary health facilities (*74*), which may exacerbate problems of coverage if health care for diabetes is not expanded at the same rate as projected urban growth (and a consequent increase in the geographical spread of people with diabetes within African countries).

Known (diagnosed) diabetes versus unknown (undiagnosed) diabetes

An important aspect of coverage of diabetes care is the distinction between known and unknown diabetes. While it might be assumed that identification and appropriate management of people at risk of diabetes is better in developed countries, the evidence that there is an association between economic development and the proportion of people with undiagnosed diabetes is not convincing. Figure 5.3 plots, for those countries for which data are available, the proportion of people with known diabetes against the country's health system ranking in the *World Health Report* (*75*).

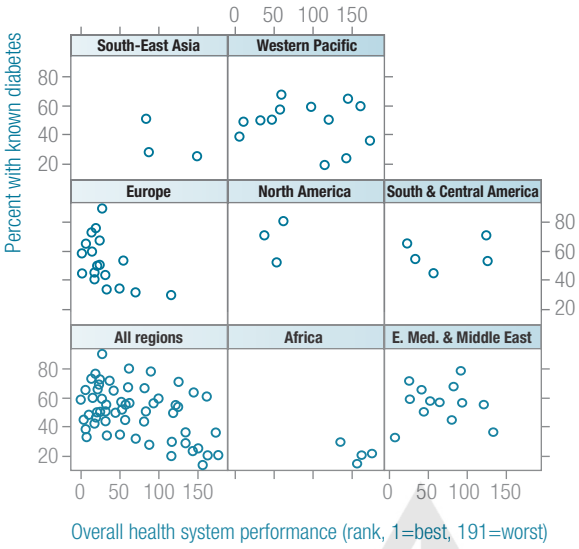
There is much variation within each region, and other than at the extremes, with over 70% known in North America and only around 20–30% in the few countries representing Africa, there is no strong association between level of development and the proportion of people with known diabetes. One factor that may contribute to this is survival bias; in countries in which health system performance is poor those with undiagnosed diabetes may be more likely to die than those with diagnosed diabetes.

Within countries there are varying associations between socioeconomic position and the likelihood of being diagnosed. In the United States there was no relationship between socioeconomic status, education or health insurance and the likelihood of being diagnosed (*76, 77*). In Bangladesh, however, the proportion of people who were not diagnosed was higher in rural than in urban areas (*30*).

Differential health care outcomes: diabetes control, complications and mortality

There are several important diabetes outcomes at the individual level, including glycaemic and blood

FIGURE 5.3 Proportion of people with known diabetes by overall health system performance



Sources: International Diabetes Federation (*59*) and World Health Organization (*75*). Each circle represents a country.

pressure control; other risk factors for diabetes-related complications, particularly dyslipidaemia; diabetes-related complications, including cardiovascular disease; and premature mortality. This subsection examines the relationships between socioeconomic position and diabetes control, complications and mortality by first comparing differences in outcomes across the world, and then differences within countries.

Blood glucose and blood pressure control

Diabetes is generally not well controlled in a large proportion of people, and the proportion of people with diagnosed diabetes who are poorly controlled is inversely associated with country-level economic development. For example, an evaluation of the management of diabetes in the United Kingdom found that just under half of the patients were poorly controlled (HbA1c > 7.5%) (*78*). However, control of people with diabetes in sub-Saharan Africa is generally much poorer: few ever have their HbA1c checked, assessment of fasting blood glucose is also much less frequent than in higher-income countries, and control is poor in those who are assessed (*64*). In a survey of people with known diabetes in Dar es Salaam, United Republic of Tanzania, only 10% had good HbA1c (below 6.5%) (*79*).

There is also clear evidence of an association between socioeconomic status and glucose control within countries, particularly from North America and Europe, where glycaemic control is worse in people of lower socioeconomic status (*73, 80*). In countries with universal health care that is free at the point of access income-related measures of socioeconomic status should not be associated strongly with control, but associations with other measures of socioeconomic status, such as area deprivation or education, remain (*24, 81, 82*). In countries that do not have universal health care, such as the United States, health insurance appears to be an important factor in the quality of care and glycaemic control (*73*), while lack of health insurance is associated with worse control (*83*).

As reviewed by the diabetes chapter of *DCP2* (*19*), blood pressure control, alongside blood glucose control, is one of the most cost-effective interventions for the prevention of both macro- and microvascular diabetes-related complications in people with diabetes. Studies from developed countries are largely consistent in finding that blood pressure (in the general population) is inversely related to socioeconomic status (*84*), a relationship that has also been found in urban areas of the United Republic of Tanzania (*85*). However, the limited evidence available on the relationship between blood pressure and socioeconomic status in people with diabetes is less consistent, with evidence both for (*86*) and against (*87*) an inverse relationship.

Diabetes-related complications

Rates of diabetes complications can be difficult to compare internationally because there are no standard international definitions of diabetes complications. Other factors add further difficulties to making valid comparisons, including age structure, duration of diabetes, type of diabetes and whether the data are from a clinic or population sample. Table 5.1 summarizes the maximum and minimum prevalence rates of four categories of diabetes complications from the *Diabetes atlas* (*59*). These ranges are broadly similar for each region and mask the variation within regions. Two multicentre studies (*88, 89*) of people with type 1 diabetes found a broad association between health system performance and prevalence rates of diabetes complications, with higher rates of complications in countries with poorer health system performance.

Within countries, diabetes-related complications have been shown to be more frequent in people of lower socioeconomic status in North America and Europe (*73, 80*). In England people with less education were more likely to suffer from complications such as retinopathy and heart disease (*83*). However, one health area of the United Kingdom that implemented a diabetes information system designed to improve care found that there was no association between complications and socioeconomic status, suggesting that improvements in systems can be equitable (*90*). There is also some evidence of an association between

TABLE 5.1 Summary of prevalence (%) ranges of diabetes complications (all diabetes)

	Neuropathy (various definitions)		Nephropathy (overt)		Retinopathy		Coronary heart disease	
Region	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Africa	27.6	31.2	5.3	23.8	15.1	55.4	n.a.	n.a.
East Mediterranean and Middle East	21.9	56.0	6.7	6.7	14.4	64.1	15.0	19.8
Europe	16.8	33.7	7.6	15.0	11.3	44.7	3.3	25.2
North America	28.5	47.6	6.1	6.1	28.5	62.1	9.8	43.4
South and Central America	n.a.	n.a.	11.3	11.3	n.a.	n.a.	n.a.	n.a.
South-East Asia	12.7	15.0	3.8	3.8	11.0	30.2	2.0	33.7
Western Pacific	7.3	44.0	1.0	57.1	21.0	48.6	1.0	31.1
Overall	7.3	56.0	5.3	23.8	11.0	64.1	1.0	43.4

n.a. not available.

Source: Diabetes atlas (*59*).

socioeconomic position and avoidable hospitalizations. In Canada avoidable hospitalization rates were higher in people with diabetes from low-income neighbourhoods, although the relationship was much weaker than seen in the United States (*91*), but there was no gradient in access to health care (*92*).

Diabetes-related mortality rates

There is very little direct evidence available regarding global inequalities in diabetes mortality rates. An important reason for this is that diabetes is often not recorded on death certificates in countries that have well-functioning vital registration systems (*93*), and in many countries of the world vital registration systems do not function and deaths and causes of death are not recorded at all (*94*). However, those studies that have been undertaken show higher mortality rates in people with diabetes across all ages, with the greatest relative difference in younger adults (*15*).

Within-country analyses of mortality in cohorts of people with diabetes by socioeconomic status generally show an inverse relationship with socioeconomic status, as typically found in the non-diabetic population. In studies from the United Kingdom (*86, 95*) excess mortality from cardiovascular disease accounted for much of the socioeconomic gradient (*86, 96*). Although much more limited, there are some data on mortality in people with diabetes by socioeconomic status from developing countries. For example, in the United Republic of Tanzania mortality rates were more than double for those with no formal education and lower for those who worked in offices (*97, 98*).

Differential consequences: quality of life and socioeconomic status

There is more literature on the consequences of type 1 than on the consequences of type 2 diabetes, and this section therefore draws more on research on type 1 diabetes than previous sections.

Depression and quality of life

There are few studies that explicitly examine quality of life in people with diabetes or present results by socioeconomic group. There is good evidence, however, that diabetes can lead to depression and negatively impact the quality of life. A meta-analysis of 39 studies concluded that the likelihood of depression in people with diabetes is double that of those without (*99*). There is some indirect evidence of a link between socioeconomic status and diabetes-related depression (*100*). It is likely that depression and quality of life in people with diabetes are related to socioeconomic status through differential complication and control rates by socioeconomic status. However, there currently seems to be no literature that describes the relationship between socioeconomic status and depression or quality of life in people with diabetes given the same level of glycaemic control or severity of complications.

Income, costs and losses

There are few studies that directly address the issue of social inequities in income or costs for people with diabetes, and few of those report outcomes by socioeconomic group. Diabetes does seem to result in

additional costs or losses, and these might be expected to have a greater impact along an income gradient. For example, a study in the United Kingdom concluded that while a small proportion of people with type 2 diabetes (6%) or their carers (11%) lose earnings as a result of diabetes, the amounts they lose are large (*101*). In the United States, the proportion of income spent on health care was 80% higher in families with a child with type 1 diabetes than in families without (*102*). A nationally representative study in India found a gradient in the proportion of household income spent on diabetes care, with the highest proportion (34%) in the low-income group and the smallest (4.8%) in the high-income group (*103*).

Access to health insurance and care

Where health insurance is an important part of the health system, access to insurance and care may be limited in people with diabetes. One study that compared families with and without children with type 1 diabetes found that children with type 1 diabetes are more likely to be refused health insurance than those who do not have diabetes (*102*). Another study of mostly African-American and Hispanic young people with diabetes in the United States concluded that they were "largely excluded from health insurance at age 18 years" (*104*).

Education and employment

A review of the social and economic consequences of childhood-onset type 1 diabetes found many mixed results (*105*). Overall it seems that although people with type 1 diabetes tend to miss more school than those without, there is no difference in ultimate educational attainment. However, poor glycaemic control, serious hypoglycaemic events, early onset of type 1 diabetes and longer duration were all associated with worse school attainment. This may indicate that the effects of diabetes on work might be more sensitive than they are on education (*105*). Another example of the effect of type 1 diabetes on employment comes from the United States, where 21% of those aged 20 years and above had been denied employment because of their diabetes (*104*). These effects on employment and income could potentially increase the vulnerability of people with diabetes, particularly in countries that do not have universal access to health care.

5.4 Discussion: approaches to addressing the social determinants of diabetes and reducing their impact

Summary of the pathways leading to diabetes and its consequences

This chapter has explored the social determinants of diabetes and its consequences following a hierarchical model of causation. As indicated in the introduction, this model has been used to structure the chapter. The model is summarized in Figure 5.4, and is based on five different levels, with socioeconomic context leading to differences in exposure, which in turn leads to differences in vulnerability to diabetes and health care outcomes, which leads to differences in consequences on quality of life and socioeconomic circumstances. Each of these levels is discussed in the subsections that comprise section 5.3.

In summary, the model suggests that the following pathways operate in increasing the risk of diabetes and its consequences. Globalization and human development through industrialization involve, among other things, increased mechanization and urbanization, which result in diets with higher energy and lower fibre content, and reduced physical activity. Changes in diet and physical activity lead to increased risk of obesity and diabetes. In the early stages of economic development these changes affect people in groups of higher socioeconomic status, but relatively rapidly this situation becomes inverted and groups of lower socioeconomic status are affected more than those of higher socioeconomic status. In general, poorer and less educated people in urban centres are more vulnerable to poor diet and physical inactivity, and the availability of healthy food options may be limited or they may be more expensive. Certain groups, such as people of South Asian origin, are more prone to type 2 diabetes given the same level of risk factors and are therefore at increased risk when their way of life becomes more urbanized and mechanized, such as through migration or economic development.

Those who are at high risk of diabetes, and especially those who get diabetes, need to be identified and engage in an intervention programme that involves the health system, the community and the patient. In countries that do not provide universal, well-distributed health care or where patients have to pay for medication or the costs of monitoring, people who are disadvantaged will be more adversely affected. If insurance, monitoring and treatment costs are not covered by the health care system then people with diabetes will incur greater health care expenditure and this, as

a proportion of income, follows a social gradient. People with diabetes who are not well controlled develop complications earlier, develop more severe complications and suffer reduced quality of life. This causes them to miss more work, and possibly lose or be refused work, ultimately reducing their income. Both quality of life and life expectancy are reduced.

Entry-points for interventions

Figure 5.4 gives an overview of diabetes-related pathways. Socioeconomic gradients are seen at every stage. The top half of the model is based on type 2 diabetes; the determinants of type 1 diabetes are less well understood but the outcomes are similar. The lines (pathways) between each of the nodes provide opportunities for intervention that could help to reduce inequities in diabetes incidence, outcomes and consequences.

Starting from the position of differential health care outcomes in the pathway, people who are more disadvantaged are more likely to develop diabetes and are likely to have worse glucose control. The proximal factors that make people more vulnerable to incident diabetes and poor control are access to and type of health care; the interaction of genes and early life experience, obesity, physical inactivity and poor diet; smoking (entry-points and interventions for smoking are not covered here as they are covered in Chapter 11 on tobacco); and being older. Many of these factors, except genes and being older, can potentially be modified in the most disadvantaged to reduce the differentials in the outcomes at the individual level.

Access to and type of health care covers a range of issues, including universal care versus access to care dependent on the ability to pay, or limited access to insurance schemes; the geographical distribution of health care for diabetes; the type, quantity and training of personnel for the treatment of diabetes; and the methods and language used to educate people in self-management (*106*). Improving these reduces the differential in vulnerability to poor diabetes outcomes. Early life experience can be modified by improving nutrition and other conditions of women during pregnancy. Knowledge of which genes increase the risk of diabetes or its complications might be employed in the future to target interventions in high-risk groups and again reduce the differential in vulnerability.

Obesity is strongly associated with diabetes risk and poor diabetes outcomes and is also more common in disadvantaged populations, except perhaps in rural low-income countries. There is increasing awareness of this association and the focus in the popular media has been on reducing obesity. There is some debate as to the extent to which obesity itself is an independent risk factor or whether obesity is a marker for poor diet and physical inactivity (*107*), the two main effects of the "obesogenic environment" (*108*). There is certainly evidence that physical inactivity is a risk factor for diabetes independent of its relationship with high body mass index (*4*).

Potential entry-points at this level include improving diet, increasing physical activity and reducing smoking in disadvantaged populations. Modifying these require action at the individual level and also at the level of society by changing the exposures. Recently there has been sufficient political and popular will to change exposure with respect to smoking by the introduction of bans on smoking in public places and limitations on advertising for smoking. Changes to elements that create the obesogenic environment, such as the design and construction of urban environments, the marketing of food and social norms are also possible given sufficient popular and political will.

At the top levels, fundamental changes to the way that we live, eat, work and organize health care systems have the potential to change the environment that contributes so much to driving the increase in diabetes prevalence in those who are disadvantaged and to ensure that being from a disadvantaged population does not have an effect on access to good-quality care for diabetes.

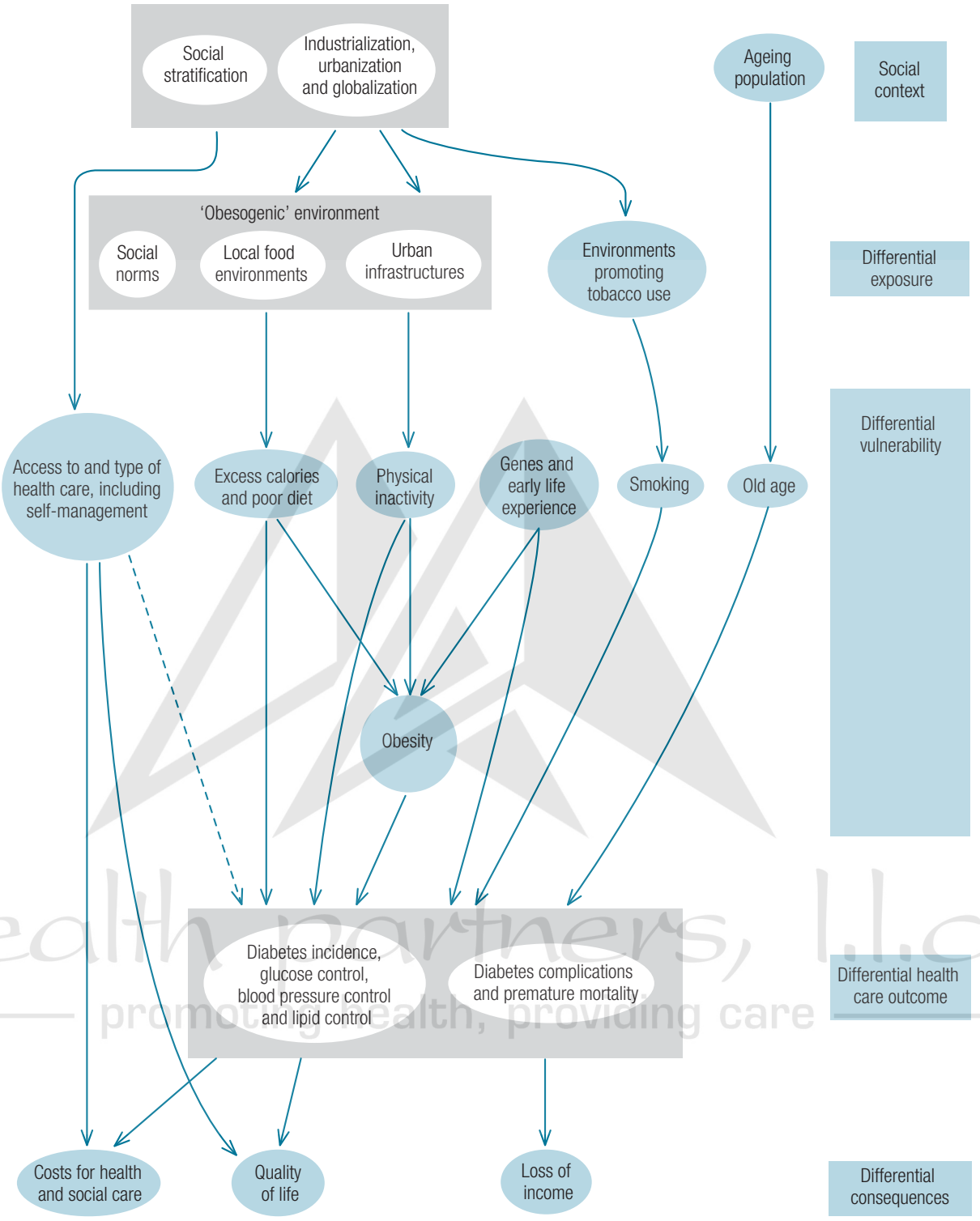
Returning to the bottom of the model, differentials in the consequences of diabetes are addressed. People from disadvantaged groups are more likely to develop diabetes complications and suffer premature mortality. The data for the other consequences of diabetes are somewhat limited and rarely available separately for different socioeconomic groups. Loss of income means that people with diabetes are economically disadvantaged and increased costs of health care will have a greater effect on those with lower incomes, especially when health insurance payments are required or if health insurance companies exclude people with diabetes.

5.5 Interventions

What has been tried and learned?

There is a relatively strong evidence base for the prevention of type 2 diabetes and the prevention of diabetes-related complications. A WHO report (*109*) on the prevention of diabetes and its complications reviews the evidence and provides guidance on its implementation, particularly in low- and middle-income countries. However, while the overall evidence base on prevention is strong, there is very little evidence on interventions that have been implemented to

FIGURE 5.4 Overview of diabetes-related pathways



reduce inequities in the determinants, outcomes and consequences of diabetes (*110*). Most intervention studies note any inequities observed, but do not attempt to change them, or they are designed to show that they work in a specific high-risk group, but are not compared to a general population control group; the controls are usually members of the high-risk group who receive "normal" care as opposed to the intervention being evaluated.

The most direct attempt to reduce inequities that include inequities in diabetes is seen in the REACH 2010 project in the United States, a large, multifactorial community-based attempt to reduce racial and ethnic inequities in six key health areas, one of which is diabetes (*110*). There are many interventions involved, including developing partnerships, supporting faith-based groups, nutrition and physical activity classes, and classes specifically designed to change social and cultural norms. This project is being evaluated using quantitative and qualitative methods, including risk factor surveys, and its results are awaited with interest.

It is reasonable to ask why so few interventions to reduce inequities in the determinants of diabetes have been conducted. One possibility is that there is surprisingly little evidence about interventions that reduce the determinants generally, let alone in specific disadvantaged groups. Returning to the pathway model, an important entry-point is tackling the two components of the obesogenic environment. While there is evidence in a research setting that diets and pharmacological measures can lead to a reduction in obesity when implemented as focused interventions at the individual level (*111, 112*), there is very little evidence to support public health interventions to improve food environments or increase physical activity (*113, 114*).

Potential interventions

As indicated above the evidence base on interventions specifically designed to reduce the social determinants of diabetes is very limited, so the interventions suggested here are largely untested. The majority of the potential interventions are not specific to diabetes but applicable to other chronic diseases, including cardiovascular disease, chronic respiratory disease and many cancers. Arguably therefore it is of limited value to consider separately the potential interventions for closely related chronic diseases, which tend to share very similar determinants. It is more efficient, and likely to be more effective, to consider diseases with similar determinants together.

Interventions at the level of society are policy-type interventions, agreements within and between governments regarding the primary upstream determinants of inequities in diabetes risk and diabetes care. These may take the form of noble targets or more forceful national or international law, and would primarily be aimed at limiting the availability of unhealthy food or environments, and increasing the availability of healthy choices. These interventions would need to be implemented in a way that does not hinder the economic development of low- and middle-income countries, and will increasingly need to be focused on a wider age range to counter the risk posed by increasing childhood obesity at one end of the spectrum and ageing populations at the other.

Interventions at the level of exposure would mostly address the obesogenic environment and would involve changes on a large but manageable scale. These would include measures to address the social norms regarding desirable body size, changing urban infrastructures to promote physical activity, and changing local food environments so that they promote healthy food options.

Interventions to address inequities in vulnerability would include improved access to health care, reduction or removal of patient-borne costs, improved early life experiences for those who are currently disadvantaged, and possibly gene profiles to identify those at high risk. However, while these interventions are causally closer to the main diabetes outcomes, evidence to support them is generally limited.

Health care outcome interventions to improve compliance and adherence are supported by reasonably good evidence (*80, 115, 116*) and could include increased screening of those at high risk, use of folk media to reach the disadvantaged, culturally and linguistically appropriate health education, and improved self-help and follow-up. Such measures should help to reduce inequities, although the screening tools need further work to improve their performance in populations other than those descended from Europeans. The primary intervention that is likely to have the greatest impact on inequities in care for diabetes is the establishment of a system that provides access irrespective of the ability to pay, including access to consultations, medication and materials for monitoring. It is, of course, acknowledged that inequities by socioeconomic status also exist in health systems that do provide access irrespective of the ability to pay, and that providing universal access compared to limited access will reduce but not eliminate them.

There is very little information regarding inequities in the consequences of diabetes, other than that the economically disadvantaged will suffer greater adverse consequences where the health system requires user fees or is based on private health insurance.

Tackling inequalities in the obesogenic environment requires action on a large scale, and while the broad issues are reasonably well established there is very little evidence supporting interventions to change the obesogenic environment or the inequalities seen in such environments. There are three main elements to the obesogenic environment: social norms regarding desirable body size and shape; local food environments; and the design of urban areas. Integrated interventions would be required and would probably need to take place across an entire municipality or district. Appropriate professionals would need to measure the health and economic impact of the changes to provide evidence on whether or not the changes worked. If such interventions can be shown to work it would increase the chances for their introduction in other areas. Such evidence could be particularly important for low- and middle-income countries where urbanization is currently taking place more rapidly because it could help them to plan their urban development to create environments that help to avoid or reduce the increase in diabetes.

5.6 Implications

Managing the change process

Very few of the interventions can be implemented by the health sector alone, or even at all. Most of the interventions in the matrices are broad, structural and policy-type interventions, rather than specific clinical interventions. This, and the assessment that political feasibility is often the weakest aspect of many of the interventions, means that implementing them requires political will at high levels. Many of the interventions at this level are likely to be opposed by people or groups that might see the interventions as a direct threat to their business model or as a likely source of additional expense, for example through the need to develop new practices or approaches. Much has been written on the importance of advocacy for change, and relevant recent initiatives from within WHO include the production and promotion of the report *Preventing chronic diseases: a vital investment* (*39*), and a programme run jointly with the International Diabetes Federation known as Diabetes Action Now (*117*). Both of these initiatives have emphasized the relationships between poverty and chronic diseases, or specifically diabetes, and their consequences, and have promoted approaches to prevention appropriate to low- and middle-income situations. These initiatives have drawn attention to the importance of an integrated, cross-sectoral approach to changing policy to prevent and improve outcomes for people with diabetes and other chronic diseases. Ideally, policies on health financing, health systems, the built environment, and legislation and regulation (such as on food labelling and advertising) should provide a complementary framework for prevention.

Measuring the impact of interventions

There is limited information available regarding changes in some of the key upstream determinants of diabetes and of diabetes prevalence itself and this has contributed to the steady rise in prevalence of type 2 diabetes generally, and particularly in disadvantaged groups and populations. Now that we are beginning to broadly understand the key issues, it is important to monitor the prevalence of diabetes risk factors and of diabetes at country level and within countries. WHO has developed a three-stepped approach to the use of representative and repeated surveys for noncommunicable diseases (*118*) that allows for differences in the resources available for countries to conduct large surveys. Conducting representative surveys of diabetes prevalence is difficult and expensive, and even economically developed countries do not perform such surveys regularly.

Every three years the International Diabetes Federation produces the *Diabetes atlas* (*59*), in which it pulls together summary statistics of diabetes prevalence and complications from across the world. These are presented in tables and figures that facilitate comparisons across countries. This work could potentially be extended in two directions: to provide this information within countries and perhaps regarding population subgroups; and also to include information on upstream determinants of diabetes and diabetes inequities, such as the walkability of urban centres, distribution of food outlets and distribution of health care for diabetes relative to need. Some of these data may already be available but are not yet organized or collected together, while for many low-income countries additional data collection may be required. Gathering this information would take a considerable amount of effort in the first instance, and the data would rapidly become out of date in low-income countries that are growing and changing with urbanization.

There are many items of data that would help to monitor and evaluate progress and interventions at the level of exposure, relating directly to data needs at the society level. Whereas the society level is concerned more with broad policy-level data, the exposure level requires data for measuring exposures more directly. Some of the data required at this level could be obtained using health survey questionnaires, while other data fit more naturally within the purview of other sectors of local government. Most data collection activities involve costs and, for many of the data items at this level, arrangements would need to be made to plan and pay

for the collection of the data and then disseminate and share the results between these sectors of government.

The data needed to measure aspects of vulnerability and the effect of interventions on inequities are mostly within the realm of the health system. Some of the data would ideally be obtained from representative population-based surveys, although alternative means may also be possible. Population-based data are best to ensure that people from the general population who are more disadvantaged are not excluded from the data collection process, as may happen if surveys are only based on those engaged in formal employment or using exit interviews from health facilities.

The data to measure outcomes can largely be obtained from routine health administrative records, assuming that these are collected and recorded accurately. In settings where there is much migration and medical records are not well integrated, as in many low- and middle-income countries, aggregating routine administrative data will be challenging. Maintaining medical records for the clinical management of diabetes is already difficult in these circumstances, and patient-held records (for example a school exercise book) have been used to compensate for the lack of integrated health information systems in such settings (*119*). This approach could be formalized and integrated within the health system, for example by using a standard approach for generating unique identifiers that is not dependent on a single health facility's records system or a computerized system. A sample of the patient-held records could then be audited on a periodic basis to provide the aggregate statistics required for monitoring outcomes. Any mechanism for monitoring patient outcomes would also need to report on and tackle those who default from clinics. In countries where communication systems are weak, and especially where distances are large, managing this could be difficult.

Identifying people at high risk of diabetes is important because it has been demonstrated that intensive interventions in this group can reduce the incidence of diabetes (*10, 11*) and reduce inequalities in complications (*72*). Risk scores that use routine health facility data (in economically developed countries) have been shown to be an effective way of detecting Europid people at high risk but they need further validation work for other ethnic groups (*116*). Again, poorly integrated medical records or health information systems will make it more difficult to collect these data and report on them, although the risk score approach could still be used with individuals to identify them and refer them for the intervention.

An important part of making health interventions work for people with diabetes (or indeed for those at high risk of diabetes) is to make sure that the approaches used are culturally and linguistically appropriate (*80*). One way to do this is through formal ethnographic research, although this may be too expensive and time consuming to repeat on a large scale. An alternative approach may be to foster the creation of patient self-help groups, supported by medical professionals to ensure that core messages are being transmitted correctly.

To properly measure the effects of interventions on inequities in the consequences of diabetes in countries that currently do not have universal access to health care will be hard to do without population-based surveys of people with diabetes. This is because some of those who are most disadvantaged may be excluded from health care that is funded by private health insurance or user fees. In countries where universal access to health care is available and the health system functions reasonably well most of the data required can be obtained from routine clinic data or additional clinic-based surveys.

Perhaps the most important conclusion that comes from considering the information needs for measuring the impact of interventions at all levels, from social context through to differentials in consequences, is that at present there is very little information available, even for high-income countries, and the information that is available is rarely integrated into health statistics.

5.7 Conclusion: significance for public health programmes and the diabetes programme at WHO

This chapter has reviewed the determinants of diabetes, its complications and its consequences for social and economic well-being. The information presented is not new and will be familiar to many in the field of diabetes. Arguably, however, the approach taken here is unusual and illuminating in its scope. Most epidemiological work on the causes of diabetes and its complications tends to focus on the identification of personal characteristics (risk factors), such as lifestyle and physical and biochemical characteristics. Sometimes personal measures of social and economic status are considered, as reviewed in this chapter, but they are often ignored (either entirely or through controlling them out in the statistical analysis). While the paradigm of risk factor epidemiology for diabetes and other chronic diseases has had notable success in adding to knowledge on disease causation and feeding directly into some highly effective preventive interventions (almost always directed at individuals at high risk), it has also been criticized for ignoring the wider environment within

which risk factors arise and thus providing a limited and biased view of disease causation from a population perspective (*120–122*). This chapter has illustrated how broad social and economic factors determine the vulnerability of individuals to the development of diabetes and its complications. The challenge to public programmes concerned with the prevention of diabetes, its complications and consequences is to develop and evaluate ways of addressing the underlying factors that render individuals vulnerable.

An obvious example of the challenge of addressing the underlying factors (exposures) that render individuals vulnerable to diabetes and its consequences is finding ways to reduce the obesogenic environment. It is increasingly accepted, on the basis of much evidence, that approaches to reducing obesity, the major risk factor for type 2 diabetes, "that are firmly based on the principle of personal education and behaviour change are unlikely to succeed in an environment in which there are plentiful inducements to engage in opposing behaviours" (*123*). A founding basis of the WHO Strategy on Diet, Physical Activity and Health (*124*) is the need to use policy to change the obesogenic environment, analogous to the way in which policy measures have been shown to be highly effective in reducing smoking (*11*). However, the evidence base for reducing the obesogenic environment is less well developed than that for reducing an environment that encourages smoking (*125*). Public health programmes need to make best use of the evidence that does exist to design interventions that are then properly evaluated so that they add to the available evidence base on diabetes. While this may prove challenging, the alternative of doing any less to stop the rapidly increasing prevalence throughout the world of this deadly disease would be short-sighted and unacceptable.

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Food safety: equity and social determinants

6

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Figure

Table

6.1 Summary

Foodborne diseases are the illnesses, generally infectious or toxic in nature, caused by pathogenic agents that enter the body through the ingestion of food. The incidence of foodborne diseases varies greatly between countries, and low-income countries bear the brunt of the problem. However, episodes of foodborne illness continue to constitute a challenge to public health even in industrialized countries, despite advances in food hygiene, food protection and food control. Inappropriate modes of food consumption, handling and production entail exposure to food hazards, disproportionately affecting the most disadvantaged groups. Certain conditions, such as food insecurity, malnutrition and comorbidity, may increase vulnerability to unsafe food items. At the structural level a number of social determinants (ethnicity, gender, education, migration, trade, urbanization, demographic factors and poverty) imply inequity in relation to food safety. Accordingly, this chapter leads to three main lines of recommended interventions: strengthening food safety systems; addressing the conditions leading to increased vulnerability; and addressing the root causes of inequity in food safety.

6.2 Introduction

Food safety: scope and burden

Foodborne diseases are the illnesses, generally infectious or toxic in nature, caused by pathogenic agents ("hazards") that enter the body through the ingestion of food. Foodborne diseases are a major cause of suffering and death throughout the world. Besides direct health consequences, the economic costs associated with foodborne diseases represent a significant economic burden on consumers, the food industry and governments. Foodborne illnesses can also reduce labour productivity, impose substantial stress on the health care system, and reduce economic output as a result of loss in confidence in the food production and marketing system. Food can be the vector of a large number of hazards. More than 200 known diseases can be transmitted by food (*1*). Table 6.1 provides some examples of broad categories of foodborne hazards.

Foodborne diseases share some common characteristics regarding their determinants and possible preventive interventions:

- Infectious foodborne biological pathogens are incidentally introduced into foods following improper hygiene and sanitation at any stage in food production, collection, processing, transport, handling, distribution and preparation for final consumption.
- A large part of microbiological or chemical foodborne diseases are directly (for example from drinking-water pollution) or indirectly (for example from air, water or soil through plants or animals) attributable to environmental factors.
- Infectious foodborne pathogens have, in most cases, an animal reservoir from which they can spread directly or indirectly to humans (*2*). Infectious foodborne diseases are very often foodborne zoonoses.

TABLE 6.1 Examples of foodborne hazards

Type of hazard	Examples
Biological hazards	Zoonotic agents that may enter the food chain (e.g. *Brucella, Salmonella*, prions)
	Pathogens predominantly foodborne (e.g. *Listeria monocytogenes*, *Trichinella, Toxoplasma*, *Cryptosporidium, Campylobacter jejuni, Yersinia enterocolitica*)
	Established pathogens emerging in new vehicles or new situations (e.g. *Salmonella enteritidis* in eggs, hepatitis A virus in vegetables, Norwalk/Norwalk-like virus in seafoods)
	Pathogens newly associated with foodborne transmission (e.g. *Escherichia coli* O157:H7, *Vibrio vulnificus*, *Vibrio cholerae*, *Cyclospora cayetanensis*)
	Antimicrobial-resistant pathogens (e.g. *Salmonella typhimurium* DT104)
Chemical hazards	Naturally occurring toxicants (e.g. phytoestrogens, marine biotoxins, mycotoxins)
	Environmental or industrial contaminants (e.g. mercury, lead, polychlorinated biphenyls, dioxins, radionucleides)
	Residues of agricultural chemicals, veterinary drugs, surface sanitizers
	Toxic compounds generated during food processing (e.g. polycyclic aromatic hydrocarbons, acrylamide)
	Toxic substances derived from packaging or other materials in contact with foods
	New issues in toxicology, including allergenicity, endocrine disruption (e.g. phytoestrogens, pesticide residues), mutagenicity, genotoxicity, immunotoxicity
Physical hazards	*(not considered in this chapter)*

- The factors that influence exposure to foodborne pathogens are often tied to human behaviour, in particular consumption, handling, preparation and storage behaviours.
- Due to the globalization of food trade, foodborne pathogens can spread rapidly and worldwide.
- A variety of food crises and information on outbreaks have heightened consumer awareness, creating a large social demand for improving the science base of decisions and for enhancing the guarantee of food safety.

Foodborne diseases comprise a variety of clinical syndromes. Gastroenteritis is the most frequent; while generally mild, it may also result in serious illness requiring hospitalization and possibly leading to long-term disability or death (*3*). Some foodborne pathogens can cause systemic infections and other acute syndromes, for example meningitis, septicaemia, acute neurological symptoms, perinatal loss or acute hepatitis (*4, 5*) and may also lead to serious complications and long-term consequences, perhaps in 2–5% of cases (*6*), including reactive arthritis, Guillain-Barré syndrome (the most common cause of acute paralysis in children and adults) and haemolytic uraemic syndrome (*4, 7*). Chronic sequelae may be more detrimental than acute disease and thus increase the global burden of foodborne diseases. Chemical toxicology focuses primarily (except for allergy or occupational illness) on long-term effects such as endocrine disruption, immunotoxicity, mutagenicity, carcinogenicity or teratogenicity (*8*). An attempt to elaborate a comprehensive evidence map of clinical presentations by etiology has recently been made by the World Health Organization (WHO) in the framework of its estimation of the global burden of foodborne diseases (*5*). The scientific evidence available on the biological hazards is much more substantial than that on the chemical hazards, with regard to burden of disease in general and equity aspects in particular.

The incidence of foodborne diseases varies greatly between countries, with low-income countries bearing the brunt. In industrialized countries, continuing advances in food hygiene, food protection and food control are highly effective in improving the safety of the food supply. Nevertheless, episodes of foodborne illness still constitute a challenge to public health. For example, each year foodborne diseases cause approximately 2 366 000 cases, 21 138 hospitalizations and 718 deaths in England and Wales (*9*). Though estimates vary greatly, the frequency of foodborne diseases is probably of the same order of magnitude in most industrialized countries (*10, 11*). In many developing countries, the high prevalence of diarrhoeal diseases suggests that many underlying food safety problems still prevail. With some uncertainty WHO (*12*) has estimated that diarrhoeal diseases cause an annual 1.9 million deaths globally, of which 99.8% occur in developing countries and 90% occur in children. Indirectly, 12 to 13 million die from the combined effects of diarrhoea and malnutrition.

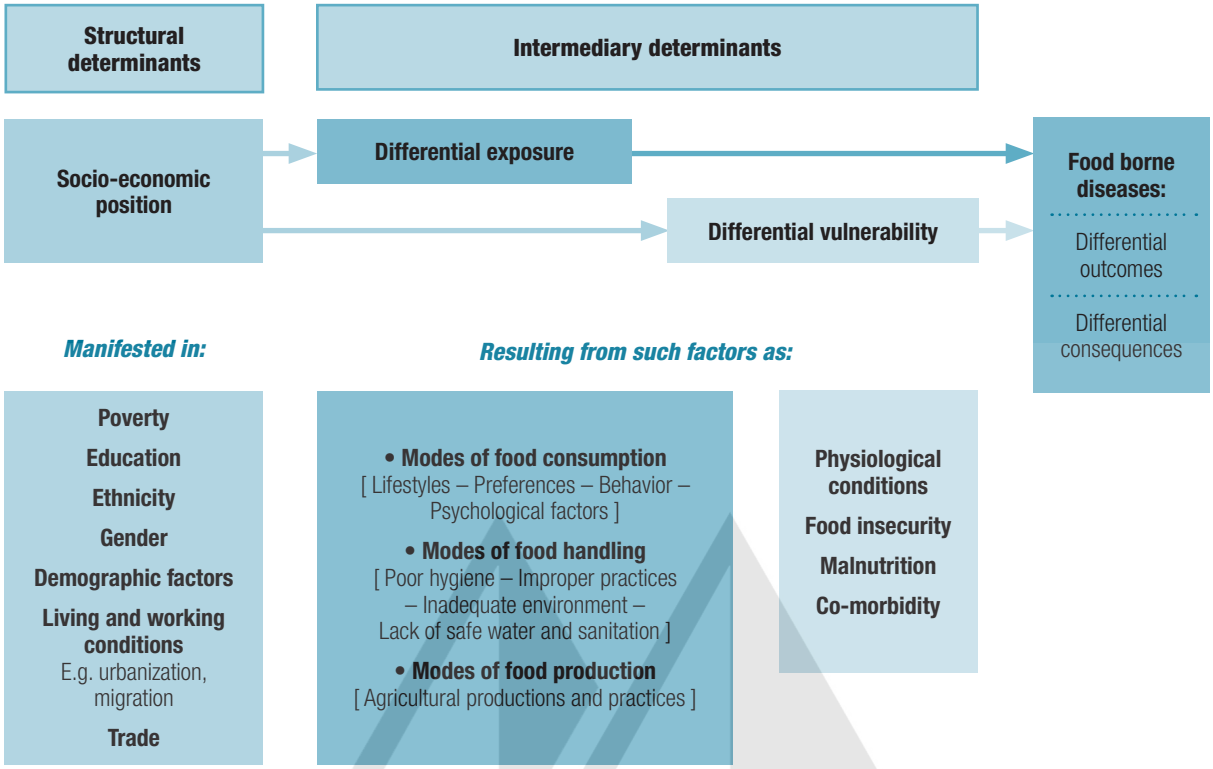
Foodborne diseases have profound socioeconomic consequences related to inequities. For example, the costs incurred can represent a significant economic burden, inequitably impacting the poor. Direct costs can be categorized as costs borne by the ill individuals or their families, public health costs to society and costs incurred by the industry (*13, 14*). Additional economic consequences and indirect costs can be incurred by governments (for example costs of epidemiological investigations and disease eradication), the food industry (litigation costs, product recall and market impact), and the overall economy of a country (market and trade losses) (*15*). The costs can be significant (*16, 17*); for example, in the United States of America, estimates of annual financial losses vary from US$ 2.9–6.7 billion (*18*) to US$ 8.43 billion (*13*).

Direct cost estimates for foodborne diseases in developing countries are rarely available. However, in some countries, episodes of diarrhoeal diseases are one of the most frequent reasons for paediatric hospitalization (*19*). In poorer countries, although the cost of treatment is lower than in industrialized countries, these costs represent a huge economic burden due to their frailer economies and higher rates of incidence (*10*). The economic consequences to individuals can be dramatic. In Argentina, for example, treatment of a case of diarrhoea in a government hospital, with five days hospitalization, has been estimated to cost about US$ 2000 (*10*). Long-term costs of seeking care often impoverish poorer households, reinforcing pre-existing social stratification. At national level, epidemics of foodborne diseases may affect tourism and the food trade and bear heavily on a country's income. A typical example was the outbreak of cholera in 1991 that cost Peru more than US$ 700 million in loss of export of fish and fishery products and the decline in tourism (*10*).

Equity and social determinants

The World Declaration on Nutrition (1992) of the Food and Agriculture Organization of the United Nations (FAO) and WHO (*20*) states that "access to nutritionally adequate and safe food is a basic individual right". As reaffirmed by the 1996 World Food Summit, access to safe and nutritious food is not a luxury of the rich but a right of all people. Food safety constitutes an effective platform for poverty alleviation and social and economic development, while opening and enlarging opportunities for trade. The Commission on Social Determinants of Health understands health as a social phenomenon and intends to advance health

FIGURE 6.1 Social determinants of food safety



equity. Where food safety is concerned, this view invites two approaches: first, an exploration of which social determinants may interact, and how, with the safety of the food consumed; and second, a translation of this information into interventions that will contribute to a more equitable approach to ensuring food safety.

To guide analysis of linkages between social determinants of health and food safety a conceptual framework was developed, adapted and simplified from the model of the Commission on Social Determinants of Health (Figure 6.1). It outlines the social determinants described later in this chapter and will help identify the main entry-points to related policies and interventions. The figure shows how the structural determinants that generate social stratification (left) may further operate through more specific intermediary determinants (centre) to result in differential outcomes and consequences of foodborne diseases, leading to differential exposure to foodborne hazards and vulnerability to conditions that compromise food safety (see next section). The structural and intermediate determinants may overlap or operate at several levels; for example, living and working conditions or trade are related to socioeconomic context and position and also operate at the level of exposure.

As the focus of this chapter is specifically on inequities related to food safety, not all food safety issues are comprehensively addressed. Though food insecurity is one of the most important global public health problems, it is considered in this chapter only in so far as it creates inequities with regard to accessing safe food.

6.3 Analysis: social determinants of food safety

This section will provide an overview of social determinants of food safety. The three main subsections will deal with the factors leading to differential exposure; the causes of increased vulnerability; and differences in socioeconomic context and position.

Modes of food consumption, handling and production

The analysis of potential pathways leading to differences in exposure to foodborne diseases generally proceeds through the various chronological links in the food chain, including farm inputs, farm production, collection (harvest or slaughter), processing, transport and distribution (wholesale, retail or food services),

down to final consumer handling and consumption. Only some of these steps will be outlined below, in reverse order (consumption, handling and production).

Modes of food consumption

Perceptions of food safety risks are multidimensional and complex and may affect people's concerns and reactions about food safety. Contemporary lifestyle and consumer preferences may adversely affect exposure to foodborne hazards, with many consumers appearing more interested in saving time and in convenience than in proper food handling and preparation (*21–23*). Those usually responsible for meal preparation in the home may have taken paid employment, leaving other family members or domestic helpers, who are often less experienced or ill-trained, to prepare meals (*10*). Decreased opportunities for food safety instruction, declining food preparation skills and insufficient food safety information often lead to diminished appreciation of the basic principles of food preparation (*24*). Furthermore, even when people are informed or educated with regard to food safety issues, attitudes do not always translate into improved food handling, and a substantial number of educated consumers frequently implement unsafe food handling practices (*24–27*).

Typically, consumers in industrialized countries appear to perceive foodborne hazards as mainly generated by the industry, a defiant attitude often associated with diminished faith in science and technology (*28, 29*). A parallel process has been an increase in consumer demand for foods that are fresh (less processed and packaged), natural (no chemical preservatives) and without a perceived negative health effect (low fat, salt or sugar levels). As a consequence, today's marketplace has more perishable products, with less secondary barriers to oppose microbiological build-up, which leads to an increased risk from food handling errors (*23*).

People might also be subjective and unrealistic about the risks they incur, even if they have the appropriate information, and may demonstrate judgements termed "optimistic bias" and "illusion of control" related to the notion of perceived invulnerability to food poisoning (*30–34*). A study showed that food handlers perceived their business to be at relatively low risk, and yet all businesses in the study prepared high-risk foods (*35*). The perception of the risk characteristics of potential hazards has been explored, in particular, under the paradigm of the psychometric model (*36–39*). Women generally perceive higher food safety risks (*40*). Those who perceive higher risks often exhibit safer food handling practices (*41*). Elevated perception of food safety risks in relation to personal health has sometimes been found in low-income groups of people, associated with perceptions of social exclusion (*42, 43*). Individuals in these groups felt frustrated at having less control over food safety risk management processes, whether at individual or collective level (*42*). An important factor is the way in which information is obtained; it should come from reliable sources, should not be too detailed or too scientific, and should be understandable and in a "what and how to do" format (*44*).

Modes of food handling

A substantial proportion of foodborne diseases is attributable to improper food handling practices in the consumer's home (*25*). Increased exposure to foodborne hazards results from defective hygiene practices, lack of safe water and sanitation and inadequate environmental conditions, which often act synergistically (*45*). Factors shown to have contributed to foodborne diseases include improper cooking, storage or holding temperature (for example in *Bacillus cereus*, *Clostridium perfringens*, *Salmonella*, *E. coli* O157:H7, *C. jejuni, Staphylococcus aureus* and group A *Streptococcus* outbreaks), poor personal hygiene of the food handler, such as lack of or inefficient handwashing (for example in *Shigella*, hepatitis A, Norwalk virus and *Giardia* outbreaks), cross-contamination, contaminated raw food ingredients and food obtained from an unsafe source (*46–49*). In extreme conditions, lack of water, poor sanitation, absence of facilities for adequate storage and absence of fuel for cooking (wood, gas, electricity) hamper safe preparation and increase the risk of exposure to foodborne hazards (*50*). Breastfeeding has been shown to have a strong protecting effect in reducing the risk (*51*). For people of low socioeconomic status handwashing, even if quite frequently practised, was often of low effectiveness, as demonstrated by faecal coliform bacteriological counts on both hands (*52, 53*). Numerous studies (*10, 54–56*) have demonstrated contamination of complementary (weaning) foods prepared under unhygienic conditions. In developing countries, the highest risk of complications and death due to domestically acquired cases of typhoid occurred in children from birth through 1 year of age, and adults older than 31 (*57*). Poor sanitation increases the risk of morbidity and mortality from diarrhoea among poor children (*58*). Several studies have emphasized the association between unsanitary excreta and waste disposal and high prevalence of diarrhoeal diseases in affected communities (*59–61*).

As a consequence of the rapid rise in the informal economy, there is an expansion in street food vending in developing countries. This plays an important socioeconomic role in terms of employment and income inflows (*62*). In modern cities throughout the world people frequently eat outside the home (*24, 63*). This practice is a risk factor for certain foodborne diseases (*1*). The major concern with street foods is their microbiological safety, as street vendors generally operate from places that lack appropriate hygiene and sanitation

facilities (*64, 65*). Foods can also be contaminated because of lack of personal hygiene and unhygienic handling practices, and can serve as a vehicle for a number of pathogens (*64, 66, 67*), including cholera (*68, 69*). A characteristic feature of informal street vending is that it escapes formal food safety inspection by official authorities, as most vendors operate without licence and from undesignated places (*70*). In Mexico, children of women working as street vendors had increased prevalence of gastrointestinal diseases compared to the general population (*71*).

Modes of food production

Foodborne illnesses can be caused by unsafe food contaminated during agricultural production. For example, pathogens on raw vegetables or fruits may result from irrigation with polluted water or inadequately treated wastewater (*72–74*), and aflatoxins in staple crops, such as maize and groundnuts, have been linked with impairment of child growth (*75*). In developing countries, the spread of zoonotic infections is encouraged by the close association between the rural poor and animals, dispersed and heterogeneous smallholder livestock systems, the predominance of the informal rural economy and markets, poor infrastructure and lack of resources (*76, 77*). In rural areas, poverty and associated unsanitary living conditions increase the risk of exposure to waterborne and other indirectly transmitted zoonotic pathogens, for example waterborne parasitic zoonoses, including those caused by *Giardia, Cryptosporidium* or *Toxoplasma* (*78*), or the recent upsurge of *Taenia solium* cysticercosis in Africa (*79, 80*). Globally, the prevalence of foodborne zoonoses is increasing (*2*), with much of the impact falling on poor people (*76*).

Some agricultural practices, such as the use of manure rather than chemical fertilizer, the use of untreated sewage, contaminated irrigation and surface runoff water, poor personal hygiene of workers and lack of sanitation through all stages of handling, contribute to an increased risk of product contamination by *Salmonella*, *E. coli* (for example VTEC O157:H7), *Campylobacter, V. cholerae*, parasites and viruses (*73, 81*). In developed and developing countries, population growth, urbanization and increasing income are resulting in a marked increase in demand for livestock products (*82*). The risk posed by chicken as a vehicle for *Campylobacter* and *Salmonella* has increased, and contamination of beef and red meat with *Salmonella* or *E. coli* (VTEC) remains a significant problem.

In most countries the food industry is a major sector, sometimes accounting for the highest proportion of the gross domestic product (*83*). In many parts of the food industry, increased market size and greater geographical distribution has led to consolidation of businesses, facilitating broader application of good hygiene practice, for example through the Hazard Analysis Critical Control Point (HACCP) system (*1*). Food safety problems may nevertheless arise in all countries, due to the existence of weak points in commercial and business processes, structural obsolescence, drifts in the application of control and assurance schemes, and managerial deficit (*84*). Conditions that may introduce breaches in food safety are more often found in the small business sector, which in many countries is responsible for a large share of the food consumed and a large part of the total employment in the food sector, but is often a major source of foodborne illness transmission (*85*). Operators of small and less developed businesses often lack appropriate education and training, and the technical and financial resources, to provide on-site solutions and to improve food safety (*86, 87*).

Interaction with food security, malnutrition and comorbidity

Whereas the issues dealt with above mainly relate to differentials in exposure, this section will concentrate on differential vulnerability to foodborne diseases, which depends primarily on biological and physiological conditions that alter the host defences and suppress the function of the immune system. Crucial determinants of the number of cases and the severity of infection are age (young or old), pregnancy and immunosuppressive conditions (the so-called "YOPI" conditions).

Food insecurity is a major global public health problem with close links to inequity. It may exist at national (or regional) level due to a variety of factors that affect food supply, such as the food production–population imbalance; lack of employment; low national income; shifts in international food prices; natural disasters; blockage and disruption of transport routes; civil war and unrest; and environmental degradation (*88*). Food insecurity also exists at the household level, and the importance of sustained access to food within households is increasingly recognized (*89*). Household food insecurity goes beyond insufficient food availability and includes uncertainty and worry about the food supply; inadequate food quality, including food safety; and the social unacceptability of procurement practices (*90, 91*). Food insecurity may have broad social implications, including a state of frustration due to being deprived of access to food, and feelings of guilt, shame and inequity associated with lack of control over the situation (*92, 93*). Food safety is not sufficiently prominent in international and national development plans intended to tackle food insecurity (*94, 95*). Achievements in food safety and food security can act synergistically and effective improvement of food safety should capitalize on the positive impacts of food security policies.

Malnutrition is the most severe manifestation of poverty and food insecurity, and the leading cause of increased host vulnerability to foodborne infections. In children, malnutrition is associated with both the incidence and duration of diarrhoea (*96, 97*). In countries with inadequate sanitation, rotavirus diarrhoea is one of the main causes of morbidity, with children the most likely to be infected (*98*). There is emerging evidence of the long-term consequences of early childhood diarrhoea for growth and physical and cognitive development, effects that may translate into costly impairment of human potential and productivity (*99–102*).

The number of new cancer cases has steadily increased over the past 20 years, and patients are also surviving longer. Complex procedures such as heart, liver, kidney, lung, bone marrow or even full-face transplants have been developed. Patients undergoing these procedures often receive intensive chemotherapy with immunosuppressive drugs, leaving the patient with little defence against opportunistic infections, including foodborne illnesses (*96, 103*). Hospitalized people may be at increased risk due to weakening of the immune system by other diseases or injuries, or exposure to antibiotic-resistant strains. Genetic predisposition (certain human antigenic determinants duplicated or mimicked by microorganisms) or other underlying medical conditions may predispose to more severe outcomes (*1, 13*). External pressures, such as prolonged stress, are plausibly linked to immune responses and increased vulnerability to infectious diseases (*104–106*). The population of patients with AIDS is still alarmingly high. An estimated 33.2 million people are living with HIV, and 2.1 million people died of AIDS in 2007 (*107*).

Structural social determinants

Inequity aspects of food safety are embedded in the broad socioeconomic and political context of a given country, which involves governance and public administration, macroeconomic policies (fiscal, monetary, trade, labour market), social policies (labour, social welfare, housing, land distribution), public policies (agriculture, industry, education, medical care, water, environment), culture and other societal values. A number of structural and mutually interconnected social determinants of relevance to food safety and particularly related to the analytical level of differential socioeconomic context and position will be dealt with below. In some cases these determinants also operate at the levels of vulnerability (demographic factors) or exposure (trade).

Ethnicity

There are large variations in the effect of risky behaviours according to ethnicity, but patterns vary depending on the factors considered (*108–111*). Ethnicity is closely intertwined with disadvantaged position, for example due to low income, poor housing and living environment or poor education. These cumulative disadvantages also lead to conditions prejudicial to food security and safety. Some aspects of foodborne diseases involve transmission via foods that are more commonly consumed by ethnic populations, as a consequence of their traditional eating habits. In examples from the United States, outbreaks of *Y. enterocolitica* in African-American communities have been associated with preparation and consumption of pig intestines (*112*), and brucellosis from consumption of raw milk and cheeses affects Hispanic communities (*113*). In some societies in developing countries, and in particular among disadvantaged groups, diarrhoea is not seen as a symptom of a disease with serious health consequences but as a "natural" health problem (*10*). In a number of countries, the perception of cleanliness is not always based on germ theory, but is viewed in the larger socioreligious context of purity and impurity: washing oneself serves physical and spiritual needs and is performed according to defined patterns that may not effectively prevent food contamination by the handlers (*10*). Ethnicity is often structurally linked to inequity within local national contexts.

Gender

Women during pregnancy may be at increased risk from certain foodborne pathogens, for example hepatitis E from contaminated water (*114*) and listeriosis (*115, 116*). Beyond biological conditions, gender translates into practices and behaviours that affect food safety. Social norms and concepts of masculinity may be reflected in a tendency towards risk-taking behaviours by adult men, including with regard to food safety, as reflected in greater consumption of raw food and frequency of risky food handling practices. Against this, in the food cultures of industrialized countries, dietary recommendations are moving towards increased consumption of foods that are markers of femininity (for example yogurt, fresh fruit and vegetables) and decreased consumption of foods that are markers of masculinity (such as red meat) (*117, 118*).

Traditionally, women have the primary responsibility for daily household tasks and caring for the family. In this role, food handling and preparation for consumption is essential to household food safety, and it has been recognized that mothers are usually the final line of defence against foodborne illnesses among their children (*119*), and lack of access to safe water and sanitation severely compromises this function (*120*). Female heads of households constitute a particularly vulnerable group, due to higher rates of poverty, lack of economic opportunities and social marginalization (*87, 121*). There is a positive relationship between female-headed households, poverty, illiteracy and ill-health

(diarrhoeal diseases) in poor urban and rural areas (*122, 123*). Women show greater sensitivity to chemical exposure due to differentials in absorption, metabolism and excretion of fat-soluble substances (*124*). Women's organizations have grown and matured and have become important players in the social debate surrounding gender and equity.

Education

Female literacy rate and education make significant contributions to food availability and food safety. General educational achievement is not distributed equally in a society. People living under disadvantaged circumstances have less access to educational services and consequently tend to have lower levels of educational achievement. Education is a powerful social stratifier (*125*). Parental (particularly maternal) education and economic status act synergistically as risk factors for diarrhoeal diseases in children under 5 years of age. However, the effect of maternal education appears to be more protective for children in wealthy families than for children in poor families; paternal education is also protective and operates independently of economic status (*126*). A significant number of women do not have easy access to education, and children of women who have never received an education are 50% more likely to suffer malnutrition and to die before the age of 5 (*127*).

Migration

Migration of populations for economic or sociopolitical reasons may result in the emergence of diseases in a local population, or the re-emergence of diseases previously eliminated (*1, 113, 128*). Migrants often share common disadvantages, such as poverty, social isolation and poor housing, which impair access to safe food and safe preparation of food. Refugee camps or reception centres are examples of extreme situations where the sudden arrival of a great number of people, associated with unsanitary conditions, have resulted in epidemics of cholera and other infectious intestinal diseases (*129, 130*). Irrespective of the kind of migration, migrants are generally in a relatively vulnerable position in their new environments.

An important and rapidly increasing form of migration is tourism, whether for leisure, holidays, business, sport or pilgrimage, which has increased the potential for diseases to be transmitted to locations far from the source of infection within a very short time. International travellers run a greater risk of being exposed to foodborne illness ("travellers' diarrhoea"), with causative agents including bacteria, viruses or protozoa (*131*). Few travellers meticulously avoid potentially dangerous food items (*132*), due often to lack of information on unsafe foods and practices in the country of destination (*133, 134*).

The daily geographical migration (commute) of workers within the same country or region does not have a significant impact on food safety in developed countries, due to the development and control of institutional or commercial food service sites. However, in low-income countries the infrastructure for appropriate food services is often non-existent, and poor workers take their food from informal street vendors, who are often characterized by inadequate hygiene practices and food safety.

Trade

The international trade in food and feed may lead, at times, to the rapid transfer of microorganisms from one country to another, and to the international diffusion of unhealthy foods, raw or processed. Examples abound where outbreaks of foodborne diseases have been traced to imported foods and include, for instance, an outbreak of *Salmonella typhi* infection in Aberdeen, United Kingdom, following importation of canned corned beef from Argentina (*135*), and outbreaks of shigellosis in several northern European countries as a result of the importation of iceberg lettuce contaminated with *Shigella sonnei* from Spain (*136*). In a more recent case, adulterated food and feed products exported from China included fish preserved with forbidden antibiotics, mushrooms containing pesticides and wheat gluten for petfoods mixed with melamine (*137*). The incident led to worldwide calls for increased food safety regulations and international discipline. As these examples show, even the relatively affluent countries are exposed to unsafe food through international trade. Finally, international trade has a major (often negative) influence on food security in the developing countries that is outside the scope of the present chapter.

Urbanization

Increasing urbanization creates a major challenge for public health in the 21st century. In industrialized nations, urban life offers a number of benefits that have a positive effect on food safety, including availability of potable drinking-water, hygienic waste disposal systems, general access to quality food, good public education and appropriate public health infrastructure. In such settings, food safety is generally ensured.

In both developed and developing countries poor people, living in disadvantaged urban areas, are excluded from many of the benefits of urban life. In crowded urban slums and informal settlements the lack of sanitation facilities creates conditions conducive to a high incidence of waterborne disease (*138, 139*). Half of the urban population in Africa, Asia and Latin America

is suffering from at least one disease attributable to the lack of safe water and inadequate sanitation, with women and girls being more exposed (*140*). Within the fast-growing urban sprawls of developing countries, lack of basic hygiene, close association between human population groups and animals, consumption of unpasteurized milk and dairy products, illegal slaughtering and inappropriate waste disposal are factors perpetuating infections in humans, with foodborne and waterborne zoonoses (for example salmonellosis, hepatitis A) of increasing concern (*141*).

In East and South Asia, large-scale poultry and pig production units are often located in peri-urban environments characterized by high-density, poor-quality housing, a low level of health and social services, and limited access to basic services such as water and sanitation, a series of conditions conducive to the emergence and rapid spread of infectious diseases (*76, 128*). It has been argued that this factor might have contributed to the emergence of the avian influenza epidemic in Asia.

Demographic factors

Changing demographic characteristics of consumers affect the incidence of foodborne illness and reinforce differences due to increased vulnerability to foodborne hazards. As the world's population continues to grow, constant rates of disease will increase the total number of cases. In addition, the proportion of the population that is at high risk of foodborne infections, illness and death is rising (*1*). With people living longer, the elderly are an increasingly vulnerable group, and it is expected that foodborne illness will affect this group more frequently and more severely, even in relatively well-off communities. Elderly people living in long-term facilities are more vulnerable (*142*).

Absorption, disposition and toxicity of food chemical contaminants are determined by factors such as age and sex that interact with other factors such as food composition or dietary habits (*8*). Infants and children may potentially be at greater risk from exposure to certain environmental pollutants (for example pesticides or dioxins through breast milk or polluted water). Exposure of pregnant women to chemical contaminants (for example lead or methylmercury) may have negative effects on the health of the fetus. Young adults have a number of risky food handling, preparation and consumption practices (*1, 109, 143*) and are more likely to engage in poor hygiene practices (*110, 144*). Christensen et al. (*145*) designed a model to address individual practices during food preparation in private homes, establishing links with age and gender. The probability of ingesting a risky meal was highest for young males (aged 18–29 years) and lowest for the elderly (above 60 years of age). The main factor accounting for the differences observed was found to be variation in the hygiene level of food preparers.

Poverty

Poverty is widespread: 2.5 billion people, 40% of the world population, live on less than US$ 2 a day (*106*). Poverty interacts with food safety through food insecurity and associated malnutrition (leading to vulnerability), faulty individual hygiene practices and lack of appropriate infrastructure for water, sanitation and environmental hygiene. Poverty can be viewed either from an absolute perspective, where simple lack of resources has serious consequences for the people in question (for example lack of access to food and health care); or from a relative perspective, which takes greater account of income differences in the society. In this chapter the former approach is adopted. Despite the close link between poverty and inequity in relation to food safety, no studies have shown any gradients.

Poverty exists in developed countries and may be increasing. In France, in 2002, about 8% of the population had income below the poverty level, or 50% of average income (*146*). While programmes are being implemented in various countries to mitigate the effects of food insecurity, disadvantaged people may experience nutritional deficiencies (*147, 148*) and are more exposed to unsanitary food-related behaviours. For example, drinking raw milk, an indicator of poverty, was one of the main risk factors for tuberculosis in the Russian Federation (*149*). A specific point is that low-income people often buy cheap foods to cope with serious budgetary constraints. This raises the question as to whether, in developed societies, low-price foods bought by low-income people present a higher food safety risk (*146*). In the European Union, regulations require that all products put on the market fulfil the same safety characteristics, regardless of their price.

6.4 Discussion of entry-points for intervention

In the previous section the intermediary and structural social determinants of importance to equity and food safety have been outlined, in three subsections. First, the modes of food consumption, handling and production were described, supported with a range of examples from production to consumption, as well as trade. Second, the interaction between inequity and food insecurity, malnutrition and certain medical conditions that affect the immune response was dealt with. Finally, a large number of structural social determinants were outlined, mostly linked with socioeconomic context and position. This structure leads to three clusters of determinants related to differentials in terms of

exposure, vulnerability, and socioeconomic context and position, respectively. With regard to food safety, access is a key issue – namely, access to safe food.

To identify and classify the sets of policies and actions that may contribute to reducing inequities in food safety, three general entry-points for intervention have been identified, as outlined in the following paragraphs and discussed further in section 6.5.

The first entry-point mainly comprises issues of differential exposure to unsafe food and relates to the recommendation below regarding strengthening food safety systems. Such systems are very complex and only a few aspects will be dealt with in detail (health communication, promotion of safe food handling and trade regulations). There is strong evidence from a number of industrialized countries regarding the effectiveness of food safety systems.

The second entry-point involves food security, malnutrition and comorbidity, which have been shown above to be important causes of differential vulnerability and, to a certain extent, exposure to food safety. Relevant recommendations are suggested, though the available evidence for this cluster of recommendations is scarce. Nevertheless, they are backed up by a number of studies as well as by more theoretical considerations.

The third entry-point refers mainly to differentials at the level of socioeconomic context and position, where the analysis has shown that a number of structural social determinants affect food safety via the levels of exposure and vulnerability, giving rise to a number of appropriate recommendations. The evidence is strong for the importance of these many structural social determinants with regard to food safety, though the exact modalities are not well studied.

6.5 Interventions: recommendations for addressing social determinants of food safety

Ongoing work to improve food safety involves a variety of actions and players in interventions that integrate general environmental hygiene; provision of adequate infrastructures and facilities; use of appropriate (and innovative) material and technology; education, information gathering and research; implementation of good hygiene practices and sanitation; and implementation of food safety assurance schemes based on the principles of the HACCP system. All these interventions should be "flexibly and sensibly applied with a proper regard for the overall objectives of producing food which is safe and suitable for consumption" (*150*). From a public health perspective, interventions should emphasize promotion of food safety, consumer protection and foodborne disease prevention. Appropriate funding is essential.

Contemporary trends have led to the development of a conceptual model for long-term policy-making and food safety risk management (*151*) consisting of four phases:

1. identification of a food safety issue, gathering scientific information and aggregating it into a risk profile;
2. identification and evaluation of a variety of possible options for managing the risk;
3. implementation by relevant stakeholders of the preferred risk management options;
4. carrying out monitoring and reviewing activities.

When dealing with a specific food safety issue, this model can be entered at any phase and the cyclical process (the "risk management cycle") can be repeated as many times as necessary (*152*).

Recently a risk-based approach presented as "risk analysis" has been introduced as a means of improving food safety decision-making, encompassing three interacting activities (*153*):

- quantitative risk assessment, the scientific process that addresses the magnitude of the risk and identifies factors that control it;
- risk communication, a social and psychological process that promotes dialogue between the different parties with an interest in managing the risk;
- risk management, which combines science, politics, economics and other relevant social factors to arrive at a decision regarding what to do about the risk.

One of the main implications of a risk analysis approach is that governments and regulatory agencies, the food industry and other professionals, consumers and other parties involved should develop active partnership to improve food safety management.

Tugwell et al. (*154*) have introduced an "equity effectiveness loop" intended to systematically explore equity issues in relation to the various stages of public health management, which may prove a useful supplement to the risk management cycle.

Strengthening food safety systems

A national food safety system is the institutional set-up whose primary purpose is to ensure the safety of the food supply. It encompasses national policies and goals governing food safety; laws and regulations; organizational and technical arrangements between involved

BOX 6.1 Main elements of food safety systems

- Development of food safety goals
- Planning and implementation of food control and food inspection activities
- Incorporation of the tenet of risk analysis
- Development, updating and effective enforcement of food legislation, regulations and standards
- Building and maintaining food safety from production to consumption
- Implementation of good hygiene practices
- Provision of adequate infrastructures and use of appropriate technologies in production, processing, manufacturing, retail sale, transportation, and preparation and handling of foods
- Response and adaptation to new technologies and to changing consumer needs
- Advocacy, information and education
- Monitoring and surveillance
- Science-based research and development
- Appropriate capacity building

partners at all relevant levels; and the infrastructures and technologies necessary for the proper functioning of the food chain. Specific activities are outlined in Box 6.1. National food safety systems operate within the global context of multinational arrangements (for example the Agreement on the Application of Sanitary and Phytosanitary Measures and Codex Alimentarius).

The food safety system should provide a framework for the dynamic interaction of, and collaboration between, a number of players, including government, producers and industry, consumers, academia, research organizations and the media. Evidence gained in a number of developed countries demonstrates that comprehensive, well-planned, effective and appropriately funded food safety systems have the potential to contribute affirmatively to the availability of, and access to, safe food, thereby addressing inequities related to differential exposure, in addition to securing outcomes indirectly related to food safety, such as environmental quality, economic opportunity and sustainable development.

Modern food safety systems are sophisticated constructs that require application of significant resources, which are generally out of reach of low-income countries, and the development of such systems may not be of immediate priority compared to other concerns (*155*). The lack of financial resources limits the ability of institutions in low-income countries to carry out their control, enforcement and education tasks efficiently, and the necessary infrastructure (logistical support, laboratories, surveillance infrastructure) is often weak or deficient.

The following subsections describe three of the key elements of food safety systems – health communication, regulation and control of food handling, and trade regulation. The surveillance and research elements of food safety systems are considered in section 6.6.

Health communication

Health communication is a key element in addressing the lack of knowledge on the part of food handlers or consumers and negligence in safe food consumption and handling. Education of consumers gives them the knowledge to be selective when choosing their food and to refuse food that is of doubtful hygienic quality, encouraging good manufacturing and hygiene practices and playing a role in improving food safety standards. Empowerment with regard to securing food safety is an important outcome of education.

Education was effective in reducing listeriosis in industrialized countries following the education of pregnant women, and in reducing the incidence of foodborne diseases in some Latin American countries following a series of cholera epidemics (*10*). Monte et al. (*51*) observed that all mothers of underprivileged children invited to adopt defined behaviours through an information campaign initiated the advocated behaviours and most of them (53–80%) sustained those improved behaviours. Official campaigns of education can have

a positive impact on food preparation and safety practices, in particular if social marketing takes advantage of multiple culturally-relevant channels (*156, 157*). Education of food handlers and managers has led to improvement of sanitary conditions in food service establishments (*158*). Certain factors may inhibit uptake of lessons: whereas formal training-related activities in south Wales were generally found in large food businesses, small businesses reported that time and financial factors constrained continual and systematic training (*159*). Basic hygiene knowledge had an effect on hygiene practices, reducing incidence of food-associated illnesses (*160*).

Education is effective only when conditions permit implementation of the recommendations and advice. Education and economic status operate synergistically: poverty alleviation efforts occurring in concert with education programmes to educate women and girls have proven to be more effective for improving children's health than either approach alone (*126*). Food safety education cannot replace essential infrastructure and services. It is also important to remember that food safety education is not only a matter of knowledge transfer, but also involves fostering activities aimed at developing willingness to adopt an hygienic attitude.

Regulation and control of food handling

Effective control needs to be supported by appropriate inspection services responsible for the enforcement of food safety legislation and for the inspection of premises, processes and foods to prevent unsafe food entering the food chain at any level. As modern food safety systems have evolved towards a preventive approach, food authorities should ensure that food business operators develop and implement food safety assurance schemes based on the principles of the HACCP methodology to the extent that capacity, experience and resources permit. Effective control and management also relies upon analytical capabilities and the linkage between laboratories and the public system, so that information on foodborne diseases can be linked with food monitoring and lead to appropriate risk-based food control options.

In a "farm-to-fork" approach to food safety, good agricultural practices contribute to provision of raw materials and ingredients with improved microbiological safety, and good manufacturing and hygiene practices set basic standards for hazard control and facility sanitation. Recent initiatives to develop risk-based approaches offer the opportunity for science-based, though flexible, control, and there is potential for further development and implementation of food safety strategies along these lines. Additional efforts should focus on addressing weak links that are important determinants of inequities in exposure to foodborne hazards, particularly in developing countries, including through controlling zoonotic agents in animal and poultry reservoirs; improving the viability of informal food vending; promoting food safety assurance and management in small and less developed businesses; and ensuring that differences in standards between domestic and international markets should not result in inequities in local access to safe food.

Trade regulations

National food safety systems evolve in the context of multinational agreements on food standards, including the Agreement on the Application of Sanitary and Phytosanitary Measures of the World Trade Organization and the standards, guidelines and recommendations elaborated by the Codex Alimentarius Commission and its subsidiary bodies. The resulting policies and standards are indispensable elements of the infrastructure for ensuring the safety of internationally traded food. As far as possible they should also apply to food for local consumption, thus making it easier for countries to meet standards for export and thus keep their share of global food markets.

However, there is often a perceived excess of formalism in the food safety management guidance issued through international agreements (such as the Codex Alimentarius), which may create or widen disparities between nations in relation to securing a safe food supply. In low-income countries, high compliance costs may be prohibitive for small producers, working against rural development objectives (*94*). Most importantly, newly improved food systems may focus on profit and export, and may fail to address the social determinants of food safety at national or local level, resulting in a widening gap between export-driven and domestically-oriented production and levels of food safety, with the risk of prompting further migration of the rural poor to disadvantaged and already crowded urban areas (*161, 162*). Benefit would be gained from identifying the appropriate level of protection that should be guaranteed, and establishing performance objectives and food safety objectives that offer a means to convert public health goals into targets that can be used by regulatory agencies and food manufacturers (*163*).

Addressing food safety in relation to food security, malnutrition and comorbidity

As described in section 6.3, the risk of harm caused by unsafe food may be heightened by differential vulnerability due either to food insecurity leading to malnutrition, or to certain medical conditions that compromise the immune system. This issue requires serious consideration when providing health services,

including through community-based nutrition interventions aiming at alleviating food insecurity and malnutrition, and through clinical assistance to patients with ailments compromising their immune system. Training of health staff should address this issue. Though the inequity aspects in this cluster of recommendations are not well documented they cannot be neglected.

Addressing the root causes of inequity in relation to food safety

The roots of inequities in health are the complex interactions between socioeconomic, environmental and personal factors (*164, 165*). In this context, and notwithstanding general policies aimed at promoting social justice and reducing overall poverty and social exclusion, empowerment of people and their progressive realization of the right to safe food involves introducing specific consideration of food safety issues into the more general measures intended to improve food security.

Most of the structural and social determinants outlined above are directly linked to inequities in social context and position and operate through enhancing differentials in vulnerability or exposure to unsafe food. Trade is ideally addressed as part of a well functioning food safety system. Other determinants, such as urbanization and migration, primarily call for concerted efforts of intersectoral planning based on political will and allocation of sufficient funds. Determinants such as ethnicity and gender have elements of marginalization based on attitudes and cultural factors and may require other appropriate measures. Poverty stands out as a fundamental root cause related to unsafe food and a large number of other public health conditions. Common to all these social determinants is the basic need for decision-makers at all levels to address the issues based on allocation of adequate funds according to local priorities and contexts.

6.6 Implications

Measurements, evaluation and data requirements

The main areas for data collection relevant to measuring food safety inequities include determination of the burden of foodborne diseases and exploring exposure and consumption patterns. These should be specifically linked to detailed demographic data.

Monitoring the impact

Addressing food safety inequities involves evaluating the effectiveness of interventions in reducing inequalities in food safety. The two main aspects to this process are an evaluation of the potential impact of food safety policies and interventions on equity issues; and the use of evidence from epidemiology and research to add, where appropriate, an equity dimension to planned food safety programmes and interventions. Potential efficacy could be assessed with regard to both technical gains in reducing exposure to foodborne hazards and other factors, such as availability of resources, accessibility to vulnerable populations, acceptability and adherence of consumers and compliance of providers (*154, 166*).

Subsequently, monitoring assesses success in mitigating inequities related to food safety. The progress towards mitigating inequity in food safety should be measured against the overall long-term goals and objectives. There is also a need to collect data on a range of indicators that could provide a measure of progress made in the short and medium term, including foodborne disease morbidity and mortality, with particular attention to monitoring the evolution of the foodborne disease burden in the targeted groups. These aspects are a direct reflection of the fourth phase of the risk management cycle described in section 6.5.

Methodologies and protocols for conducting foodborne disease burden studies should combine syndromic and etiologic agent-specific approaches to estimate the burden of foodborne diseases (*5*) and should include an attribution of the proportion of disability-adjusted life years (DALYs)[1] that is likely to be foodborne. Core data requirements at country level include magnitude, distribution and health impact data; possible exposure and sources of pathogens and chemicals; monitoring associated diseases as indicators; and data on the presence of etiologic agents and disease in domestic animals or wildlife consumed as food (*5, 167*). Data should be systematically linked to comprehensive demographic data, allowing an accurate mapping of populations.

Data may be available from a variety of sources, including national surveillance systems on the incidence of foodborne diseases, epidemiological surveys to investigate sporadic cases and outbreaks of disease, governmental monitoring activities of foods and water for regulatory purposes or routine testing, industry, and published literature and research results (*168–170*). In developing countries epidemiological data may be insufficient, specifically with regard to disadvantaged

1 DALYs reflect a combination of the number of years lost from early deaths and fractional years lost when a person is disabled by illness or injury.

groups, requiring application of improved data collection techniques, as discussed in the second FAO/WHO Global Forum of Food Safety Regulators (*163*). Foodborne disease surveillance and monitoring can allow early detection of hazards and illnesses, build capacity to respond to outbreaks of foodborne illnesses, enable identification of weaknesses in the food safety system and provide essential data for assessing food safety risks from primary production to consumption (*24*).

Knowledge gaps

Although there is now a wealth of information available, it is generally recognized that lack of scientific data is a very substantial factor limiting enhancement of food safety, and that active collection of appropriate data throughout the food production and processing system is vital (*1*). The limitations of current food safety data and key data needs have been extensively discussed (*1, 168–173*), and it is clear that the food safety information database needs to be expanded to provide more complete and in-depth information on foodborne hazards and their sources and on the incidence of foodborne illness by pathogen, by food, by contributing factor and, most importantly for equity issues, by socioeconomic group. There is also a need for further scientific evidence on chemical hazards and on the complex links between food safety and food insecurity, malnutrition and comorbidity.

An effective food safety system needs to support both long-term research and short-term research in response to emerging problems, requiring some shifting of resources and emphasis. Research priorities should be established in partnership with stakeholders, including private industry, academia and consumers. The research budget, especially for long-term projects, should be protected: perhaps more than for other fields, the complex problems of ensuring a safe food supply require time and the significant application of effort, patience and resources to create a cross-disciplinary force of dedicated scientific investigators from the biomedical, social and economic disciplines (*24*).

In order to better identify and assess inequities in food safety across vulnerable groups, information is also required on factors underlying food safety-related behaviours and preparation practices in those groups. This involves collection of data on environmental conditions (housing, water supply, sanitation), food preparation and storage facilities, consumption patterns, and on knowledge, attitudes, skills, practices and perceptions with regard to food safety, foodborne hazards and control measures. It is also necessary to gather data on the structure of the food safety system within which action takes place, its resources and the extent to which it encourages safe habits, safe food handling and adequate food and hygiene control in all stages and in all segments of the food supply. Further data are required on syndromically-defined diarrhoeal diseases. Such data can be gathered systematically in selected areas or for defined community groups, and can include information about the severity of the disease, its impact on work loss, medical visits, cost of treatment, hospital admission and mortality. Environmental surveys add further dimension to any analysis.

Managerial implications and challenges

Side-effects

Improving food safety with a specific focus on reducing differentials in access to safe food has the potential to generate side-effects. On the positive side, efforts to improve food safety will support, and benefit from, efforts to improve food security and fight malnutrition. They also have the potential to benefit from interventions in fields that are indirectly linked with food safety, such as environment or urbanization. Improvement in the safety of locally-produced foods may generate increased revenue for poor rural producers and informal sector vendors and be an effective way out of poverty. On a global scale, improvement in food safety to meet international requirements would benefit national economies.

On the negative side, increased prices of food presented on local markets may add further constraints to the budgets of poor consumers and maintain or even widen inequities in access to safe food if not paralleled by efforts to improve the socioeconomic status of disadvantaged groups or individuals. The benefits of the development of the agro-food business may not be shared by all. Unless governments also enhance the livelihoods of rural and urban communities that might be disadvantaged, small-scale operators may not be able to compete with larger businesses.

Points of resistance

There might be some resistance to the introduction of food safety systems. People in very poor personal situations may have other priorities, and may lack the resources and information that could facilitate their access to safe food. Also, where national resources are scant, public authorities may recognize other priorities, shifting resources toward other issues. This is particularly relevant when food safety policies compete with food security considerations and reduce access to a secure food supply (for example by increasing prices). In this regard, it has been argued that access to a wholly safe and nutritious food supply is a basic right that should not be compromised in order to achieve cost savings (*174*). Another approach would be to select

policies that favour increases in the safety of food whenever the benefits of doing so outweigh costs arising from the decrease in the security of access (*175, 176*). The introduction of food safety systems will necessarily infringe on economic interests and will consequently entail resistance.

Implications for management

In a globalized world, international actors can have a significant influence on the development of national initiatives regarding food safety and on inequities in access to safe food. International organizations are in the best position to provide technical analyses and assistance to orientate and support national or regional actions tackling food safety inequities. WHO, in particular, should ensure that it has sufficient capacity and expertise to provide Member States with technical guidance and support on how they can improve food safety while effectively addressing potential inequities.

Lack of financial, technical and human resources is a powerful barrier to improving food safety in its different aspects, particular in low-income countries. Lack of consensus on priority-setting is another barrier, due to rivalry (institutional or professional), competition, institutional separation and poor linkages (for example between the ministry of health and other ministries). Such sources of resistance can be overcome by specific efforts to promote collaboration, integration, networking and partnership.

In many countries, organizational difficulties may arise as food control activities are implemented through different agencies or under different government departments, a situation that needs to be overcome by clearer definition of responsibilities and greater coordination within and between agencies (*163*). The decision on the organizational structure that best meets a country's needs and resources is country specific and involves political considerations. Whatever the structure chosen, public health food safety managers can play a decisive role in fostering partnership and synergies between sectors and constituencies.

6.7 Conclusion

This chapter has attempted to identify the main social determinants of food safety. The potential for differential exposure to hazards in each component of the chain – consumption, handling and production – has been elaborated. Risk of harm caused by unsafe food may be increased by vulnerability due either to food insecurity leading to malnutrition or to a large number of medical conditions that in various ways compromise the immune system. Finally, a series of structural determinants (ethnicity, gender, education, migration, trade, urbanization, demographic factors and poverty) have been outlined. This led to the identification of three entry-points for recommended interventions. First, adequate food safety systems should be established or strengthened in all countries. Second, there is a need to focus not only on the health care system but on the negative impacts on food safety of food insecurity and malnutrition. Third, all relevant stakeholders need to join hands in order to address the root causes, namely the structural social determinants such as poverty, that keep people in marginalized and disenfranchised positions, thereby perpetuating lack of food safety as a global health problem.

In developed countries, a high level of protection regarding food safety, within an overall context of consumer protection, has been obtained and should be maintained. Certainly food safety has a cost, but food safety is not negotiable, and levelling down food safety is not an option. In developing countries, and further to the most proximal actions to improve household hygiene, improvements in food safety can only go hand-in-hand with wider socioeconomic developments. If inequities are to be reduced, these countries have to face in the transition stage the daunting challenge of balancing the quality of food, the price of food, and foodborne risks.

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Mental disorders: equity and social determinants

7

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1 This chapter is an output from a project funded by the United Kingdom Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

7.1 Summary

As with most noncommunicable diseases, the etiology of mental disorders is multifactorial, with risk determined by an interaction of genetic, other biological, psychological and social determinants. The large variation in the prevalence of most mental disorders between and within countries suggests that the social determinants have particular salience. This chapter focuses on social determinants with emphasis on evidence from low- and middle-income countries, and gives particular attention to two examples of mental disorders: depression and attention deficit hyperactivity disorder (ADHD). These disorders were selected because they are each associated with a considerable burden, and there is a substantive evidence base that interventions for these disorders are effective and feasible.

There are significantly increased rates of depression among low socioeconomic groups, and exposure to risk factors is disproportionately high in contexts characterized by social disadvantage where vulnerable groups are overrepresented. There is convincing evidence of an association between depression and stressful life events; exposure to violence and other crimes; chronic physical ill-health; low levels of educational attainment; conflict; disasters; stressful working environments; and female gender. Additionally, reasonable evidence implicates discrimination, income inequality, food insecurity, hunger, unemployment, toxins, urbanization, lack of housing, overcrowding, low social capital, poor sanitation and built environment, and minority ethnicity. Overall rates of mental health service use are generally lower amongst the disadvantaged. Low mental health literacy and stigma may reduce the ability of people with depression to use treatment services effectively.

Further, depression is associated with negative physical health outcomes, including cardiovascular disease, type 2 diabetes mellitus, injuries, HIV/AIDS and various perinatal and reproductive conditions; consequences of these comorbidities may also show social gradients. While increased risk of ADHD is associated with lower socioeconomic status and lower parental education in high-income countries, research on ADHD from low- and middle-income countries is scarce and inconclusive. The expression of genetic susceptibility to ADHD appears to be moderated by environmental exposures. Fetal or neonatal hypoxia, traumatic brain injury, epilepsy and antiepileptic medications, and HIV infection are all associated with ADHD, and these exposures all show social gradients. Also, male gender appears to confer additional risk. Children with ADHD experience adverse academic outcomes.

Put simply, mental disorders are inequitably distributed, as people who are socially and economically disadvantaged bear a disproportionate burden of mental disorders and their adverse consequences. A vicious cycle of disadvantage and mental disorder is the result of the dynamic interrelationship between them. This chapter reviews a wealth of evidence on interventions that can break this cycle, by addressing both upstream social determinants and vulnerabilities, and downstream health outcomes and consequences through a combination of population- and individual-level actions. A key goal is for health care systems to be responsive to the mental health needs of the population. Efforts to increase coverage of cost-effective interventions must explicitly target disadvantaged populations and health impact assessments of macroeconomic policies must consider mental health outcomes. Evidence from low- and middle-income countries remains relatively scarce and more contextual research is required to inform mental health policy and practice. In particular, research is needed regarding the impacts of social and economic change on mental disorder, and the mechanisms through which protective factors strengthen resilience and promote mental health. Longitudinal monitoring of population mental health is crucial for this purpose.

7.2 Introduction

Mental health and mental disorders

Mental health is integral to the definition of health of the World Health Organization (WHO): "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". A definition of mental health that is applicable across the lifespan is as follows (*1*):

> The successful performance of mental function, resulting in productive activities, fulfilling relationships with other people, and the ability to adapt to change and to cope with adversity; from early childhood until later life, mental health is the springboard of thinking and communication skills, learning, emotional growth, resilience, and self esteem.

This definition of mental health is consistent with its wide and varied interpretation across cultures. It is self-evident that, as with the broad definition of health, mental health is more than the absence of mental disorder. "Mental disorders" are manifested by clusters of symptoms or illness experiences, which reflect impaired mental health. Typically, these symptoms (or experiences) are distributed widely in a population but when they occur in clusters, and are associated with impairment in one or more domains of functioning, they are considered to be signs of clinically significant mental disorder.

This chapter discusses social determinants of mental disorders, as opposed to mental health, for three reasons:

- The definition and measurement of mental disorders has been studied more extensively across cultures and countries than mental health.
- The evidence base on social determinants is relatively more robust for mental disorders.
- Mental disorders result in the greatest degree of adverse impact on the lives of individuals and their families.

However, the findings here may still be relevant for poor mental health, in the absence of mental disorder. Population-level interventions targeting social determinants of mental disorders are likely to exert small but, from a public health point of view, potentially important effects on population mental health, given the high prevalence of mental disorders (*2*).

Global burden of mental disorders

The global burden of mental disorders can be assessed in four ways: the prevalence of disorders, their burden as measured in disability-adjusted life years (DALYs),[2] inequities in the distribution and impact of disorders, and their impact on other health conditions.

There is now a rich evidence base on the prevalence of mental disorders; it is estimated that about 10% of the adult and child population at any given time suffer from at least one mental disorder, as defined in the *International Statistical Classification of Diseases and Related Health Problems* (*3, 4*). However, it is also evident that there are large variations in the prevalence of mental disorders between, and within, populations (*5, 6*). A range of factors, including social determinants, are likely to be important in explaining the distribution of and risk for mental disorders. Put simply, mental disorders are inequitably distributed and, as the evidence in this chapter will demonstrate, people who are socially and economically disadvantaged bear a disproportionate burden of mental disorders and their adverse consequences.

The recent edition of the *Global burden of disease and risk factors* report (*7*) has become the benchmark to assess, and compare, the burden posed by various health conditions in each region of the world. The major relevant findings from this report are that neuropsychiatric disorders (which include mental disorders such as unipolar depression, bipolar disorder, schizophrenia, epilepsy, alcohol and drug use disorders, dementias, anxiety disorders and mental retardation) account for over 12% of the global burden of disease. Even in low- and middle-income countries, about 10% of the total burden of disease is attributable to mental disorders, and this proportion rises to 11% if self-inflicted injuries are included. Furthermore, stigma associated with mental disorders is likely to lead to considerable underreporting of mental disorders. For example, accurate counting of suicides in China and India have shown that rates are much higher than those reported in routine statistics and that self-inflicted injuries account for a quarter to half of all deaths in young women (*8, 9*). Of all the mental disorders, unipolar depression is the leading neuropsychiatric cause of burden of disease. The burden of mental disorders is highest in young adults (*10*).

The social costs of mental disorders to families and society (for example the social welfare and criminal justice systems) have not been quantified, although they are likely to be substantial.

Apart from demonstrating the high prevalence and associated disability of mental disorders, some of the most important evidence of the burden of mental disorders to emerge in recent years has been demonstrating how they contribute to the risk for, or are the consequences of, other important health concerns, such as maternal and child health, HIV/AIDS, heart disease, injuries and diabetes. Alcohol use, for example, accounts for over 4% of the attributable global burden of disease (*7*). The evidence on the relationship between mental disorders and "physical" health conditions has been subject to systematic review in the recent *Lancet* series on global mental health (*11*).

Scope of review

Mental disorders constitute a number of distinct conditions affecting people across the life course, with diverse epidemiological characteristics, clinical features, prognosis and intervention strategies. It is impossible to address all mental disorders in one chapter, just as it would be unrealistic to address the determinants of all "physical" disorders in one chapter. This chapter therefore focuses on two examples of mental disorders:

- depressive episode or major depressive disorder, referred to here as "depression";
- hyperkinetic disorder (HKD) or attention deficit hyperactivity disorder (ADHD).

These disorders were selected on the basis of two factors. First, they are each associated with a considerable burden, both in terms of prevalence and public health impact. Second, there is a large evidence base for effective treatments for both disorders, which is described below. The overall aim of this chapter, then, is to synthesize the available information in order to motivate the design and implementation of interventions that

2 DALYs reflect a combination of the number of years lost from early deaths and fractional years lost when a person is disabled by illness or injury.

aim to address the double, and often coexisting, burden of socioeconomic disadvantage and mental disorder.

As with most other noncommunicable diseases the etiology of mental disorders is multifactorial, with risk determined by an interaction of genetic, other biological, psychological and social determinants. The relative contribution of genetic factors varies between disorders, with these factors playing a significant role for both depression and ADHD (*12, 13*). However, social determinants, as defined by the Commission on Social Determinants of Health, play a major role in explaining risk. An understanding of social determinants is important for illustrating the potential for primary prevention, indicating areas in which biological and psychological treatments can be enhanced by socioeconomic interventions and identifying target groups for prevention and care. Such an understanding should lead to breaking the vicious cycle of mental disorder and social disadvantage (Figure 7.1) and, ultimately, contribute to human development (through, for example, facilitating the attainment of the Millennium Development Goals). An important challenge when considering the social determinants of mental disorders is the direction of causality. For example, if social disadvantage is found to be associated with a particular mental disorder, it cannot be automatically inferred that the social determinant has caused the disorder. The social determinants of mental disorders are multifactorial and operate in a variety of distal and proximal settings that may be organized according to the priority public health conditions analytical framework (Chapter 1), which forms the basis for the analysis undertaken in this chapter.

Search strategy

Studies included in the review had to satisfy the following criteria: published in English; published between 1 January 1990 and 31 July 2006; and reported epidemiological data on social determinants and their relationship with depression or ADHD. Key studies outside the range of dates were also included. In addition to these studies, other literature sources that provided theoretical frameworks for understanding the relationship between social determinants and depression were used. As a substantial difference exists in the volume of research between high-income countries and low- and middle-income countries (*14, 15*), the search for high-income countries was limited to reviews and selected primary research papers only.

7.3 Analysis

Depression and its social determinants

People suffering from depression typically experience symptoms such as feelings of sadness, lack of confidence, negative views of self, others and the future, loss of interest in activities, and disturbance of sleep and appetite. These psychological and behavioural disturbances are frequently accompanied by a range of somatic complaints, such as headache and fatigue. In its most severe form, people with major depression are unable to continue with normal activities, and suicidal thoughts and acts are common. Depression often follows an episodic pattern and may become chronic, crossing the threshold for a mental disorder.

Depression represents a major and growing public health burden: it is estimated to be the leading cause of mental disability worldwide (*16*) and is predicted to be the second leading cause of all health disability by 2020 (*17*). This increase in burden is partially due to the "epidemiological transition" and the reduced proportion of global burden attributable to communicable diseases, but has also been attributed to changes in family structure, urbanization, substance abuse and increased socioeconomic inequalities associated with current global trade policies and practices (*18*).

There is strong evidence for the effectiveness and cost-effectiveness of off-patent antidepressant medications and brief structured psychological treatments for depression in countries of all income levels (*19*). Depression often runs a chronic or relapsing course. Thus, although up to 50% of depressive episodes resolve spontaneously, the associated disability, social and economic costs will be high. Although there is mounting evidence that depression is universally experienced across cultures (*20, 21*), prevalence estimates vary between and within countries (*5, 22, 23*). This international variation in prevalence may be explained partially by measurement factors, as well as a range of social, cultural and economic protective and risk factors. These social and economic gradients will now be considered.

Socioeconomic context and position

Socioeconomic context and position exert a powerful influence on the societal distribution of health conditions, including depression. Axes of social stratification are strongly influenced by global, national and regional political and economic trends, and by existing institutions and legal systems. Globalization in the economic, political, social, cultural, environmental and technological spheres has led to rapid changes in the

configuration of societies, particularly in poorer countries, which have the weakest social welfare and public health systems. Some researchers have hypothesized a substantial increase in the societal burden of mental disorders as a result (*24*). Conflicts and civil unrest can also erode social fabric and increase exposure and vulnerability to mental health risks, with an impact on prevalence rates of depression. Changes in the physical environment, which are accelerating with climate change, can similarly affect the mental health of populations. The impact of shifting distributions of power and resources on patterns and severity of depression can be assessed by examining the main indicators of social stratification.

A review of the literature found very convincing evidence regarding the role of socioeconomic position, strong evidence regarding the role of gender inequity and education and reasonable evidence regarding income inequality as determinants of depression (*25–28*). These findings indicate high levels of inequity in the distribution of depression across socioeconomic strata within societies, with significantly increased rates of depression among low socioeconomic groups and in countries with higher levels of income inequality. Furthermore, there is a strong dose–response relationship between education and decreasing rates of depression among populations. Gender inequity increases the risk of vulnerability to depression among women, although biological factors also contribute to the increased risk (*29*).

A number of mechanisms may explain these associations, although the precise causal relationship is difficult to ascertain, given the complexity of the relationships and the cross-sectional nature of many of the studies cited. These mechanisms may include stress associated with low socioeconomic status, experiences of disempowerment and violence, stigma associated with low socioeconomic status (particularly in contexts of high income inequality), marginalization, hopelessness, helplessness, income insecurity and reduced access to health services for physical health problems, which in turn may increase risk for depression.

Differential exposure

Differential exposures to risk factors are frequently inversely associated with social position. Thus, the risk for these exposures is greater among people in lower socioeconomic positions. There is very convincing evidence regarding the role of stressful life events and violence in determining depression; strong evidence regarding the role of crime, social conflict, civil unrest, natural disasters, and working environments; reasonable evidence regarding stigma and discrimination, food insecurity and hunger, toxins, urbanization, lack of housing, overcrowding, social capital, sanitation, the built environment, and unemployment and underemployment; and weak evidence regarding changing sociocultural norms (*12, 24–27, 30–43*).

A number of potential mechanisms may be implicated in these associations. Stressful life events, such as bereavement and child abuse, show a strong association with subsequent psychopathology. Family history of depression may affect the mood of other family members through both genetic and psychosocial pathways such as family conflict and learned behaviour. Higher rates of depression among separated, divorced and widowed individuals may be associated with social isolation, loss, marginalization and economic difficulties. Weak cognitive social capital may be manifest in reduced perceptions of trust and social connectedness, associated with depression. Experiences of crime, violence, or stigma on the basis of disability or ethnicity are likely to lead to insecurity, hopelessness, helplessness and low self-esteem. Changing cultural norms, migrancy and urbanization may be associated with loss of identity, loss of traditional support structures, conflict and lack of resources. Inadequate housing and overcrowding may similarly be associated with alienation, stigma, hopelessness and helplessness. Poor sanitation and toxins may increase health anxiety and stigma, but may also operate through pathophysiological mechanisms, such as the role of organophosphate pesticides in serotonin disturbances. Hunger and food insecurity not only produces feelings of anxiety and hopelessness but also fatigue and physical health difficulties that increase risk for depression. Working environments that increase stress through improper design of tasks, poor management styles, career anxiety, conflict and danger all increase risk for depression. Obstetric difficulties increase risk for postnatal depression through physical ill-health, disability and anxiety. Survivors of natural disasters experience increased rates of depression through loss, insecurity, anxiety and guilt. Unemployment and underemployment are associated with income insecurity, marginalization, stigma, boredom and food insecurity. Tobacco use is associated with depression via the effects of nicotine on the central nervous system and the experience of tobacco-related illness. Alcohol exercises direct biological effects on mood as well as having indirect effects through the consequences of alcohol abuse and dependence. Associations between substance use and depression are confounded by shared life events that predispose individuals to both.

The most striking feature of all these exposures is that they are overrepresented in poorer communities. Therefore there are high levels of inequity in the distribution of these exposures, across socioeconomic gradients within societies.

Differential vulnerability

Certain population groups may be differentially vulnerable to the factors that increase the risk of developing depression. Vulnerable groups may be identified by individual characteristics such as gender, age, health status, marital status and income, or by shared attributes or experiences such as common ethnicity. Mental health literacy is a relatively new concept that encompasses more than just the ability to recognize problems but includes recognition of mental illness and knowledge and beliefs about causes, self-help and professional help (*44*). Lack of mental health literacy contributes to low recognition of problems, is frequently a reason for delay in seeking help and may be more prevalent in lower socioeconomic groups.

The literature review found very convincing evidence regarding the role of chronic physical ill-health and disabilities as determinants of depression; strong evidence regarding the role of age (young adults) and female gender; and reasonable evidence regarding ethnicity (*11, 24, 26, 27, 29, 41, 45, 46*). There is likely to be a differential impact of exposures on vulnerable groups by social gradient; for example, exposures to domestic violence and alcohol-abusing spouses are greater in women from lower socioeconomic groups (*47*); furthermore, these vulnerable groups are less likely to access services (see next subsection).

There are a number of possible mechanisms implicated in these differential vulnerabilities. Gender is associated with biological and social vulnerabilities, the latter including violence, disempowerment and discrimination. There is a higher prevalence for depression in the 20–40-year age group, possibly associated with multiple stressors of income generation and child rearing during this developmental period. Minority ethnic groups may experience depression as a result of discrimination, marginalization and the cultural inappropriateness of services. Chronic physical ill-health and disabilities that are strongly associated with depression may operate through pathophysiological mechanisms as well as loss of functioning, social stigma and loss of employment and income. Finally, low income may be associated with depression through stress, income insecurity, lower social status, disempowerment and stigma.

Many of these vulnerabilities are overrepresented in lower socioeconomic groups, once again indicating high levels of inequity in the distribution of depression across societies.

Differential health care outcomes

World Mental Health Survey data from 17 countries reported that respondents using any mental health services over the previous 12 months ranged from a low of 1.6% in Nigeria to 17.9% in the United States of America, with overall rates generally lower in developing than in developed countries. Being male, married, less educated and in the extremes of age or income were associated with undertreatment. National studies, for example from Brazil and the United States, show that unmet need for treatment is greatest in traditionally underserved groups, including racial or ethnic minorities, those with low incomes, those without insurance, and residents of rural areas (*48–50*). People who are privately insured, or represent more powerful groups in the population (for example white people in the United States), have better access to mental health care and receive a wider range of interventions (*51, 52*).

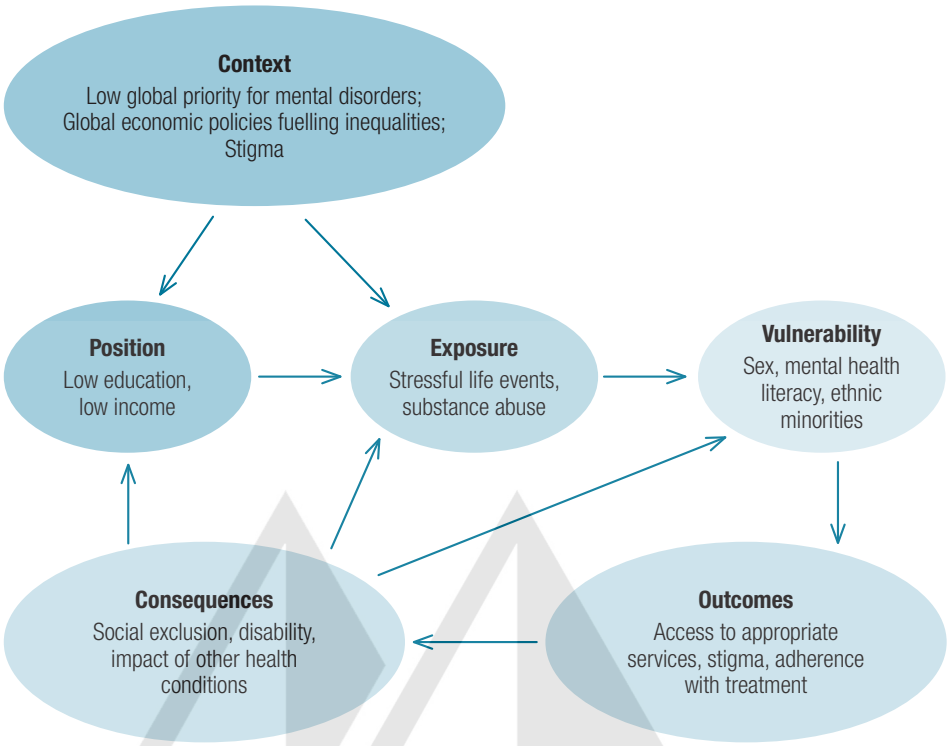
Continuation of antidepressant treatment for depression beyond the first months helps to consolidate treatment response and to reduce the risk of early relapse. A study in the United States showed that antidepressant discontinuation was significantly more common among Hispanics, patients with fewer than 12 years of education and patients with low family incomes (*52*). People who suffer from depression in low-income groups are less likely to respond to antidepressant treatment than those in middle-income groups (*53*). The reasons for this differential outcome are unclear, but may include lower quality of intervention, poor rapport between service users and providers (who may have different socioeconomic or cultural backgrounds from the service users), and poor adherence, which in turn may be attributable to the factors just mentioned and socioeconomic factors that restrict the ability of people to complete their treatment (*54, 55*).

Other determinants of help-seeking behaviour are knowledge of mental disorders and effectiveness of treatment, which have both been found to relate to mental health literacy (*44, 56*) and stigma (*57, 58*). Low mental health literacy may reduce the ability to use services effectively, for example to adhere to recommended treatments. Lack of mental health literacy is the most frequent reason for delay in seeking help and may be more prevalent in lower socioeconomic groups. Furthermore, access to mental health promotion activities is likely to be more restricted for people of lower socioeconomic status (*59*). Thus, the differential outcomes of depression follow socioeconomic gradients at the global level and within countries, and provide further evidence of inequity in the distribution of depression.

Differential consequences

Depression is strongly associated with certain physical health outcomes, including cardiovascular disease, type 2 diabetes mellitus, injuries, HIV/AIDS and various perinatal and reproductive conditions (*11, 60*). There are a number of possible mechanisms for these

FIGURE 7.1 Vicious cycle of social determinants and mental disorders



associations, namely that depression affects the rate of other health conditions; that some health conditions affect the risk of depression; or that depression affects treatment and outcome for other health conditions. The adverse health consequences of depression may be differentially observed in populations according to the differential risks to which groups are exposed, their differential vulnerabilities, and socioeconomic context and position. This reinforces the inequities in the distribution of other health conditions and can carry important intergenerational consequences. For example, the impact of maternal depression on infant growth and development outcomes is greater in mothers from low-income groups (*11, 61*).

The differential consequences of depression maintain a vicious cycle of depression and deprivation (Figure 7.1) through the following pathways: increased financial cost of treatment and medication for depression (*62, 63*); increased cost to households (caregiver time and opportunity costs) (*62, 63*); loss of earnings, as a result of reduced productivity due to depressive episodes (*62, 64*); reduced ability to work (domestic and paid); stigma and reduced access to health care (*57, 58, 65*); and substance abuse (*66–68*). In effect, a vicious cycle of deprivation and depression is established with differential effects on the poor (*69*), who have limited access to evidence-based, cost-effective treatments and to interventions that might address social determinants. The effect of this vicious cycle is inequitable across socioeconomic positions. For example, the impact of disability on loss of earnings would be greater in those who work in jobs with less sickness benefits for mental disorders, and the lack of access to affordable care leads to more out-of-pocket expenditure for depression, which will have greater adverse consequences for poorer families.

Attention deficit hyperactivity disorder and its social determinants

Attention deficit hyperactivity disorder (ADHD) as defined by the American Psychiatric Association (*70*) is characterized by symptoms in one or both of two core domains: inattention and hyperactivity-impulsiveness. Inattention can be manifest by features such as an inability to sustain attention in tasks or play activities, and having difficulty in organizing tasks and activities; hyperactivity by fidgeting, running about and talking excessively; and impulsiveness by often interrupting and intruding on others. Hyperkinetic disorder (HKD) as defined by the *International Statistical Classification of Diseases and Related Health Problems* (*4*) can be regarded

as a narrower and more severe condition than ADHD, in that it includes a smaller component of a continuum of symptoms. Almost all of the research addressing determinants of ADHD/HKD has been carried out in reference to the diagnostic construct of ADHD. One analysis estimated DSM-IV (*70*) median prevalence rates at 7% and 1% for ADHD and HKD respectively (*71*). The ratio of boys to girls is about 2:1.

It has been suggested that ADHD is a product of "Western" (or even American) society and that it does not occur in the developing world or other cultural contexts. However, a growing and convincing body of evidence has emerged in the past decade that supports the conclusion that ADHD is not a cultural construct (*72–74*), though cultural factors do influence illness recognition and help seeking. A recent review identified 22 studies addressing prevalence rates of "non-Western" countries over the last 15 years (*75*). The prevalence rates reported in these studies were, generally speaking, at least as high as in Western countries. Furthermore, many studies have provided evidence that the symptoms and other characteristics of ADHD are similar in both Western and non-Western settings (*76*).

ADHD runs in families, with first-degree relatives of affected individuals showing significantly higher rates of the disorder (*13*). Twin and adoption studies, used in an attempt to disentangle genetically-mediated effects from the effects of shared environment, have consistently provided evidence that genetic factors play a significant role in the etiology of ADHD (*13*). However, a growing body of literature also points to the important role played by social and environmental contexts in mediating the impact of genetic risk and in moderating outcome in children with ADHD. The debate no longer revolves around nature versus nurture, but has moved to a more complex model in which susceptibility genes (and potentially protective genes) interact with the social environment in a dynamic relationship with potentially bidirectional influences. Family and wider sociocultural influences, in addition to modifying the extent to which genetic risk is expressed in psychopathology, may also influence the perceptions and thresholds of tolerance of challenging behaviours in children.

Socioeconomic context and position

Low socioeconomic status and low parental education is robustly associated with an increased risk of ADHD in research originating from high-income countries (*71*); some of the historical classic studies are reported in the following subsection. This has implications for interventions, as it suggests that for equity to be achieved it is necessary to ensure that services are equally accessible for those of low socioeconomic status. The research originating from low- and middle-income countries is less consistent, with a few studies suggesting no significant association (*77–80*), though too much weight should not be attached to these findings, given the small number and limited scope of the studies. Also, the failure to detect associations between low socioeconomic status and symptoms of ADHD is likely to be due to insufficient variability in socioeconomic status in the populations studied.

Differential exposure

Cultural context plays an important role in determining the environmental demands experienced by an ADHD-affected individual, and also in determining how such an individual is understood and responded to. Expectations and levels of tolerance for certain behaviours in children are clearly culturally determined. Although diagnostic criteria for ADHD are operationally defined, a degree of subjectivity in making the diagnosis must still be acknowledged, and perceptions of what constitutes "hyperactivity" have been found to differ among mental health professionals in different countries (*81*).

Several studies also indicate that a variety of pregnancy, birth and early neonatal factors – including prematurity, low birth weight, eclampsia, poor maternal health, long duration of labour, fetal distress, antepartum haemorrhage and the more time a newborn spends in an incubator – all increase the risk of ADHD in offspring (*82–84*). Also included among the risk factors is the maternal use of both tobacco and alcohol during pregnancy (*85–87*), although at least one study from a low- or middle-income country contests this association (*77*). The most likely pathophysiological common denominator amongst these early insults to the developing brain is fetal or neonatal hypoxia. However, from a public health perspective, it can be seen that most if not all of these risk factors may serve as indicators of inadequate obstetric care and are likely to be inequitably experienced across the social gradient, indicating the salience of social inequity in the etiology of ADHD.

A variety of postnatal insults to the developing brain have also been associated with ADHD, including traumatic brain injury, epilepsy and antiepileptic medications, and HIV infection (*88–90*). As is the case with the potential risk factors acting in the prenatal and peripartum period, those factors thought to play a role in the postpartum period are also, at least in part, socially determined. The notion that ADHD may be caused by certain foods or food additives, and that by extension ADHD might be alleviated with certain dietary changes, has long been popular, but has not been substantiated by systematic study (*13*). The potential role of television exposure in childhood attentional problems and ADHD remains controversial and inconclusive (*91*). Children exposed to a range of traumatic experiences,

particularly physical and sexual abuse, may also present with problems indistinguishable from those manifesting in the child who appears to have a more genetically mediated ADHD (*92, 93*).

It is striking that many of the environmental and social exposures that are associated with an increased prevalence of ADHD are overrepresented in those from economically-deprived populations. This suggests that interventions to address economic deprivation generally, or the specific exposures associated with deprivation, may be expected to have an effect on the prevalence of ADHD.

Differential vulnerability

Environmental exposures appear to moderate the expression of genetic susceptibility to ADHD. In this way, an individual with a high genetic loading for ADHD may not manifest with the disorder if nurtured within an environment with low levels of adversity. Conversely, an individual with a low genetic loading for the disorder may yet become symptomatic if exposed to high levels of environmental adversity. Research has identified a number of factors within the social and physical environment that have been implicated as risk or exacerbating factors for ADHD.

Determinants included here are differentially experienced across social gradients and vulnerable groups. As with most of the neurodevelopmental conditions encountered in childhood, male gender appears to confer additional risk for the diagnosis of ADHD (*13*). The higher prevalence of ADHD amongst males may reflect differentially higher exposures to environmental causes of ADHD, such as head injury. There are differential effects of family adversity on the risk of ADHD by gender, age and possibly birth order (*13, 77, 82, 84, 94*). In one study, for example, it was shown that family adversity was associated with ADHD regardless of gender, but that gender modified the effects of adversity in terms of functional impairment, with boys exhibiting worse cognitive and interpersonal outcomes (*95*). One study of a sample of ADHD-affected sibling pairs aged 5 to 18 years suggested a greater vulnerability of the elder sibling to a broader array of family adversity factors, particularly paternal factors. A significant association between impairment and father's substance abuse or mood disorder was found only in the elder sibling (*94*). This is relevant for equity as substance abuse and mood disorders occur at higher rates in those of low socioeconomic status.

There is evidence of wide variation in the rates of ADHD amongst different ethnic groups in multicultural societies such as the United Kingdom, which may be the consequence of protective factors operating for some ethnic groups, or increased risk for others (*96*). While the causal explanations for the associations between ethnicity and ADHD have yet to be elucidated, it is possible that ethnicity serves as a marker for various aspects of social disadvantage. Young maternal age at childbirth (*72*) is another aspect of social disadvantage associated with greater risk of ADHD. These factors provide further evidence of the differential distribution of determinants of ADHD.

The relationship between family adversity and child psychopathology was first addressed by Rutter and colleagues (*97, 98*). The risk factors that were examined became known as Rutter's Family Adversity Index: marital discord, low social class, large family size, paternal criminality, maternal mental disorder, and foster placement. Subsequent studies, mostly from high-income countries, have confirmed a close relationship between indicators of family adversity – including family conflict and lack of cohesion, and parental mental disorder or substance abuse – and ADHD and comorbid symptoms of depression, anxiety, conduct disorder and learning disability (*82, 94, 95, 99–102*). Rutter's work established the importance of the aggregation of risk factors in modifying risk; although a single environmental risk factor did not significantly increase the risk of mental disorder in children, two risk factors resulted in a fourfold increase in the likelihood of mental disorder, and four indicators resulted in a tenfold increase in risk.

Differential health care outcomes

There is strong evidence for the effectiveness of both pharmacological and psychosocial interventions for ADHD (*103*). However, the treatment gap is large and inequitable and there is good evidence that ADHD is both underrecognized and undertreated amongst minority groups. Minority status, female sex, and low income all predict failure to diagnose and treat the disorder (*13*). Thus, differential access to appropriate health care among families of low socioeconomic or minority status may moderate outcome of the disorder due to the higher untreated prevalence of ADHD in these populations. Efforts to achieve equity will be of suboptimal success if they fail to take these findings into account. The male-to-female ratio for ADHD is generally higher in clinical samples than in community samples, suggesting a referral bias in favour of boys (*71*).

The accessibility and degree of cultural attunement of local mental health services to child mental health needs will also determine the degree to which families seeking help are able to access and engage with mental health providers. In many countries so-called "Western" or biomedical models of mental health care may function as the "alternative" option for families in distress, with the preferred choice being a traditional healer or religious leader (*104*). Family and community

belief systems, attitudes and expectations also determine the extent to which problem behaviours are perceived as disordered, and may guide the family along different help-seeking pathways. An Indian study found that most parents of children with ADHD in a community clinic were reluctant to accept a biomedical explanation for their child's problems, preferring to attribute them to psychological issues such as learning and memory difficulties (*104*). While there is evidence of relatively high levels of use of medication for children with behavioural problems in some countries – notably the United States – in most populations of the world, medications are rarely if ever used for ADHD. The lack of mental health literacy, as noted for depression earlier, may also contribute to low recognition of ADHD and a delay in seeking help and may be more prevalent in lower socioeconomic groups.

Differential consequences

Children suffering from ADHD tend to experience adverse academic outcomes (such as poor scholastic progress, school failure or drop-out), which are clearly the consequence of the core symptoms of the disorder. In addition, children suffering from ADHD frequently have poor organizational skills, motor skills deficits (affecting handwriting), ineffective and wasteful cognitive styles and poor memory, each of which affects the ability to understand, retain, reproduce and manipulate new knowledge. Poor scholastic progress can give rise to a lack of motivation, despair and hopelessness, which in turn can exacerbate the core symptoms of the disorder, resulting in a vicious cycle (*105–107*). The adverse academic outcomes can be exacerbated by difficulties in establishing and maintaining sound relationships with families, educators and peers, with isolation, loneliness and stigma compounding the effects.

Socioeconomic differentials in the risk for ADHD are compounded by differentials in the recognition of the disorder, help seeking for the disorder and access to appropriate care, leading to differential consequences with a higher risk of school drop-out and lower levels of educational achievement. This, in turn, leads to greater vulnerability for the offspring of these children, who are faced with both the genetic vulnerability and the vulnerability of growing up in a low-income household with a less educated parent.

ADHD used to be viewed as a time-limited disorder of childhood. It is now realized that in a considerable proportion of children and adolescents the disorder persists into adulthood, when it can have adverse effects on occupational capacity. The economic ramifications of a diagnosis of ADHD can thus extend over the entire lifespan of an affected individual and also across generations of affected families. Adults with ADHD have been shown to exhibit increased use of mental health, social and special education services, and are more likely to come into conflict with the law. In a large population-based birth cohort study, individuals with ADHD were more likely to have diagnoses in multiple categories, including major physical injuries and asthma (*108*). Significant direct costs (medication, transport to appointments) and indirect costs (opportunity cost of caregiver time, diminished income-earning potential) are incurred by affected families (*109*). Clearly, all these effects in adulthood are likely to be associated with greater impairment in contexts of social deprivation, again pointing to the importance of equity in this regard.

7.4 Discussion

Lessons learnt

A considerable body of evidence has accumulated for interventions to address depression and ADHD at a variety of levels. There is strong evidence for the treatment of depression and ADHD using locally available and cost-effective drug or psychosocial treatments (*110–112*). There is reasonable evidence for the benefits of a variety of social and economic interventions, particularly on the social determinants and potential mediating factors for depression, such as interventions to reduce acute income insecurity or gender-based violence. However, there is weak evidence for the impact of interventions targeted at more upstream social determinants such as income inequality, stigma, mental health literacy and gender inequity, most of which are currently at the level of expert opinion and are unsupported by empirical evidence of effectiveness. However, the evidence for the downstream interventions is very robust, as mentioned earlier, though access to a range of evidence-based interventions for both depression and ADHD is not equitable across the socioeconomic gradient, and there is little evidence in support of individual or health system interventions that reduce these inequities in access to treatments for depression. For both disorders, the general lack of evidence for interventions targeting social determinants is in large measure due to the absence of evidence rather than evidence of absence of effect, as mental health is usually not assessed as an outcome of these interventions.

Pathways and possible entry-points

The evidence reported in this chapter shows that for both disorders (depression and ADHD) a pattern can ensue in which the disorder is more frequently seen in people who are from low social and economic classes, who are less likely to receive evidence-based care, and who are more likely to experience adverse social and

economic consequences, fuelling a vicious cycle of deprivation, mental disorder and disadvantage (Figure 7.1).

The diagram points to promising entry-points for interventions, which can be aimed at breaking any of the points in the vicious cycle. These interventions include:

- economic, health, development, education, labour, welfare and drug and alcohol policies, which can carry a range of mental health benefits;
- population-level interventions to improve mental health literacy and to challenge the stigma and discrimination associated with mental disorders;
- community-level interventions aimed at improving safety and security, adequate housing with sanitary facilities, secure employment and accessible and comprehensive primary health and antenatal and obstetric care;
- provision of a range of family and individual interventions targeting early childhood development, parenting, adolescence, older adults, nutrition and discrimination, as well as screening programmes for vulnerable groups;
- health sector reforms to improve access to and affordability of care (for example through integration with routine health care services and provision of low-cost health care providers to deliver psychosocial treatments), and provision of a range of evidence-based psychosocial and drug treatments for mental disorders and substance use disorders;
- support for caregivers, social networks and health promotion.

Specific interventions addressing social determinants and mental health outcomes are considered in the next section.

7.5 Interventions

Addressing socioeconomic context, differential exposure and differential vulnerability

Interventions targeting upstream social determinants, examples of which are presented in Table 7.1 (along with relevant references), have the potential to reduce the population burden of both depression and ADHD. Although a wide range of possible interventions are common to both disorders, there is greater supportive evidence for their effectiveness in the case of depression, given that research into child mental disorders has lagged behind that of adult mental disorders. Most interventions are based on evidence from studies in high-income countries. Indicators are suggested for each intervention; see section 7.6 for discussion of indicators and measurement.

The considerable overlap in interventions for two such disparate conditions as ADHD and depression suggests that these interventions are equally relevant to a broad range of child, adolescent and adult mental disorders. They are also likely to carry wider benefits, depending on the target interventions, including reducing risk behaviours such as tobacco use, alcohol and drug misuse and unsafe sex; improving housing environments for the poor; improving access to basic health care; and reducing social problems such as school drop-out and domestic violence (*123, 124*).

While this review found some evidence for the benefits for mental health of a variety of social and economic interventions, most interventions did not evaluate the mental health consequences of their actions. These consequences may not be easy to evaluate as the mental health outcome is frequently distal to the intervention. Furthermore, given the multiple, interacting nature of social determinants, it may be difficult to identify which aspect of the intervention "caused" the mental health outcome (*123*).

Political will, strong partnerships between the state and civil society, and the availability of financial and human resources are broad requirements for the feasibility and sustainability of all interventions targeting upstream social determinants. Specific interventions, depending on their target and characteristics, will be contingent on support from international agencies, an enabling legal and economic framework, trained human resources, health system readiness and supportive public attitudes.

Addressing mental health care outcomes and consequences

The lower two levels of the social determinants framework address health care outcomes and consequences. Table 7.2 shows potential interventions targeting these areas, with examples of relevant references. Again, in most instances the evidence is based on randomized controlled trials for depression only. As for upstream interventions, indicators are suggested for each intervention; see section 7.6 for discussion of indicators and measurement.

Addressing differential mental health care outcomes

Interventions that aim to improve the detection and treatment of mental disorders are critical in addressing mental health outcomes. Efforts are needed to scale up these interventions in routine and general health care settings. Such interventions can reduce the adverse

TABLE 7.1 Interventions for mental disorders targeting socioeconomic context, differential exposure and differential vulnerability, with indicators

Interventions targeting:	Indicators
Socioeconomic context and position	
Mental health policy, legislation and service infrastructure to coordinate service provision (*3*)	Presence, date, development and content of policies, legislation and plans
Alcohol and drug policies to reduce substance-related disorders (*85*)	
Economic policies promoting financial security of populations, funding for key services (*41, 113*)	
Labour policies promoting employment and protection against stress (*114*)	
Welfare policies protecting the disabled, sick and unemployed (*115*)	
Education policies that provide quality basic education and cater for special needs (*78*)	
Differential exposure	
Providing safe home and community environments for children	Child abuse rates, conviction of child abusers
Prevention of injury, violence and crime (*71*)	Statistics on injury, violence and crime, improved community safety
Provision of adequate housing (*116*)	Housing backlog, % of population homeless
Relocation of people with mental disorders to less adverse neighbourhood (*100*)	Access to employment and economic opportunities
Improved antenatal and obstetric care	Infant and maternal mortality rates
Employment creation and skills development (*117*)	Employment rate, skill levels, available training programmes
Differential vulnerability	
Early childhood development programmes targeting impoverished populations (*110*), mother-infant interventions (*118*), parent training (*103*)	Number of parents/children in receipt of programme, longitudinal indicators of child health and development
Depression prevention programmes (*10*)	Number of target population receiving programmes, mental health outcomes
Targeted screening programmes, e.g. following head injury (*88*)	Detection and treatment rates
Provision of adequate nutrition (*119, 120*)	Rates of malnutrition and micronutrient deficiency
Antidiscrimination programmes targeting racism, gender discrimination, stereotyping (*121*)	Social attitudes to and service utilization by age, gender, ethnicity
Access to financial facilities for poor (*122*)	Households receiving microcredit and savings schemes

economic impact of the disorders (*129*). Issues related to scaling up mental health interventions for adult mental disorders have been discussed in the call for action of the recent *Lancet* series on global mental health (*130*). Due to the great shortage of mental health specialist human resources, particularly in low- and middle-income countries (*131*), most of these services will need to be provided by relatively low-cost, non-specialist heath workers who are provided with adequate training and supervision. Critical issues include ensuring the affordability of services, addressing inequities in the provision of a range of evidence-based treatments (particularly non-drug treatments), and sustaining adherence rates to maximize the probability of recovery.

The feasibility and sustainability of these interventions depends on a number of factors, including the practices of pharmaceutical companies in the context of trade-related intellectual property rights (TRIPS); the availability of appropriately trained and supervised human resources; a reliable supply of appropriate medications; the level of integration of mental health with general health services; strategies to combat stigma and promote public education; availability of continuing

TABLE 7.2 Interventions for mental disorders targeting differential health outcomes and consequences, with indicators

Interventions targeting:	Indicators
Differential mental health care outcomes	
Provision of affordable treatment (*19, 103*)	Cost of medication, uptake in poor communities, treatment prevalence
Integration of mental health services with routine health care (*3*)	Staff per population, service utilization rates, outcomes, coverage rates of health care; clinical and social outcomes of persons in care
Provision of evidence-based mental health care and rehabilitation (*19*)	Staff per population in receipt of evidence-based training and continuing professional development
Provision of culturally and linguistically acceptable care (*125*)	Staff profile, staff competency audit
Improved accessibility of services, e.g. through provision of affordable transport (*126*)	Attendance rates at local services, cost of public transport
Anti-stigma campaigns (*127*)	Stigma-related attitudes, campaigns conducted
Effective services to treat substance abuse (*19*)	Staffing in substance abuse services, service utilization rates, outcomes
Differential mental health consequences	
Caregiver support	Reduction in caregiver stress, caregiver support per population
Promotion of social networks and skills training	Children in receipt of training, reduction in secondary social impairments
Disability allowances and sickness benefits	Cost and uptake of disability allowance
Health promotion to encourage healthier lifestyles (*128*)	Number receiving programme, lifestyle and substance use measures

professional development, quality improvement and monitoring systems; and programmes to detect and treat substance abuse. Needless to say, political will and financial resources underpin the sustainability of all these interventions.

Addressing differential mental health consequences

The final set of interventions aims to minimize the adverse impact of these disorders; for example, examination concessions and remedial teaching programmes can improve school outcomes in children with ADHD. Similarly, access to workplace mental health interventions can help reduce the economic consequences of lost workdays due to depression. Programmes challenging stigma and discrimination, such as mass media advocacy campaigns, are likely to lead to improved access to care (*127, 132–134*).

The feasibility and sustainability of these interventions will hinge on the availability of skilled human resources to deliver various interventions; the extent of existing community social networks; the extent of existing stigma against mental illness; the availability of a disability benefits infrastructure; the existence of an evidence base to support health promotion interventions; and availability of skills for designing and implementing programmes. As with other interventions, political will and financial resources are obviously essential.

Proposed new interventions or changes to current ones

A major imperative for implementing interventions is to persuade global and national health policy-makers that mental health is a relevant, indeed important, health need for the poor and disadvantaged. A cornerstone of this approach is that mental health is not just an end in itself but a means to improved health and development – there is "no health without mental health" (*11*). The assessment of the mental health impacts of macrosocial or economic policies would indicate a concrete example of progress in this sphere.

The evidence in this chapter indicates that:

- there is widespread inequity in the distribution of depression and ADHD across populations;

- many of the determinants of these inequities are rooted in socioeconomic context and position, differential exposure and differential vulnerability;
- there is uncertain evidence of the impact of rapid social and economic change on the burden of mental disorders, or their distribution across socioeconomic groups, and that monitoring of the prevalence, determinants and distribution of mental disorders, as globalization affects virtually all societies, is a policy imperative;
- the path to addressing these determinants lies in national and community-level interventions that can have a major impact on the mental health of populations;
- the scaling-up of cost-effective evidence-based mental health services can carry a range of other health, social and economic benefits.

Across all the levels of interventions an explicit targeting of inequities in the mental health care system is proposed, in order to address the vulnerabilities, exposures, adverse outcomes and consequences that are differentially distributed across populations. Specific examples of such strategies include:

- building capacity, at all levels of the health system, to acknowledge the social determinants of mental disorders;
- ensuring that the adverse impact of economic reforms on mental health are mitigated, for example through a systematic health impact assessment and implementation of strategies before the reforms are begun;
- ensuring equitable allocation of resources to enable access to health care services for groups facing the highest levels of disadvantage, for example impoverished or displaced communities;
- preparation of the health system, from policy-makers through to grass-roots health workers, to address inequities, for example through provision of minority language skills in health staff and community outreach services.

A major task for future interventions lies in proactive engagement with policy-makers and the general public with a view to arriving at better-informed decisions on the link between social determinants and mental health. This form of wider intervention underpins the success of many other interventions.

7.6 Implications: measurement

If policies are to be implemented that address the determinants of mental disorders, then their impact needs to be measured. There are a number of challenges that arise when developing indicators and measures for mental health outcomes, which generally rely on reports of internal states or behaviour, rather than the direct observation that is the source of data for many other domains. For assessment of children, there is the additional challenge that younger children are not sufficiently mature to verbalize their thoughts, feelings and experiences, entailing some dependence on the reports of adult informants, such as parents and teachers. Cultural factors, such as the idioms used to describe mental distress experiences, are particularly relevant (*135*).

Most instruments used to measure psychiatric morbidity have been developed in Western countries; however, there are now robust methods for the adaptation and validation of such measures in different cultural settings (*135, 136*). The ideal instrument to assess the presence of psychopathology should be comprehensive in scope; provide the means for determining the presence or absence of psychiatric disorders in the general population; categorize psychiatric disorder using criteria that are in widespread use by mental health professionals; for child mental health, capture data from both the child and an appropriate adult informant (generally a parent) using parallel forms that are easily understood by both; allow for different levels of certainty and severity; have acceptable psychometric properties (for example test–retest reliability and construct validity), ideally for the population for which it will be used; and be practically feasible to use (for example brief, inexpensive, and equipped, if appropriate, with computer-based scoring algorithms) (*137*). The most commonly used instruments to assess child psychopathology are the Child Behaviour Checklist (*138*) and the Strengths and Difficulties Questionnaire (*139*), while for depression in adults the most common screening measures are the General Health Questionnaire (*140*), the Self-Reporting Questionnaire (*141*) and the Kessler Questionnaire (*142*).

It is essential that the indicators for mental health identified are linked in a coherent health information system. The information system should be capable of measuring the implementation of a clearly conceptualized set of policy goals that target the social determinants of mental ill-health, amongst other aspects of health. The following broad principles need to inform the design of such a system:

- The health information system should be designed as a system for action: not simply for the purpose of gathering data, but also for the purpose of enabling decision-making for the interventions that target the identified social determinants. Design of the health information system should include systems for collecting, processing, analysing, disseminating and using information related to mental health and its determinants.
- It is essential that indicator data are collected in a form that allows disaggregation by the major social

determinants (in particular related to socioeconomic position). In order to achieve representation across socioeconomic and other types of disadvantage, it is critical to monitor response rates, and implement strategies to maximize these (for example, using appropriate language versions of measurement tools).

- The system should be driven by a set of well-defined indicators that summarize information relevant to a particular phenomenon and can be used to measure change. These indicators must include mental health determinants and outcomes that are specifically relevant to disadvantaged groups.
- The system should be designed in consultation with a range of relevant stakeholders, explicitly including the representation of disadvantaged groups, for example persons and families affected by mental disorders. This is particularly important in monitoring the social determinants of mental ill-health, when interventions are required by a range of different sectors with varying agendas and information needs.

The WHO module *Mental health information systems* (*143*) sets out practical steps for the design and implementation of a mental health information system. These steps include:

1. Needs assessment: identifying what information is needed to monitor the interventions that have been selected;
2. Situation analysis: identifying what information is already being collected, analysed and used, and how this may be adapted for use in the planned system;
3. Implementation: finalizing the indicators and minimum dataset, mapping the information flow, establishing frequency of data collection, identifying roles and responsibilities, designing and distributing materials, training of staff, addressing practical barriers, building data quality checks, conducting a pilot project and rolling out the system;
4. Evaluation: establishing how well the information system is working by developing a framework and criteria for evaluation, determining the frequency of data collection, and collecting baseline and follow-up data.

Indicators for monitoring interventions targeting the social determinants of mental disorders are summarized in Tables 7.1 and 7.2. Suitable tools for data collection need to be developed and applied, including monitoring and population surveillance systems in relevant areas, community surveys and attitudinal surveys, and impact evaluation of mental health-related programmes. In particular, information regarding mental health needs to be routinely gathered within general health information systems, including with relation to human resources and budgeting.

The incorporation of key indicators for mental health in the national information system is crucial for monitoring the burden of mental disorders and monitoring and evaluating interventions that target mental health. Frequently a long-term perspective will be required to evaluate interventions that may be distal to the intended outcomes and in this context a set of intermediary indicators may be useful. Examples of sets of indicators that target specific mental health goals are available in a document developed by the WHO Western Pacific Regional Office to monitor pro-poor and gender-aware mental health interventions (*144*), and a framework for monitoring child and adolescent mental health, risk behaviour and substance abuse has also been developed (*137*). For both of these sets of indicators it is necessary to stratify the data by economic group and gender, and other categories of disadvantage, in order to assess the extent to which inequities are reduced as policy goals are achieved.

7.7 Conclusion

The evidence that is available strongly indicates an increased risk for mental disorders in conditions of social disadvantage, given the socioeconomic differentials that occur across all levels of determinants of mental disorders. Thus, it is critical for the mental health system to implement strategies that address the needs of disadvantaged and poor groups to reduce mental health inequities. Examples of strategies at all levels of determinants have been described earlier. An overarching strategy is the explicit recognition of equity as a driving principle for mental health policy and programme development.

It is important to acknowledge that the limitations of evidence for the social determinants and interventions for both mental disorders presented in this review include lack of robust evidence indicating causal associations (for example, in low- and middle-income countries most studies are descriptive and cross-sectional and there are few evaluations of interventions), interactions between determinants and outcomes, multiple confounding and mediating variables, the difficulty of distinguishing proximal and distal mechanisms and the relative paucity of evidence on protective factors. Furthermore, the review did not cover non-English language publications and thus cannot be considered systematic or comprehensive. A systematic review of the evidence related to poverty and mental ill-health in low- and middle-income countries is currently being undertaken (Lund et al., in preparation).

There are two priority questions for future research. First, what is the impact of social and economic change, which in most countries are widening inequalities, on mental health inequities? This would require

longitudinal monitoring of populations with simultaneous assessment of determinants and mental health outcomes. Second, what are the protective factors that strengthen resilience and promote mental health – for example, why do most people living in violent relationships, or extreme poverty, or exposed to severe disasters, not succumb to clinical depression? Why are the rates of behavioural disorders in children from some ethnic groups lower than for others in the same community? This may require a different research approach, whereby all people in the study sample are exposed to the risk factor and measures of effect on mental health outcomes are calculated for exposure to protective rather than risk factors (*96*). There is a particular need for this research to be carried out in low- and middle-income countries, where, as this review has shown, the evidence base is weakest.

In addition to considering implementation and measurement for each of the interventions listed earlier, policy-makers and programme designers should also be aware of some of the complexities of designing interventions that target social determinants of disorders such as depression and ADHD. Context, intervention design and delivery, and time to follow-up may influence the pathway by which a social or economic intervention influences mental health. Particularly in low- and middle-income countries, where mental health resources are limited but the need is high, it may be beneficial for pro-poor and equity-focused interventions to be designed and implemented in ways that promote mental health and incorporate mental health indicators into their evaluations to monitor short- and long-term effects. Interventions to alleviate the effects of poverty on the prevalence of mental disorders are likely to be most cost-effective if targeted at those with the lowest incomes (*115*). Finally, the robust evidence for the efficacy, cost-effectiveness and impact of evidence-based interventions calls for the urgent need to scale up these interventions to reduce the massive treatment gap in all countries, but most particularly in low- and middle-income countries (*130*).

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Neglected tropical diseases: equity and social determinants

8

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Contents

Table

1 The authors would like to acknowledge the valuable input of reviewers (especially Susan Watts and Erik Blas), and Birte Holm Sørensen for her comments regarding the potential of social determinants as indicators of multiendemic populations. Also thanks to staff members of the WHO Department of Neglected Tropical Diseases for their support and advice.

8.1 Summary

The neglected tropical diseases (NTDs) are very heterogeneous and consequently the analysis of inequity and social determinants is extraordinarily complex. The result is a pattern where the various NTDs are clustered in different ways. This leads to six recommended actions, all of which relate mostly to preventive and promotive measures. In each case the right of vulnerable and marginalized groups to be heard and to exert political influence should be ensured.

Action 1: Addressing water, sanitation and household-related factors (the "preventive package"). The analysis shows overwhelming evidence of how the intermediary social determinants of water and sanitation, and housing and clustering, determine NTDs. Consequently, there is a need to address these risk factors in endemic communities to provide sustainable prevention for clusters of NTDs.

Action 2: Reducing environmental risk factors. Environmental factors are essential determinants for many of the NTDs. These factors are often introduced by humans, either directly or indirectly. Planning based on health impact assessments for new projects and mitigating revisions of existing schemes are needed in order to control NTDs.

Action 3: Improving health of migrating populations. Migration encompasses the movements of nomads, labour migrants, people subjected to forced resettlement and refugees from natural disasters or armed conflict. Their movements influence exposure and vulnerability to some NTDs, and access to health care systems is reduced. The particular NTD issues that relate to these groups should be addressed in ways that are tailored to local conditions (patterns of morbidity, mobility, environmental and sociocultural factors).

Action 4: Reducing inequity due to sociocultural factors and gender. Sociocultural factors, which are often closely linked to gender roles, interact with NTDs in various ways. In some cases NTDs incur added burdens due to stigma, isolation and other negative consequences. These factors may also reduce the acceptability of health services, leading to differential health care outcomes. There are unexplored potential advantages in addressing these issues from a multidisease perspective.

Action 5: Reducing poverty in NTD-endemic populations. Poverty emerges as the single most conspicuous social determinant for NTDs, partly as a structural root determinant for the intermediary social determinants and partly as an important consequence of NTDs, either directly (leading to catastrophic health expenditure) or indirectly (due to loss of productivity). Consequently, poverty should be addressed both in general poverty alleviation programmes for NTD-endemic populations and more particularly by ensuring affordable treatment.

Action 6: Setting up risk assessment and surveillance systems. The NTDs are characterized by their focality determined by the complex combinations of environmental and social determinants. Pockets of multiendemic population segments are likely to "disappear" within statistical averages and must be identified as a means to address inequity and in order to direct curative or preventive interventions to NTD hot spots, thereby increasing efficiency. Cross-disciplinary risk assessment and surveillance systems should be established based on combinations of epidemiological, environmental and social data, providing not only early warnings for epidemics, but also evidence for long-term planning under more stable conditions.

8.2 Introduction

Neglected tropical diseases

This chapter considers the so-called neglected tropical diseases (NTDs) (*1–3*), focusing on the 13 diseases covered by the World Health Organization (WHO) Department of Neglected Tropical Diseases: Buruli ulcer, Chagas disease, cholera, dengue fever (including dengue haemorrhagic fever), dracunculiasis, lymphatic filariasis, human African trypanosomiasis, leishmaniasis, leprosy, onchocerciasis, schistosomiasis, soil-transmitted helminths and trachoma. From a biomedical perspective, the 13 NTDs are very heterogeneous. Box 8.1 gives a brief description of each disease.

An aggregated measure of 11 of the 13 NTDs (omitting cholera and dengue fever) ranks sixth among the 10 leading causes of disability-adjusted life years,[2] ahead of malaria and tuberculosis (*4*). Estimates are, however, uncertain, and recent studies argue that incidences and impacts of schistosomiasis (*5*) and trachoma (*6*) have been underestimated. Researchers have mapped the global distribution of trachoma (*7*) and lymphatic filariasis, onchocerciasis, schistosomiasis and soil-transmitted helminths (*8*). Brooker et al. (*9*) have attempted to map helminth infection in sub-Saharan Africa. De Silva et al. (*10*) add an interesting time dimension to the analysis of soil-transmitted helminths, showing the trend 1994–2003.

2 Disability-adjusted life years (DALYs) reflect a combination of the number of years lost from early deaths and fractional years lost when a person is disabled by illness or injury.

BOX 8.1 Brief description of neglected tropical diseases

Buruli ulcer is caused by a bacterium (*Mycobacterium ulcerans*) and is clinically characterized by big ulcers that lead to disfiguration and sometimes loss of limbs. There are indications that infection is based on direct contact to the environment, without vectors or animal reservoirs playing a role. Treatment is expensive and involves surgery and hospitalization.

Chagas disease is caused by a protozoon (*Trypanosoma cruzi*). It is transmitted by various species of "kissing bugs" (Triatominae) that live either in houses or in forests, or via blood transfusion. Domestic and wild animals play important roles as animal reservoirs. The symptoms develop gradually, mainly affecting the heart and the intestines. The main control measure is vector control. The disease is confined to Latin America.

Cholera is caused by different types of *Vibrio* bacteria. Water and food contaminated with human faeces are the main sources of infection. Cholera cases are characterized by profuse diarrhoea, and rehydration is the main treatment. Cholera is present worldwide though rarely in parts where the sanitary infrastructure is of adequate standard.

Dengue fever is caused by an arbovirus and transmitted by mosquitoes (*Aedes aegypti*). The symptoms are fever, headache, musculoskeletal pain and rash. If the patients are reinfected with another serotype there is a risk of dengue haemorrhagic fever. Within recent decades the disease has spread from Asia to tropical areas in all parts of the world.

Dracunculiasis (guinea-worm disease) is caused by a worm (*Dracunculus medinensis*), the larvae of which enter the human body through drinking water containing the tiny crustaceans that carry the larvae. Adult female worms erupt from the skin to shed eggs. Filtering water and surgical removal of adult worms are important control measures. Though much progress has been made, there is still a handful of endemic countries in Africa.

Human African trypanosomiasis (sleeping sickness) is caused by various *Trypanosoma* spp. The disease is transmitted by tsetse flies (*Glossina* spp.), and various types of animals (pigs, cattle and antelopes) serve as reservoirs. The central nervous system is affected and treatment with drugs is difficult and expensive. Control is largely aimed at vectors.

Leishmaniasis is caused by various protozoa (*Leishmania* spp.) transmitted by female sandflies (*Phlebotomus* and *Lutzomyia* spp.). Symptoms range from cutaneous or mucocutaneous cases to lethal visceral cases (in India known as kala-azar) and treatment is difficult. Apart from South Asia, animal reservoirs include rodents and canines. Leishmaniasis is widespread in tropical and subtropical areas.

Leprosy is caused by a bacterium (*Mycobacterium leprae*) that affects the skin and nerves. The disease develops slowly and can lead to severe dysfunction and disfiguration. The main route of infection is from person to person, though that has been disputed recently. No vectors are involved. Multidrug treatment has led to a rapid decline in prevalence.

Lymphatic filariasis is caused by worms (*Wuchereria bancrofti*, *Brugia* spp.) Mosquitoes serve as vectors. Adult worms can block the lymph vessels resulting in chronic symptoms such as swelling of the leg (elephantiasis), scrotum (hydrocele) or other body parts, but acute stages may also cause serious illness. Treatment is through drugs or surgery. The disease is widespread in Asia, Africa and Latin America.

Onchocerciasis (river blindness) is caused by a worm (*Onchocerca volvulus*). It is transmitted by blackflies (*Simulium* spp.), which breed close to running streams. Patients can develop blindness and severe skin symptoms. The disease occurs mainly in Africa (where transnational campaigns of mass drug administration and vector control have achieved significant results), and also in Latin America.

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Schistosomiasis is caused by various types of *Schistosoma* worms, and eggs are spread via urine or faeces. Snail species serve as intermediate hosts for the larvae, which penetrate human skin in contact with infected water. Control measures include inexpensive drugs, sanitation, snail control and avoidance of contact with infested water. The disease is found in tropical and subtropical areas of Asia, Africa and Latin America.

Soil-transmitted helminths mainly comprise four types of worms: *Ascaris lumbricoides*, *Trichuris trichiura* and the hookworms *Ancylostoma duodenale* and *Necator americanus*. The adult worms live in the intestines and the eggs are shed in the faeces. Cheap and effective drugs are often distributed in mass drug administration campaigns. Soil-transmitted helminths are found worldwide where there is poor sanitation.

Trachoma is caused by an intracellular, bacterium-like organism (*Chlamydia trachomatis*). It infects the eyes and is the leading cause of preventable blindness. It is closely linked to low hygiene, presence of domestic animals and flies. Trachoma is found in Africa, Asia, Latin America and the Middle East. Control measures include the SAFE strategy (see below).

Many of the NTDs are characterized by their focality (*11–13*). Thus, morbidity and mortality may vary significantly from one place to another due to different local factors. This has several important implications. First, it means that pockets of high burden of NTDs are likely to "disappear" within statistical averages at higher (provincial or national) levels. Second, it means that curative or preventive interventions will become more efficient if they can be focused on the hot spots, particularly as populations at these locations are likely to be burdened by several NTDs at the same time, further increasing the efficiency of multidisease interventions. Third, from an equity perspective it is mandatory to find the most affected populations in order to ensure that "the health of the most disadvantaged groups has improved faster than that of the middle- and high-income groups" (*14*).

Equity aspects of neglected tropical diseases

The term "neglected" has many meanings. Seen from a political public health perspective, it is an indication that these diseases were only recently "rediscovered" after having been overshadowed for many years by the "big three" (HIV, malaria and tuberculosis). From an equity perspective, NTDs are especially found in disadvantaged populations. Thus, more than 70% of countries and territories affected by NTDs are low-income and lower middle-income countries, and 100% of low-income countries are affected by at least five NTDs (*3*). This is partly because of the association with various combinations of social determinants, as will be described below, and partly because these populations are usually not in a position to draw the attention of decision-makers to their problems and attract resources. The focality of most NTDs also contributes to this neglect. The term "tropical" is not absolutely correct as some NTDs (for example cholera and leprosy) are not limited to specific climate zones. However, as a shorthand, the term points to where most of the NTDs (as well as most disadvantaged people) are found. The NTDs are among what Hunt calls "type III diseases" – the very neglected diseases that "receive extremely little research and development, and essentially no commercially-based research and development in the rich countries" (*15*).

Methodology

The present chapter is based on an extensive literature review. An initial search in PubMed using terms relevant to social determinants and NTDs gave 4401 references, of which 250 were deemed relevant; these were supplemented by secondary identification of sources using their bibliographies, and key references provided by WHO staff members of relevance to their particular fields.

The subsequent analysis was based on an article assessment matrix that was developed in order to ensure a systematic and transparent approach when reading the selected articles. The analysis registered points of importance in relation to four main aspects:

- the five analytical levels: socioeconomic context and position, differential exposure, differential vulnerability, differential health care outcomes, and differential consequences (*16*);
- the intervention aspects: availability, accessibility, acceptability, contact coverage, diagnostic accuracy, provider compliance, consumer adherence, replicability, sustainability, scalability, feasibility (political, economic and technical) (*16*);
- the 13 NTDs;
- the relevant social determinants.

BOX 8.2 Social determinants of neglected tropical diseases considered in this chapter

- Water and sanitation
- Housing and clustering (including building design, peri-domestic area and crowding of people)
- Environment (including ecological and topographical factors, land coverage, climatic change and water resource development schemes)
- Migration (including refugees, nomads, migrant workers and resettlers)
- Disasters and conflicts (comprising elements of migration and breakdown of health care systems)
- Sociocultural factors
- Gender
- Poverty (including inadequate income, subsistence and wealth)

The analysis pivots around combinations of these four axes. The task is complex; the inclusion of 13 very heterogeneous NTDs, each with different social determinant profiles, calls for a very broad approach, while limitations of space necessitates a strict focusing on relatively few social determinants. Also, the chapter has few references from Europe and central Asia. This is a reflection of the literature review, but may not be a fair picture of the realities. Further research may rectify that.

8.3 Analysis: social determinants of neglected tropical diseases

Box 8.2 provides an overview of the social determinants of NTDs that will be discussed in this chapter. In this list, water and sanitation, and housing and clustering, and to a certain extent environment, can be termed intermediary, whereas the rest are structural. The social determinants were selected based on the literature review, either because there is substantial evidence that they play a role for many of the diseases (as in the case of poverty) or because they are necessary for understanding a group of NTDs (as in the case of housing and clustering). Some determinants are so interwoven that it would be artificial to separate them in the analysis (for example migration, disasters and conflicts; and sociocultural factors and gender).

There are major social determinants that are not included or not fully covered in this chapter, either because they were not conspicuous in the literature searched, or because of limitations of space. These include nutrition, urbanization, education, social class, religion and occupation. Most NTDs have distinct age profiles, with higher prevalences either among children (Buruli ulcer, schistosomiasis and soil-transmitted helminths), adults (human African trypanosomiasis), elderly (blindness due to onchocerciasis or trachoma) or patients infected early in life with overt manifestations presenting in later adult age (lymphatic filariasis). However, several of these social determinants, for example occupation and urbanization, will be touched on in passing in the text.

Many of the social determinants are not only coexisting but frequently also more or less overlapping (*17, 18*). As the 13 NTDs are all infectious (and to a large extent vector-borne), they are more dependent on the external physical or biological conditions than many other diseases. Thus, factors such as water and sanitation, housing and clustering, and environment play central roles in the present analysis and may actually be seen as biosocial determinants. However, in spite of the very material characteristics, even these determinants are intricately integrated with sociocultural and economic factors. In this section the selected social determinants will be illustrated by some of the NTDs for which they are especially important.

Water and sanitation

In relation to NTDs, water can have both negative and positive connotations. It can act as a source of infection or as a breeding ground for vectors; on the other hand, adequate quantity and quality of water supply is vital for hygiene and the avoidance of infection. Inadequate sanitation and consequent exposure to human faeces plays a key role in the transmission of certain diseases (*19*). "The right to water, derived from the rights to health and to an adequate standard of living … includes an entitlement to sufficient, safe, acceptable, physically accessible and affordable water for domestic and personal uses" (*15*).

The importance of water and sanitation as a determinant for cholera was forcefully demonstrated by John Snow in London in 1848 with the closing of the Broad Street water pump, though the authorities were reluctant to accept the evidence (*20*). Control measures that, from a biomedical perspective, seem rational may also meet strong opposition among lay people due to inappropriate campaigns and political tensions (*21*). Lack of access to safe water and sanitation may result in cholera epidemics among refugees (*22*). In South Africa, a cholera epidemic was found to result from reduced access to clean water following the introduction of user fees in privatization schemes (*23*).

The risk of contracting dracunculiasis is closely related to the dynamics of water contact at household and village level, as various daily chores such as fetching water, working in distant fields and trading all influence access to safe drinking-water (*24*). Guinea-worm disease was considered one of the indicators for access to safe drinking-water of the Water and Sanitation Decade (1981–1990).

For control of trachoma, the SAFE (surgery, antibiotics, facial cleanliness, environmental improvement) strategy is based on both curative and preventive measures. The inclusion of facial cleanliness demonstrates the importance of access to adequate water supply not only for drinking but also for washing (*25–27*).

A number of significant literature reviews have been conducted on water and sanitation in relation to diarrhoeal diseases, some of which are also relevant to NTDs (*28*). Water for personal and domestic hygiene has been found important in reducing rates of ascariasis, diarrhoea, schistosomiasis and trachoma, and sanitation facilities decreased diarrhoea morbidity and mortality as well as the severity of hookworm infection (*29*). It is important to distinguish between public and domestic domains of disease transmission, as the required interventions are different (*30*). A review of soil-transmitted helminths and schistosomiasis shows that "when sanitation improvements are made alongside deworming, the results obtained last longer" (*31*). The importance of water and sanitation for schistosomiasis transmission and control has also been reviewed by Bruun and Aagaard-Hansen (*32*).

In some cases vectors may breed in domestic water sources. This is particularly important for the mosquito vectors of dengue fever and lymphatic filariasis. Inadequate public water supply, either through water wells in northern Thailand (*33*) or piped systems in the Dominican Republic (*34*), was found to be a factor in inappropriate water storage providing breeding sites for the dengue fever vector. Reduction of breeding sites for culicine vectors in pit latrines is a possible means of controlling bancroftian lymphatic filariasis (*35*).

Thus, inadequate water and sanitation are well-documented causes of many of the NTDs, as exemplified above in the cases of cholera, dengue fever, dracunculiasis, lymphatic filariasis, schistosomiasis, soil-transmitted helminths and trachoma. Water and sanitation can be seen as key intermediary social determinants that in turn are influenced by some of the more structural social determinants, especially poverty. Water and sanitation will be addressed below in relation to recommended action 1.

Housing and clustering

This subsection considers the physical characteristics of the house, including materials and design; the peri-domestic area, including kitchen gardens, vegetation, solid waste dumps and domestic animals; and the clustering or crowding both within the home (number of people per room or area) and the neighbourhood (proximity to neighbours). Selection of new housing sites away from vector habitats, and improved and properly maintained housing, are important elements of environmental management for vector control (*36*). Adequate housing is not only a key factor for health but also an essential human rights issue (*15*).

The importance of this intermediary social determinant in Chagas disease control is very well documented (*37*). In Cuernavaca, Mexico, adjacent garden areas and vacant peri-domestic space and occurrence of squirrels, opossums and pigs around the house were risk factors for Chagas disease because they increased the prevalence of the vector *Triatoma pallidipennis* (*38*). In Costa Rica, a dirt floor (as opposed to cement) and storage of firewood close to the house were shown to be direct risk factors for Chagas disease (*39*). Experience from Venezuela illustrates how houses can be upgraded at low cost, using long-term solutions based on economic feasibility and community participation (*40*).

Several studies have shown that housing and clustering are significant risk factors for leishmaniasis. A study in Ecuador found that subjects whose homes had exterior walls of cement or brick had a disease risk only 40% that of persons whose homes had wooden or cane walls (*41*). In Bihar, India, not only housing material but also in-house granary and presence of bamboo tree near the house were found to be risk factors (*11*). Using a sequence of cross-sectional surveys and spatial analyses in a rural community in Bangladesh, a study of a clustering of cases of visceral leishmaniasis (kala-azar) showed that proximity to previous cases was a major risk factor (*42*).

Environmental improvement is a component of the SAFE strategy for control of trachoma (see previous subsection) (*25*). Crowding and various peri-domestic

factors that relate to the propagation of the fly population and cattle ownership play an important role in trachoma transmission (*6, 43*). A review by Marx concludes that "support for household clustering of trachoma and family transmission of disease, while not always consistent, appears strong" (*44*).

Soil-transmitted helminth infections have also been associated with house construction, and in India crowding has been shown to be a risk factor for *Ascaris* infection (*45*). There is an ongoing debate as to whether soil-transmitted helminths are concentrated in certain households due to environmental or biological (genetic) factors.

For leprosy, crowding is again an important factor, and both the household itself and the neighbourhood have been shown to be arenas for transmission (*46*). There is a strong inverse relationship between socioeconomic development (and more particularly improved housing and reduced crowding) and leprosy incidence (*47*).

To conclude, housing and clustering play a major role in exposure to several of the NTDs. In some cases (for example Chagas disease, leishmaniasis, soil-transmitted helminths and trachoma) the characteristics of the house and the peri-domestic area influence the presence of vectors, whereas in others (for example leishmaniasis, leprosy, soil-transmitted helminths and trachoma) crowding or clustering facilitate direct exposure to the pathogen via infected cohabitants. Housing and clustering can be seen as an important intermediary social determinant for many of the NTDs, having direct causal links to poverty as a structural social determinant. This social determinant will be addressed below in relation to recommended action 1.

Environment

Environment is defined broadly, comprising conditions of soil, vegetation, fauna and climate as well as water resource development schemes constructed by humans, and can thus be viewed as a biosocial determinant. It is impossible to draw a clear distinction between "peri-domestic area" and "environment", so there is a certain overlap between this social determinant and housing and clustering. Environmental change (climate, water resource development schemes and deforestation) is a major aspect of globalization (*48*).

Chagas disease control is based on an understanding of sylvatic and domestic transmission patterns of the Triatominae vector (*37*). Altitude is an important factor for the distribution of this vector for Chagas disease (*49*). Outbreaks of cholera in Bangladesh have been shown to be closely related to climatic factors (*50*) as well as a number of environmental factors (*51*). Maudlin's historical overview of human African trypanosomiasis illustrates the close relationship between the disease and the environment (*52*).

In Brazil, the spatial distribution of visceral leishmaniasis shows that "many of the regions with highest rates lie near forest areas and pastures, which suggests that transmission of infection to the human population may originate, at least in part, from a sylvatic cycle" (*53*). Ashford's review of leishmaniasis provides a systematic overview of the complex variation in mammal reservoir hosts, vectors and *Leishmania* species in different parts of the world (*54*). The article draws implications for control and makes a strong case for the importance of biological expertise. Environmental variables such as temperature and soil type are the most important ecological determinants of the distribution of leishmaniasis vectors in Sudan (*55*).

Distance to outdoor sources of infection may play a role for onchocerciasis (*56*). Construction of large dams for hydroelectricity and other developmental projects "may reduce or alternatively, as with spillways, increase the breeding sites of vectors" for onchocerciasis (*57*).

In Puerto Rico a strong correlation has been shown between improved water supply and decreased schistosomiasis prevalence, whereas improved sewage disposal did not have the same effect (*58*). The relationship between water resource development schemes and schistosomiasis is well documented (*59, 60*).

Climate change may have considerable consequences for the global distribution of NTDs and other diseases (*61*). Based on predictive modelling and spatial mapping technology, Zhou et al. (*62*) have projected that an additional 8.1% of the area of China will be prone to schistosomiasis transmission by 2050.

Thus, environment is a strong biosocial determinant for many NTDs, predominantly through exposure, and this will be addressed below in relation to recommended action 2. Chagas disease, cholera, human African trypanosomiasis, leishmaniasis, onchocerciasis and schistosomiasis have been chosen to illustrate the case. There are certain indications that even Buruli ulcer is linked to environmental risk factors.

Migration, disasters and conflicts

"The movement of people between countries now accounts for approximately 130 million people (2% of the world's population) per year", and in "the mid 1980s, one billion people, or about one sixth of the world's population, moved within their own countries" (*48*). Migration may be temporary or permanent and includes the movements of nomads, refugees, labour

migrants and people subjected to forced resettlement. Examples from West Africa show how water resource development schemes lead to both planned and unplanned migration (*63*). Refugees may flee to neighbouring countries or to other areas within their own country (internally displaced persons), and the latter are often more vulnerable because they are not covered by international humanitarian laws and organizations. Health services, including control programmes for migrating populations, face particular logistic problems and are usually inadequate or absent (*64–66*). Negative health implications of war have been shown in Uganda and Sudan (*67*). Breakdown of health systems during conflict may be coincidental or purposive, as in the case of the Contra War in Nicaragua in the 1980s, when health facilities and staff were directly targeted (*68*).

A historical overview of cholera transmission in Africa during the seventh pandemic (1970–1991) shows the association with migration and refugees (*69*). Cholera epidemics have been associated with the conflict-induced movement of refugees from Mozambique to Malawi (*70*) and from Rwanda to the Democratic Republic of the Congo (*48*).

The trade and movement of goods can also lead to the dissemination of parasites and vectors (*61, 64*). There is evidence for the spread of *Aedes albopictus* from northern Asia to North America via used tyres (*71*). This has implications for transmission of dengue fever and other arboviruses.

Nomadism often results in higher prevalences of trachoma (due to proximity to cattle) and dracunculiasis (due to unsafe water), whereas helminth infections are relatively rare (as the nomads leave their waste behind). The nomads are able to avoid health risks, but they may also be potential active transmitters of disease (*66*).

The first human African trypanosomiasis cases in southern Ghana appeared due to population movements (*48*). Internal or regional conflicts result in dysfunctional health care services and migration and have consequently led to recrudescence of human African trypanosomiasis (*52, 72*). The case of urban human African trypanosomiasis in Kinshasa originated from influx of migrants due to conflict (*73*).

In 1997, an outbreak of anthroponotic cutaneous leishmaniasis occurred in an Afghan refugee settlement in north-western Pakistan, and 100 000 deaths resulted from visceral leishmaniasis in southern Sudan due to migration (*48*). Possible factors causing an epidemic of cutaneous leishmaniasis in Khartoum included migration from western Sudan combined with an increase in the rodent reservoir population, urban expansion and conducive climatic conditions (*74*). With regard to population movements and leishmaniasis, "health services in countries where these diseases are not prevalent are often ill-equipped to deal with their introduction" (*75*).

Migration is an important factor for schistosomiasis (*76*). The increasingly mobile population poses a challenge to schistosomiasis control in China (*77*), as does the number and migration of livestock in Yunnan Province, China (*78*).

Urbanization includes elements of migration and clustering, as well as inadequate infrastructure. Urbanization has been found relevant for many NTDs, including Chagas disease in Brazil (*79*), human African trypanosomiasis in the Democratic Republic of the Congo (*73*), leishmaniasis in Latin American (*80*) and schistosomiasis (*76*).

To summarize, migration of human (and in some cases animal) populations and trade are highly relevant to at least half of the NTDs, including cholera, dracunculiasis, human African trypanosomiasis, leishmaniasis and schistosomiasis, and can lead to the introduction of pathogens into new areas or exposure of vulnerable populations to new risk zones. At the structural level these population groups are often politically marginalized. Health services are usually absent or inadequate for migrating populations and in cases of natural disasters or conflicts there is often a further breakdown of health care services leading to differential health care outcomes. This social determinant will be addressed below in relation to recommended action 3.

Sociocultural factors and gender

This subsection encompasses both sociocultural factors and gender, given that gender roles are culturally constructed. Frequently they also determine occupation differentiation. It has been suggested that the conceptualization of women's health should be broadened from the traditional concentration on reproductive aspects (*81–83*). Rathgeber and Vlassoff (*84*) have proposed a framework for gender-sensitive research in relation to tropical diseases, which has been further applied by Vlassoff and Manderson (*85*).

Some studies in Africa have found an association between prevalence of dracunculiasis and particular ethnic groups (*86*), and dracunculiasis detection rates are influenced by structural differences between the Fulani and Yoruba groups in Nigeria (*87*). In Nigeria, it has also been illustrated how the dynamics of daily life and coping mechanisms at household and community level influence the transmission of dracunculiasis (*88*). Cattand et al. find that, for human African trypanosomiasis, "men are affected at nearly twice the rate of women" (*89*).

Regarding the gender aspects of leishmaniasis, Cattand et al. (*89*) report a much higher incidence among males than females, but a community study of cutaneous leishmaniasis in rural Colombia found no gender difference, as opposed to the official ministerial statistics (*90*). Several others point to underreporting and delayed access to diagnosis and treatment for female cases as reasons for the apparent differential (*85, 91, 92*).

For leprosy, stigma and other negative sociocultural consequences often play an important role (*93–96*). A review of leprosy from a gender perspective found that women were generally more afflicted in terms of lower case detection in rural than in urban and tribal areas and that women had a relatively higher frequency of reversal reactions, while males had a higher incidence of deformities (*97*). In India, female leprosy patients were more affected in their daily life and in their interaction with the community (*94, 96*). A review of the socioeconomic impact of lymphatic filariasis found varying degrees of stigmatization in different parts of the world (*35*).

Onchocerciasis skin disease has different prevalences in different ethnic groups (Yoruba and Fulani) in Oyo State, Nigeria, and females had a significantly higher prevalence of skin conditions caused by onchocerciasis (*56*). Among the Mande in Guinea, onchocerciasis has a strong influence on mobility, marital status and occupation capability (*98*). Males are generally more affected than females, which has been ascribed to the "relatively high, innate resistance to the infection in females" (*57*).

Most studies indicate higher prevalence of schistosomiasis for males than females, presumably due to higher exposure. Morbidity does not therefore appear to be influenced by sex apart from its possible disruption of pregnancy and other "maternal functions" (*99*). Studies from Sudan and Egypt show a complex relationship between schistosomiasis and gender roles in relation to domestic activities and farming (*100, 101*). Female genital schistosomiasis has recently been found to constitute an underestimated public health problem (*102, 103*).

Women are more prone than men to have blinding trachoma. According to a literature review, this is due to more intensive exposure, because of their role as caregivers to younger children who are more likely to be infected (*26*). In Mali no gender difference was found in prevalence among preschool children whereas there was a strong relationship between the trachoma status of women caregivers and their children (*104*).

To conclude, ethnicity is a social determinant for certain NTDs, mostly working via exposure (for example dracunculiasis and onchocerciasis). Sociocultural factors are most conspicuous with regard to cutaneous leishmaniasis, leprosy, lymphatic filariasis and onchocerciasis, in all four cases because of the stigmatization associated with chronic physical disability. Gender plays a conspicuous role for many of the NTDs, and there is considerable variance in morbidity and mortality rates for males and females by disease. Thus, males bear the brunt of human African trypanosomiasis and schistosomiasis due to exposure, whereas women suffer more from leprosy (stigma) and trachoma (blindness). For leishmaniasis, some studies report higher prevalence among males, while others point to underreporting and inadequate diagnosis and treatment for women. At the structural level both ethnicity and gender are closely linked to differential political influence and access to resources. The aspects mentioned here will be addressed below in relation to recommended action 4.

Poverty

Poverty can be analysed at many levels, from global, through national, to community and household units of analysis. Poverty can be viewed either from an absolute perspective, where simple lack of resources has serious consequences, for example inability to pay for health services; or from a relative perspective, which takes greater account of relative economic inequity in society. In the present chapter the former approach is adopted, unless explained otherwise. Costs incurred through illness can be either direct (treatment, drugs, tests) or indirect (transport and food for patients and caregivers, loss of earnings). "Catastrophic health expenditures" can occur when the cost entailed by a disease permanently worsens a family's financial livelihood (*105, 106*).

A review of the socioeconomic implications of Buruli ulcer in the Ashanti region, Ghana, concluded that indirect costs accounted for 70% and direct costs only 30% of total treatment cost, and the disease was found to be a huge burden for afflicted families and for the health care system (*107*).

Low income (among other social determinants) is predictive of dengue fever in Belo Horizonte, Minas Gerais, Brazil (*108*). Analysis of secondary data for the same location found clusters of high rates of dengue fever and leishmaniasis in underprivileged areas (*12*). The cost of dengue fever was estimated to be high in Thailand (*109*). With regard to human African trypanosomiasis, the disease "mainly affects economically active adults" and "hospitalization and treatment are expensive" (*89*). In a review of leishmaniasis and poverty (*110*), poverty is described as "the major underlying determinant" and "a potentiator of leishmaniasis morbidity and mortality". Though government services for treatment of leishmaniasis are free in Nepal, lack of community confidence in local health services led many patients to use private services, incurring high direct and indirect

costs, with consequent depletion of savings, sale of assets and borrowing at high interest rates (*111*). A study from Bangladesh confirmed the harsh financial impact of kala-azar and described the families' coping strategies (*112*).

In north-eastern Brazil income inequality (as expressed by Theil's L index) was significantly associated with the incidence of leprosy (*113*). As this index shows the relative income differences in the municipalities studied, there is an interesting link to the more generic findings of Wilkinson (*114*) and Marmot (*115*) that this parameter is of utmost importance for health. The study of Kerr-Pontes et al. (*113*) is the only clear example from the literature review where relative poverty (as opposed to absolute inability to pay) determines an NTD.

In Orissa, India, a costing study of lymphatic filariasis concluded that chronic patients lost 19% of total working time per year (*116*). In Ghana, the disability and indirect economic loss (through inactivity) associated with acute lymphatic filariasis manifestation of adenolymphangitis seem to have been underestimated in the past (*117*). The serious negative impact of both acute and chronic lymphatic filariasis on productivity has also been documented in southern India (*118*).

Raso et al. report from a study in Côte d'Ivoire that school-attending children from poorer households had significantly higher prevalence and intensities of infection with hookworms, and had worse access to formal health services (by travel distance) than schoolchildren from richer households (*119*).

For trachoma, Schémann et al. concluded that "there was a clear, continuous linear inverse relation between wealth, development, and trachoma. Nevertheless, trachoma occurred at all levels of wealth and development and the data do not support the existence of a threshold 'poverty level'" (*104*). This is one of the rare examples found of a gradient in the relationship between the disease (trachoma) prevalence and a social determinant (poverty). Another review confirms the conclusion that trachoma affects poor populations – though there is the interesting aspect that cattle ownership (of the wealthy) serves as a risk factor due to attraction of flies (*6*).

Of all the social determinants explored in this chapter, poverty (inability to pay) is the only one having documented association to all 13 NTDs. There are two main mechanisms. Poverty as a structural social determinant is closely linked to the intermediate determinants of water and sanitation and housing and clustering. In addition, poverty is a consequence of some of the NTDs (for example Buruli ulcer, dengue fever, human African trypanosomiasis, leishmaniasis and lymphatic filariasis) – either due to very costly treatment (*105, 106*), or indirectly through loss of labour capability. This may further lead to differential vulnerability and health care outcomes. Poverty will be addressed below in relation to recommended action 5.

8.4 Discussion: patterns, pathways and entry-points

Based on the overview of the selected social determinants in relation to the 13 NTDs, this section will now aim to distil cross-cutting patterns and causal pathways leading to entry-points for recommended action. Table 8.1 summarizes the findings, showing the NTDs in relation to the most conspicuous social determinants at the various analytical levels of the Commission on Social Determinants of Health scoping paper (*16*). The table provides a simplified picture and is subject to debate.

Water and sanitation, and housing and clustering, are closely related to many of the NTDs, including Chagas disease, cholera, dengue fever, dracunculiasis, leishmaniasis, leprosy, lymphatic filariasis, schistosomiasis, soil-transmitted helminths and trachoma. Not surprisingly, given that infectious diseases are being considered, the intermediary social determinants appear mainly at the level of exposure. These two social determinants are therefore merged in one entry-point for intervention (recommended action 1).

Environment as a biosocial determinant is linked to many of the NTDs, and Chagas disease, cholera, human African trypanosomiasis, leishmaniasis, onchocerciasis and schistosomiasis serve as examples. Buruli ulcer may be another case. Exposure is also the key level of analysis here due to the diseases' transmission cycles. Environment has been identified as an entry-point in recommended action 2.

Migration as a social determinant manifests itself at the levels of exposure, vulnerability and health care outcome and is ultimately linked to the level of socioeconomic context and position. The diseases cholera, dracunculiasis, human African trypanosomiasis, leishmaniasis and schistosomiasis have been selected to illustrate the issues, which lead to recommended action 3.

In some cases sociocultural factors or gender determine differential exposure to certain NTDs (dracunculiasis, human African trypanosomiasis, leishmaniasis, onchocerciasis, schistosomiasis and trachoma). Some NTDs (cutaneous leishmaniasis, leprosy, chronic lymphatic filariasis and chronic onchocerciasis) entail negative social repercussions of stigma and social isolation. Often differential health care outcomes are seen and the root causes can be found at the structural level. These issues are addressed in recommended action 4.

TABLE 8.1 Relationship of the 13 NTDs to the selected social determinants and the five analytical levels

		Disease												
Determinant	**Level**	**Buruli ulcer**	**Chagas disease**	**Cholera**	**Dengue fever**	**Dracunculiasis**	**Human African trypanosomiasis**	**Leishmaniasis**	**Leprosy**	**Lymphatic filariasis**	**Onchocerciasis**	**Schistosomiasis**	**Soil-transmitted helminths**	**Trachoma**
Water and sanitation	Exposure			+	+	+				+		+	+	+
Housing and clustering	Exposure		+					+	+				+?	+
Environment	Exposure	+?	+	+			+	+			+	+		
Migration	Socioeconomic context			+		+	+	+				+		
	Exposure			+	+	+	+	+				+		
	Vulnerability			+		+	+	+				+		
	Health care outcome			+		+	+	+				+		
Sociocultural factors and gender	Socioeconomic context							+	+					
	Exposure					+	+	+?			+	+		+
	Health care outcome							+	+					
	Consequences							+	+	+	+	+		+
Poverty	Socioeconomic context	+	+	+	+	+	+	+	+	+	+	+	+	+
	Vulnerability	+			+	+	+	+		+				+
	Health care outcome	+	+	+	+	+	+	+	+	+	+	+	+	+
	Consequences	+			+	+	+	+		+				+

Note: "+" indicates instances where an overall either/or assessment of the literature reviewed demonstrates an association between an NTD and a social determinant at a given level. "?" indicates conflicting evidence. The table provides a simplified picture and is subject to debate.

Poverty emerges as the single most important social determinant, exhibiting strong association for all NTDs. Poverty is especially manifest at the levels of vulnerability, health care outcomes and consequences and is ultimately rooted at the level of socioeconomic context and position. It appears both as an ultimate cause of NTDs via the intermediary determinants and as a consequence due to direct and indirect cost. Poverty as a cornerstone for inequity is addressed in recommended action 5.

In some cases the social determinants define disadvantaged population segments (nomads, ethnic groups, women or the poor) that are not only carrying a disproportionate burden of NTDs, but are at the same time not in a position to exert political influence in relevant forums and attract resources.

As the 13 NTDs are all infectious (and to a large extent vector-borne) diseases, exposure is the most prominent analytical level, either directly, for example with water and sanitation, or indirectly, as with poverty. Vulnerability may be seen in relation to the social determinants migration and poverty, where particular population segments have greater susceptibility to some NTDs. Differential health care outcomes result in the cases of migration and poverty, due mainly to lack of availability and affordability (respectively) of adequate health services.

Most of the 13 NTDs are confined to certain geographical areas, usually due to vegetational or climatic conditions determining the distribution of the vectors (for example Chagas disease or leishmaniasis) or the parasite (for example schistosomiasis). Others (for example cholera and leprosy) are mainly transferred directly between humans and have a potentially more global distribution.

From a biomedical perspective, the 13 NTDs fall into two broad categories:

- Those for which there are already efficacious and inexpensive remedies (Chagas disease, cholera, dracunculiasis, leprosy, lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminths, trachoma) (*31, 120*);
- Those where remedies are not yet optimal (Buruli ulcer, dengue fever, human African trypanosomiasis, leishmaniasis, late lymphatic filariasis, late trachoma) (*89*).

With respect to the latter category, there may be available treatment using either surgery (Buruli ulcer) or drugs (human African trypanosomiasis and leishmaniasis), but they require hospitalization and the drugs are often costly or have significant side-effects. For some diseases (lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminths, trachoma) the existence of appropriate drugs has led to a variety of integrated interventions based on mass drug administration – often also involving noncommunicable diseases such as Vitamin A deficiency. The control of other diseases (Chagas disease, dengue fever, dracunculiasis, human African trypanosomiasis and leishmaniasis) depends to a large extent on vector control.

8.5 Interventions

Based on the analysis above of the selected social determinants of importance to the NTDs and the levels at which they interact, this section will suggest some promising interventions based on the entry-points identified above. Some general remarks should be made regarding the recommended actions.

The interventions should be introduced in populations where there is a particularly heavy burden of one or preferably several NTDs (as well as non-NTDs) or where patterns of key environmental and socioeconomic indicators make it likely that they are a problem (see recommended action 6 below). The choice of intervention will depend on the local disease patterns and environment as well as what is socioculturally feasible in the context, and a flexible approach is needed. Success depends on appropriate intersectoral collaboration, for example between ministries of public works, agriculture, water and health or similar authorities at provincial or district levels. Intersectoral action for health is defined as "a recognized relationship between part or parts of the health sector with part or parts of another sector which has been formed to take action on an issue to achieve health outcomes (or intermediate health outcomes) in a way that is more effective, efficient or sustainable than could be achieved by the health sector acting alone" (*121*). Genuine involvement of local communities is crucial not only in order to make the interventions appropriate and sustainable, but as an essential means to improved health and community empowerment (*115, 122, 123*). The recommendations involve affirmative action in the sense that resources should be directed to specific areas, communities and population segments, either as a reallocation of existing funds or as a mobilization of additional funds. This may cause political or practical problems, but is the most direct way to address inequities (*14*), and the case is strengthened by new evidence provided in this chapter that clusters of NTDs according to social determinants can be addressed cost-effectively by the same intervention.

Water, sanitation and household-related factors

There are very direct links between a number of NTDs and the intermediary social determinants of water and sanitation, and housing and clustering (see Table 8.1). Though there is an overlap with only two (soil-transmitted helminths and trachoma) out of nine diseases with regard to these two social determinants, it still makes sense to merge the two interventions. Partly, the social determinants are not clearly distinct (for example, poor sanitation leads to contamination of the peri-domestic area, as does livestock kept around the houses). Also, from an intervention perspective it would be more practical and cost-effective to enter a community and address the two together. Some authors recommend a holistic community approach to these social determinants, as the risk factors are shared and hence need to be addressed at a community level rather than at the individual level (*124*). In her review of trachoma, Marx points to the importance of conceptualizing hygiene interventions at household and even community level (*44*).

Recommended action 1 constitutes a comprehensive and integrated approach to address these social determinants in multiendemic areas. Lessons learned can be culled from the reviews of Esrey and Habicht (*28*) and Esrey et al. (*29*), which provide important guidance on priority-setting in relation to water and sanitation interventions. Ault (*36*) gives directions for environmental management and Briceño-Leon (*40*) and Bryan et al. (*125*) provide concrete examples of how housing may be improved. Issues of community participation have been reviewed by Espino, Koops and Manderson (*126*).

Environmental factors

The environment can be seen as a biosocial determinant for many of the NTDs (see Table 8.1) in that it provides a direct space in which infection can take place, predominantly through increased exposure. The environment is also linked to structural social determinants, in particular poverty.

RECOMMENDED ACTION 1.
Addressing water, sanitation and household-related factors (the "preventive package")

The "preventive package" should be introduced in populations where data have shown a particularly heavy burden of several relevant NTDs (as well as non-NTDs). It will address a combination of the NTDs for which efficacious and inexpensive treatment exists, as well as those for which the management depends on vector control or complicated and expensive treatment.

The intervention will be a combination of preventive measures regarding water supply, sanitation, house improvement, cleaning of the peri-domestic area and clustering of people within confined areas. However, the intervention consists not only of provision of equipment and tangible structures; success also depends on relevant behavioural change (for example handwashing, covering of water containers and faecal disposal). The intervention programmes should therefore encompass well-planned, state-of-the-art health education programmes based on action-oriented learning.

Improvement of housing and water and sanitation facilities is likely to be relatively costly. The intervention presupposes mobilization of political will and fund-raising, which will probably depend on a combination of public and private sources. Advocacy based on documentation of the burden of NTDs and the potential sustainable long-term benefits of the interventions could serve the point.

Community participation and adaptation to local conditions is essential for this recommended action. Whatever interventions are implemented, mechanisms for maintenance should be an integrated part. This is crucial for the sustainability of the interventions. Successful implementation of the preventive package in a given community is likely to permanently reduce the NTDs in question as well as non-NTDs such as childhood diarrhoea.

RECOMMENDED ACTION 2. Reducing environmental risk factors

Systematic health impact assessments should be implemented when water resource development schemes are planned. The substantial existing guidelines, tools and experiences should be utilized. In the many cases where schemes with negative health impacts have already been implemented, there is a need to analyse and mitigate the harmful conditions.

It should be borne in mind that not only large water development schemes but even small local projects (for example minor irrigation schemes and impoundments constructed for fishing, water supply, flood control or livestock watering) may serve as important exposure points.

Construction of large water resource development schemes of adequate standard presupposes the existence of political will. Intersectoral action for health, involving key ministries and other stakeholders (including local communities), is also instrumental, not least with regard to the smaller-scale impoundments and other schemes.

Adequate risk assessment and surveillance systems are needed to forecast environmental changes of relevance to upsurges or outbreaks of NTDs (see recommended action 6).

The methodology for intersectoral health impact assessments in relation to water resource development schemes is well established and encompasses biological, social and demographic aspects (*127, 128*). There are many examples of the effect of large dams on health, including a number of NTDs (*129, 130*), though it is methodologically difficult to evaluate the health impact of water resource development schemes (*129*) and the potential benefits to be derived from health impact assessments.

Entry-points for interventions related to the influence of environmental factors on vector-borne diseases should be based on the principles of intersectoral action for health and community participation (*131*). The report from the Consortium for Conservation Medicine and the Millennium Ecosystem Assessment provides a broader picture of environmental themes (*132*). Sutherst's review (*61*) on global change indicates potential entry-points for interventions in relation to climate change, land use, land cover, biodiversity and water resource development schemes.

Migration

Migrant populations may be more exposed or vulnerable to certain NTDs (see Table 8.1). Health services are usually insufficient, due to difficult logistics (nomads or slum dwellers) or breakdown as a result of disasters and conflicts (refugees). Programmes should be tailored accordingly.

The review of Sheik-Mohamed and Velema (*66*) outlines the main issues in relation to health care services for nomadic populations. Adapting health services to the local context helped achieve increased coverage of vaccination in western Sahel (*133*), and modalities have been explored for integration of human and veterinary medical services for a nomadic population in Chad (*134*). There is also significant knowledge of the operational aspects of health care provision for refugee populations (*22, 135, 136*).

Sociocultural factors and gender

In some cases sociocultural factors or gender determine differential exposure to certain NTDs (see Table 8.1), and it varies from case to case whether men or women are more negatively affected. It may be advantageous to address these conditions for clusters of NTDs and other diseases to the extent that they occur in the same population.

Some control programmes have gained important expertise about how to reduce stigma, for example the Danish Assistance to the National Leprosy Eradication Programme (DANLEP) in India (*137*). This programme addressed the local perceptions and negative attitudes in a systematic way by staging meetings in communities, schools and workplaces combining health education and leprosy screening. These experiences could be applied to multidisease settings with the aim of reducing suffering in endemic populations and increasing coverage.

Poverty as a root cause of NTDs

Poverty (in the sense of absolute low income, inability to pay for basic services and marked vulnerability to unforeseen health expenses) has been shown to be the most all-encompassing root cause for NTDs. A human

RECOMMENDED ACTION 3. Improving health of migrating populations

Efforts should be made to ensure that migrant populations are given the right to be heard and exert political influence in relevant forums.

Special health care programmes should be designed for labour migrants, nomadic populations and those subject to forced resettlement to provide health services for NTDs and other pertinent public health problems.

The health care needs of refugees displaced by natural disasters or conflicts should be catered for with regard to NTDs and other relevant diseases.

Curative and preventive interventions must be tailored to local conditions, including patterns of mobility, morbidity, and environmental and sociocultural factors.

Adequate surveillance systems are needed to forecast and monitor population movements of relevance to upsurges or outbreaks of NTDs (see recommended action 6).

When migration is combined with other social determinants (for example inadequate urban infrastructure or environmental risk factors for certain labour migrants) these additional conditions should be addressed concurrently.

RECOMMENDED ACTION 4. Reducing inequity due to sociocultural factors and gender

Efforts should be made to ensure that disadvantaged ethnic groups and indigenous populations, and those disadvantaged due to gender, are given the right to be heard and exert political influence in relevant forums.

As stigma and gender-based inequity are deeply rooted in local sociocultural contexts, the interventions need to be adapted to those contexts.

Where more than one NTD (and other diseases such as tuberculosis or epilepsy) have negative social impact, a concerted effort can be planned to ameliorate the consequences. The intervention will to a large extent consist of health education initiatives.

It is important that health care providers are aware of and able to rectify issues arising from gender-based inequity in access to health care, which may be based on differences in acceptability or affordability of services. This will lead not only to increased coverage of services, but also to improved quality of life for NTD patients.

In order to address gender-based inequity, there is a need to systematically provide gender-disaggregated data (see recommended action 6).

rights approach would view the adoption of measures to reduce vulnerability to neglected diseases through poverty reduction as part of the fundamental human right to health (*138*). Poverty serves as a fundamental structural determinant and is at the same time a consequence of some NTDs, due to the direct and indirect costs incurred. Consequently, poverty alleviation and provision of affordable health care should be a central element in all efforts to address structural social determinants in relation to NTDs.

An example from Japan and Taiwan showing the correlation between positive economic development and decreasing leprosy incidence illustrates the importance of poverty-alleviating interventions (*47*), though the relationship between disease and a number of socioeconomic factors, including willingness and ability to pay (*139*), is complex and largely beyond the scope of this chapter. There are a number of examples of how health sector reforms may inhibit access to treatment (*140–142*).

RECOMMENDED ACTION 5. Reducing poverty in NTD-endemic populations

Efforts should be made to ensure that disadvantaged (poor) population segments are given the right to be heard and exert political influence in relevant forums.

Initiation of development projects in NTD-endemic areas should be considered as a means to strengthen income levels and access to subsistence resources. Depending on the local context, this should encompass a combination of large-scale schemes and community and household-based poverty alleviation interventions.

In cases where treatment is disproportionately expensive (for example Buruli ulcer, dengue fever, human African trypanosomiasis and leishmaniasis), this should be addressed through targeted and subsidized health care interventions.

Consideration should be given to ways of ameliorating the indirect cost of NTDs due to loss of productivity.

8.6 Implications: measurement, evaluation and data requirements

Risk assessment and surveillance

The focality of NTDs has been described above. In order to identify the populations where one or more NTDs pose an unacceptable burden, evidence is needed. Several of the articles reviewed point to the importance of adequate risk assessment and surveillance, both generally and with regard to specific NTDs, such as Chagas disease (*37, 125, 143*) and schistosomiasis (*78, 144*).

Risk assessment and surveillance systems can enable appropriate interventions, for example for Chagas disease (*37, 125*), dengue fever (*33*) and leishmaniasis (*42, 55*). A surveillance system set up in a Cambodian refugee camp in Thailand led to early detection of an outbreak of dengue haemorrhagic fever, which allowed prompt control through house spraying, larval control and an extensive community education programme (*145*). The work of de Mattos Almeida et al. (*108*) shows how systematic use of secondary data on social determinants such as education, poverty and household density can help predict dengue fever.

Writing within a context of global climate change and emerging infectious diseases, Patz et al. recommend enhanced surveillance and response. "Attention needs to be directed towards establishing sentinel diagnostic centers in sensitive geographic regions bordering endemic zones" (*146*). In his review of global change and human vulnerability to vector-borne diseases, Sutherst says that "additional or alternative means of forewarning of impending increases in disease transmission are provided by surveillance systems as an integral part of a public health infrastructure" (*61*). Geographic information system (GIS) and other tools for spatial analysis can be used in relation to landscape ecology and epidemiology (*147, 148*), for example in the mapping of an urban visceral leishmaniasis epidemic in Brazil (*53*). Special issues relate to famine-driven migration (*149*).

Some systems have been set up already, for example the WHO Global Outbreak Alert and Response Network, which recognizes the need for "early awareness of outbreaks and preparedness to respond" (*150*), and HealthMap, a global disease alert system introduced by WHO and the United Nations Children's Fund (UNICEF) (*151*).

Thus, there is overwhelming support for surveillance and data gathering in relation to the NTDs and significant progress has already been made. However, it is one of the key conclusions of this chapter that there is a need for a more integrated approach within the framework of a risk assessment and surveillance system (recommended action 6). The evidence base provided by the risk assessment and surveillance system can contribute to addressing inequity in relation to NTDs and will provide support for actions 1–5, recommended above. A few studies have already shown the way towards an integrated approach (*64, 152*).

Monitoring the impact

The risk assessment and surveillance system (recommended action 6) will serve both to identify areas where interventions (recommended actions 1–5) should be targeted and to provide a means of monitoring the

RECOMMENDED ACTION 6. Setting up risk assessment and surveillance systems

A risk assessment and surveillance system should be used to provide a continuously updated, gender- and age-disaggregated situation analysis of existing and imminent public health conditions in specific settings in order to identify populations at risk and forecast upcoming disease hot spots, thus providing not only early warnings for epidemics but also evidence for long-term planning under more stable conditions.

Identification of such hot spots should not only be based on epidemiological data. Endemic populations should also be identified by combinations of environmental indicators (for example rainfall patterns, vegetation or altitude) and social indicators (for example life expectancy, female literacy rate, maternal mortality rate, infant mortality rate or gross domestic product).

A risk assessment and surveillance system should have the necessary cross-disciplinary expertise. In addition to biomedical specialists, experts from other fields should be involved, including biologists, climatologists, economists, demographers and anthropologists.

A variety of cross-disciplinary tools is needed. The national health management information system, if of required quality, may provide much of the epidemiological data needed. Alternatively, sentinel sites may be set up or surveys conducted. The environmental aspects will depend on technologies such as GIS, global positioning system (GPS) and remote sensing (RS), whereas the social scientists will apply their own appropriate tools.

Most endemic countries would benefit from having a risk assessment and surveillance system, targeted to the appropriate level, though in some cases (for example small Pacific Island States) they may opt for having supranational agencies. In large countries there may be a need for subunits at provincial or state level. It is crucial that the risk assessment and surveillance system, while providing aggregated data at higher levels, also illustrates local variations.

Decisions need to be made regarding which public health conditions to include, depending on the local disease patterns. There is an urgent need to identify the most appropriate combinations of environmental and social determinants, preferably in an integrated research project.

Care should be taken to draw on and supplement existing structures. Thus, the relevant partners and networks that are already involved in risk assessment and surveillance should be consulted. Furthermore, in many cases a risk assessment and surveillance system may be established largely by utilizing and merging existing data in an intersectoral approach.

It should be recognized that staff overseeing the risk assessment and surveillance system will need time to harmonize and develop cross-disciplinary skills. Challenges faced will include mobilization of funding and putting in place skilled personnel and management able to engage in cross-disciplinary collaboration. Findings generated by a risk assessment and surveillance system need to be followed by appropriate action.

interventions, according to local circumstances. The scope of NTDs that are targeted will determine which morbidity and mortality indicators are chosen. In some cases existing health management information systems will provide the answers. In other cases ad hoc monitoring systems should be established or focused studies conducted. A few studies have already explored integrated approaches to risk profiling based on combinations of indicators (*64, 152*). The impact of recommended actions 1–5 is not easily assessed, and it may be some time before impacts related to social determinants show up in evaluation studies (*76*).

Knowledge gaps

The literature review has shown that the available knowledge of the 13 NTDs varies significantly. Most outstanding is the lack of data on Buruli ulcer. Areas that would benefit greatly from further review include

the NTD-related social determinants that were not included in this chapter (for example age, education, occupation and urbanization); the social determinants of other neglected diseases (for example anthrax, brucellosis, cysticercosis, Japanese encephalitis and yaws); and links between the 13 NTDs described in this chapter and diseases dealt with in other chapters (for example food safety and tuberculosis).

The focality of the NTDs introduces another issue in relation to knowledge gaps. Many examples have been given of the importance of the local context (*88, 100*), and greater attention needs to be given to location-specific variations than in the past (*153*). Thus, successful control of NTDs necessitates, in addition to a global overview, studies describing local variations in epidemiological, environmental and sociocultural factors.

Each of the six recommended actions above entails a number of research questions that should be addressed. The implementation of each of the suggested actions should be monitored by setting up appropriate cross-disciplinary studies. The risk assessment and surveillance system concept is innovative and lessons should be learned meticulously both with regard to the managerial and cross-disciplinary processes and with regard to the most appropriate combinations of epidemiological, environmental and socioeconomic indicators.

Managerial implications and challenges

While some of the recommendations above have curative elements, the present analysis has mainly led to recommendations regarding prevention and health promotion. Seen in isolation hardly any of the findings are new – what is new is the emerging pattern of new clusters of NTDs that occur when an equity point of view is applied and the various social determinants are used as analytical vantage points. Alternative entry-points are thereby identified for interventions that allow preventive measures to be applied to clusters of NTDs. And as the diseases are not seen in isolation, cost-effectiveness balances may tilt. In order to utilize the full potential of this perspective, public health experts and managers at national and international levels will need to look at the issues more flexibly and imaginatively than they have in the past.

Even from a practical managerial perspective the suggested actions are not easy to implement. They are all complex (for example intersectoral or community based) and their success depends on long-term efforts. Furthermore, the fact that they are largely preventive can imply lower status. However, the long-term benefits in terms of sustainability and levelling up justify the efforts.

Most of the suggested actions entail a reallocation of resources to marginalized NTD-multiendemic populations. The preventive package (action 1), provision of services to migrating populations (action 3), gender-based interventions (action 4) and poverty alleviation (action 5) are likely to meet resistance because they entail affirmative action and because the required resources will need to be reallocated from groups that have hitherto been relatively more privileged (for example the wealthy, urban dwellers and men). The difficulties associated with such reallocation as part of budget negotiations at national or district levels may be increased if funds donated by bilateral donors or private partners are earmarked for specific diseases. In such cases additional fund-raising may be needed. At the structural level, where it has been recommended to ensure that the segments of the population that are disadvantaged (due to migration, ethnicity, gender or poverty) are given the right to be heard and exert political influence in relevant forums, a similar struggle can be foreseen. However, equity can only be reached through a concerted effort even at this level.

8.7 Conclusion

The NTDs pose a particular burden to the most marginalized population segments and communities, mostly in the developing countries. The inequity issues in the field of NTDs and social determinants are extremely complex. Amongst the many social determinants some were found to be particularly important for NTDs: water and sanitation, housing and clustering, environment, migration, disasters and conflicts, sociocultural factors and gender, and finally poverty. The 13 NTDs are influenced by social determinants at all the five analytical levels, though differential exposure stands out to be especially relevant. At the intervention level accessibility and to a certain extent acceptability are of relevance. The analysis leads to six recommended actions, which focus more on preventive and promotive measures than on changes in curative service provision:

1. Addressing water, sanitation and household-related factors
2. Reducing environmental risk factors
3. Improving health of migrating populations
4. Reducing inequity due to sociocultural factors and gender
5. Reducing poverty in NTD-endemic populations
6. Setting up risk assessment and surveillance systems

These recommended actions supplement the efficacious, curative tools that are available for many of the NTDs. Taking a social determinant perspective rearranges the NTDs according to new commonalities. In the same way as the availability of drugs cluster some NTDs as being "tool ready", a social determinant perspective brings to the front other clusters of NTDs. By

applying an equity point of view and using the various social determinants as analytical vantage points, alternative entry-points are identified for interventions. New "prevention ready" clusters of NTDs are found.

An effort is needed to systematically fill in the knowledge gaps in relation to the broad range of NTDs and the many relevant social determinants. New research is needed to monitor the recommended actions and other innovative ways of addressing the social determinants of the NTDs. Because of the close association between NTDs and inequity in health this will contribute significantly to levelling up. A concerted effort to address the social determinants related to NTDs is a direct way of gaining headway within public health and at the same time is a prerequisite for confronting inequity.

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promoting health, providing care

Oral health: equity and social determinants

9

Stella Kwan and Poul Erik Petersen

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9.1 Summary

Oral health enables people to speak, eat and socialize without active disease, discomfort or embarrassment. However, poor oral health is still a major burden for populations throughout the world, and is particularly prevalent among disadvantaged population groups. Social gradients occur for all oral disease conditions, and appear to be persistent over time. Research on social inequity in oral health is more substantial for developed countries, and the need is high for systematic studies of social gradients in developing countries. With regard to the socioepidemiology of oral health, the variables mostly chosen as indicators of socioeconomic status are social class, education, employment status, personal income, urbanization and gender. These factors result in differential exposure and vulnerability to oral health problems, with differential health care outcomes and consequences. Oral diseases share common risk factors with several chronic diseases.

The good news is that oral diseases are preventable, and that social inequity in oral health is avoidable. Intervention strategies that acknowledge the socioeconomic context and related risk factors offer most potential for promotion of oral health throughout the whole population. Prevention of oral diseases through public health interventions can be effective; oral health personnel are scarce in low- and middle-income countries, and primary health workers and specially trained ancillary personnel can make valuable contributions to the control of oral disease and the promotion of oral health for all.

9.2 Introduction

Background: global patterns of oral health

Oral health means more than healthy teeth; the health of the gums, oral soft tissues, chewing muscles, palate, tongue, lips and salivary glands are also important. Good oral health enables an individual to speak, eat and socialize without active disease, discomfort or embarrassment. It is integral to general health and well-being (*1*). Oral disease may affect anyone throughout their lifetime, impacting on quality of life.

While general improvements in oral health have been observed among people of industrialized countries over the past few decades, oral disease remains a global problem, particularly among disadvantaged populations in both industrialized and developing countries (*2*). Tooth decay and gum disease are among the most widespread conditions in human populations, and the prevalence of other conditions, such as dental erosion, is on the increase. The effects of oral cancer and noma[1] can be devastating. Tooth loss, as a result of oral disease and trauma caused by accidents and unintentional injuries, may have a profound impact on quality of life, nutritional intake and growth and development in children.

There is a link between oral health and general health, with common risk factors including poor diet, tobacco use and alcohol consumption. Oral disease (such as gum disease) is also associated with such general health conditions as diabetes and HIV/AIDS. Similarly, people who suffer from complex general health problems are at greater risk of oral diseases that, in turn, further complicate their overall health. Some general health diseases manifest in the mouth and oral lesions may be the first signs of some life-threatening diseases, including HIV/AIDS.

Inequities in oral health remain widespread between and within countries, and often mirror inequities in general health. These inequities vary in magnitude and extent (*3*), and are becoming more marked in some countries (*2*). Even in high-income countries with advanced public oral health care, inequities in oral health persist (*4–7*). The social determinants of oral health are largely universal, affecting a range of oral health outcomes and oral health-related quality of life.

The mechanisms and pathways related to oral health are complex and interlinking, with economic, psychosocial and behavioural factors all playing a role, as well as more specific factors such as access to oral health services, provision of safe water and sanitation facilities, optimal exposure to fluorides, availability of oral health products and healthy food supply. Risk factors for oral disease are also relevant to general health and, equally, social determinants of other diseases and conditions have oral health significance. Given that oral and general health share common entry-points, interventions that address issues for multiple programme nodes can be implemented effectively.

Methodology

A literature search was conducted using Medline and Google Scholar, with key words and phrases including oral health, social determinants, inequalities in oral health, poverty, social factors and education. Study selection focused primarily on major national studies and World Health Organization (WHO) international surveys, including the World Health Surveys,

1 Noma is a disease of poverty and malnutrition, compounded by infections such as measles. It occurs particularly among very young children in certain poor African and Asian countries.

supplemented by data from other major international investigations. It must be emphasized that information from developing countries is limited. Furthermore, there are few systematic epidemiological studies of certain oral lesions at the global level available (*2*). The conceptual framework of the WHO Commission on Social Determinants of Health provides a useful starting-point for this chapter (*8*), and the results are organized into the five levels of analysis according to the analytical framework provided.

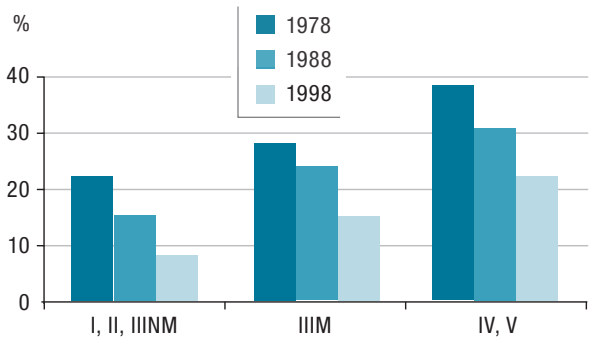
9.3 Analysis of determinants of oral health: differential factors

Differential outcomes

A social gradient in dental decay, gum disease, oral cancer and tooth loss has been reported (*9, 10*). There are also differences across regions and countries, and between different population groups, with the greatest burden of oral disease being borne by disadvantaged populations (*3, 4*), including ethnic minorities and the geographically isolated (*10–13*). The pattern of oral disease reflects systematic differences in lifestyle and risk profiles that are related to living conditions and environmental factors as well as differences in access to oral health services.

The social gradient in oral health persists over time (*3, 5*) and reflects the strong relationship between oral health and socioeconomic factors (*14–16*). For example, in the United Kingdom, the proportion of adults without natural teeth is higher among manual and unskilled workers, and the patterns have changed little over time (Figure 9.1) (*15, 17–19*). In fact, the gap appears to have widened: for social classes I, II, and III NM over 50% improvement over time has been observed, compared with about 30% among social classes IV and V. In the United States, people of lower socioeconomic status are more likely to experience tooth loss than those in higher categories (*10*). Similarly, in Australia tooth loss is more prevalent among those who are eligible for social benefits and have completed fewer years of schooling (*16*).

FIGURE 9.1 Adults with total tooth loss over time by social class, United Kingdom



Key to social classes: I professional, II intermediate, III NM skilled non-manual, III M skilled manual, IV semi-skilled, V unskilled.

Table 9.1 presents data from the World Health Survey 2003 (*20*) on oral health problems reported during the preceding 12 months. In Africa and Asia, higher-income individuals reported oral health problems less often than those with lower income. In the Americas this pattern was reversed, with those on higher incomes reporting more problems (other than for Mexico, where there is no clear trend). A similar pattern was also found in Morocco and Pakistan, with 50% of Moroccans in income quintile Q5 reporting oral health problems. In eastern Europe, the pattern for Hungary and the Russian Federation was similar to that of the Americas, with levels of reported problems greater than 50% among the higher-income quintiles in the Russian Federation. In France, Greece and Sweden, there was no clear relationship between income and levels of reported oral health problems.

Among those reporting oral health problems in this survey, the proportion reporting receipt of dental and medical care was strongly associated with income levels in some regions. In a number of countries in Africa, the Americas and Asia, those in Q5 reported levels of health care uptake twice as high (for example Senegal, Mexico, Viet Nam) or three times as high (for example Paraguay, Nepal) as those in Q1. The trend occurred across nearly all countries in Table 9.1.

The levels of reported oral health problems will reflect differing perceptions of what is "problematic". In addition to individual differences, in regions where there is no tradition of oral health care and where dental treatment is not readily available, it is less likely that a problem will be interpreted as such. This may explain in part the lower level of problems reported among the poor in the Americas, in addition to such other factors as the adoption of a more sugar-rich Western diet by higher-income groups. Intercountry variations in both reported oral health problems and uptake of health services may be due to social change, perception of available services and prevailing health-related attitudes and behaviour. While on the global level developed countries have a higher prevalence of dental decay than developing ones, the incidence of dental decay in developing countries have risen in recent years (*1, 2, 21–24*).

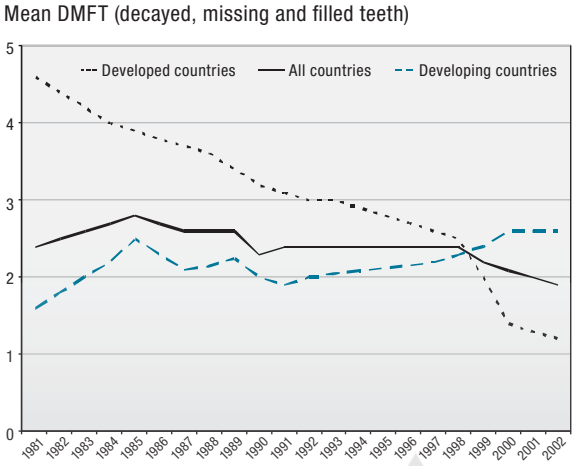
TABLE 9.1 Proportion of subjects reporting oral health problems in the previous 12 months, by country

WHO regions / countries	Residence		Income quintiles[a]				
	Urban	Rural	Q1	Q2	Q3	Q4	Q5
Africa							
Burkina Faso	20.8	23.7	23.9	24.7	22.5	23.6	21.4
Kenya	24.3	28.7	30.8	31.5	27.9	24.6	24.6
Malawi	31.0	38.4	41.8	42.7	38.7	31.6	31.4
Senegal	23.1	28.0	27.8	27.6	22.7	23.5	24.9
South Africa	13.6	17.6	18.0	17.4	14.9	12.2	12.0
The Americas							
Brazil	36.0	36.3	34.3	33.1	35.1	37.1	40.1
Ecuador	21.1	17.1	17.2	19.4	22.8	19.2	22.5
Mexico	17.4	17.9	17.1	18.1	18.0	17.9	16.9
Paraguay	43.1	39.4	38.0	37.8	40.6	43.2	44.5
Uruguay	27.8	25.5	16.2	23.1	24.1	30.2	37.3
Eastern Mediterranean							
Morocco	46.9	37.6	39.2	37.0	40.5	44.1	50.1
Pakistan	19.8	18.7	17.6	19.8	18.2	20.5	20.5
UAE	9.6	6.2	6.9	7.1	13.1	8.1	8.0
Europe							
France	30.2	33.5	28.7	31.5	29.8	29.8	30.6
Greece	34.9	35.4	27.3	35.5	36.9	40.6	34.5
Hungary	38.4	33.0	28.4	26.3	34.6	44.8	42.7
Russian Fed.	47.7	44.1	37.5	44.2	50.0	52.1	52.9
Sweden	33.2	36.8	29.5	22.0	40.1	38.6	31.2
South-East Asia							
India	30.1	28.1	29.5	30.2	29.8	26.7	24.9
Nepal	28.7	33.4	34.1	33.3	33.9	32.1	30.2
Western Pacific							
China	20.7	23.6	28.9	21.1	21.5	21.1	22.8
Viet Nam	17.4	21.1	22.0	23.6	19.9	16.8	20.5

a. Income quintiles: Q1 poorest, Q5 richest.

According to an international collaborative study, differences between developed and developing countries are marked; people in developing countries have higher levels of untreated decay (*25*). Within the wealthier nations, a higher level of dental decay, more teeth missing due to dental decay and higher unmet needs for treatment have been observed among disadvantaged groups, for both adults and children (*14–16, 26–29*). Children whose parents have attained higher levels of education are less likely to experience dental decay (*30*). Similar results were found among those with higher family incomes (*25*). With the exception of Germany, the collaborative study found that adults with high incomes have fewer teeth with dental decay. WHO has

FIGURE 9.2 Dental decay trends in 12-year-olds as measured by the average number of decayed, missing due to caries and filled permanent teeth



Sources: World Health Organization (*1*), Petersen et al. (*2*).

summarized the global trends of dental caries among children 12 years of age (*1*) (Figure 9.2).

The patterns remain consistent when other socioeconomic indicators are used. In the 2003 United Kingdom Child Dental Health Survey, children attending deprived schools (a measure of socioeconomic status used in the United Kingdom) were found to experience more tooth decay (*27*), and similar findings have been reported in other countries (*11, 13*). In Australia, children living in rural areas have higher levels of dental decay (*28*). However, the relationship between mothers' educational attainment and children's dental health is more complicated in some developing countries. For example, in postwar Iraq, with increased access to sugary snacks, children who were born to mothers with higher educational attainments have relatively high levels of dental decay (*31*).

Globally, oral cancer and the destructive form of gum disease (periodontitis) are more common among the most deprived populations; and certain ethnic groups are more susceptible (*2, 32–37*). In Australia, periodontal disease is more prevalent among those with fewer years of schooling, with no dental insurance and who are eligible for public dental care (*16*). A social gradient in periodontal health is also observed in Denmark, with most advanced public health care (*29*). The United Kingdom Child Dental Health Survey of 2003 found that while a higher proportion of children attending a deprived school had poorer oral hygiene, this did not necessarily result in a higher level of gum disease in this group (*38*).

Professional care is an important component for attaining and maintaining optimal oral health. However, availability of oral health services is poor in many disadvantaged communities. Access to these important services may be hampered by poor mobility and lack of transportation. Consequently, many people in these communities have never visited the dentist and few have preventive oral care (*21, 39–43*). Access to care is a particular problem, as significantly higher proportions of those living in rural areas and those with lower incomes who experience oral health problems are unable to receive treatment for them, according to the World Health Survey 2003 (*20*). In the United Republic of Tanzania, 75% of 12-year-old children have never visited the dentist (*44*).

Differential consequences

Poor health may have considerable personal, social and economic consequences, which may differ between and within countries, with varying social positions, medical conditions, employment status and economic and personal situations all influencing health. The consequences of ill-health are more significant among disadvantaged communities, who may have limited resources to protect themselves.

While oral disease is largely preventable, most advanced oral diseases are irreversible; the consequences can last for a lifetime, as with tooth decay and tooth loss. Hence, prevention and early detection are crucial. Oral disease is one of the most costly diet- and behaviour-related diseases to treat (*1, 14*), and carries considerable personal, medical and financial burdens.

Poor oral health can affect oral functioning and can lead to pain, premature tooth loss, dry mouth, sleep deprivation, disfigurement and, in the case of cancer or noma, death. The experience of pain, problems with speaking, eating and chewing and embarrassment about the appearance of teeth may distract people from performing daily activities and affect their social and psychological well-being and general quality of life (*45*), resulting in a downward spiral that further damages health. Poor oral health can lead to missed school time or working hours, with subsequent loss of earnings and productivity.

Thus, oral health is an integral part of general health. Systemic spread of germs can cause, or seriously worsen, infections throughout the body, with potentially fatal results, particularly among individuals with compromised immune systems. This is especially the case with HIV infection and diabetes. Oral disease is influenced by risk factors common to a number of general health conditions, including several noncommunicable chronic diseases, such as failure to thrive,

nutritional deficiency, heart disease, diabetes and cancer (*14*). Similarly, many systemic diseases, such as HIV infection, manifest in the mouth (*46*).

Bad dental experience may lead to dental phobia, which may influence attitudes to oral health and dental visiting behaviours, leading to a vicious circle that further aggravates oral health problems. The cost to the health service as well as to the individual is considerable, particularly when the budget for oral health care is limited or service does not exist, as in many developing countries. Owing to limited resources, many developing countries can only provide tooth extraction to relieve pain and problems with teeth, leaving millions of people suffering from tooth loss, with significant consequences.

Differential vulnerability

A number of factors affect the vulnerability of different groups to adverse health outcomes, including oral health. Social inequity, uneven distribution of wealth, unemployment, and lack of social mobility and cohesion may create a sense of helplessness and social disharmony, increasing the vulnerability of individuals and, in turn, adversely affecting the health of society as a whole.

The impact of the social environment on health is mediated by biological and psychological factors. Subjective experience and emotions generate stress, which, if chronic, may trigger underlying pathophysiological processes that influence physical and mental well-being. Lack of control over home and work life, social exclusion, insecurity, low self-esteem and poor social support may result in long-term stress, which is damaging to health directly and may lead to premature death. For example, in oral health, stress may be linked to problems with jaw joints (for example temporomandibular joint disorder) and destructive gum disease.

Dental decay is the most common childhood chronic disease, and those who are in marginalized social circumstances are most affected (*47, 48*). Compared with other age groups, children are more vulnerable to unintentional injuries. The risk of oral disease increases with age and, together with the lifelong exposure to risk factors, it has a disproportionate effect on elderly people, compounded by socioeconomic and psychological factors (*49*). Older people are more susceptible to root caries, gum disease, tooth loss, oral cancer, mucosal diseases, oral infections and salivary gland dysfunction. They are more likely to suffer from poor nutrition and chronic disorders and to require multiple medications with adverse side-effects, all of which are damaging to oral health.

Oral self-care practices and dental visiting patterns vary by age, gender, socioeconomic status, ethnicity, social network and urbanization. The influence of educational levels is also significant in several countries; the higher the number of years of education, the lower the chance of experiencing total tooth loss and the greater the likelihood of retaining 20 functional teeth in old age (*5, 50*). The relationship remains constant over time (Figures 9.3 and 9.4). In Burkina Faso, those who are unemployed, have lower educational attainments and endure poorer living conditions are more likely to experience oral health problems (*51*).

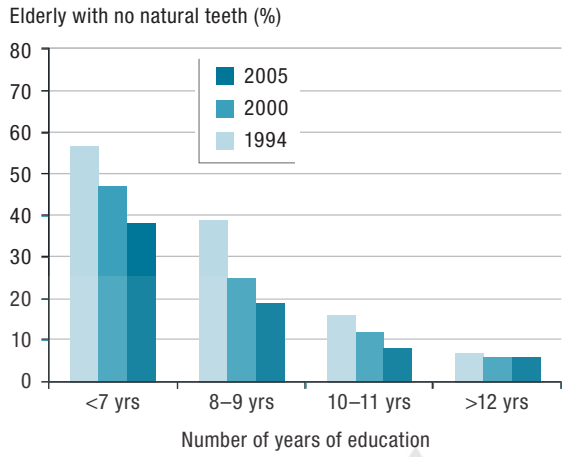
Females tend to take better care of their oral health than males and are more likely to have regular dental check-ups (*15*), primarily due to gender-specific social norms. This does not necessarily mean that the oral health of women is better than that of men; however, men are more often affected than women by oral cancer, attributable to higher exposure to risk factors such as smoking, drinking and poor diet (*52*).

Due to common sociobehavioural risk factors, oral disease is associated with a number of systemic diseases, including cardiovascular disease, diabetes, HIV infection and respiratory disorders (*1, 14, 53, 54*). With lower immunocompetence, people who suffer from HIV/AIDS and diabetes are more prone to severe gum disease. In fact, any diseases that interfere with the body's immune system may worsen the condition of the gums. Poor nutrition can compromise the body's immune system, making it harder for the body to fight off infection. This is particularly pertinent for noma, which can be life threatening.

People with disabilities are at greater risk of oral disease, for example oral infections, delayed tooth eruption, gum disease and enamel defects. The vulnerability of those who are medically compromised, physically disabled, housebound or institutionalized may also be higher (*54*). There are other special needs groups, such as the homeless and refugees, who may be in dire physical situations and chronically stressed, making them more susceptible to diseases, including oral health problems (*3*).

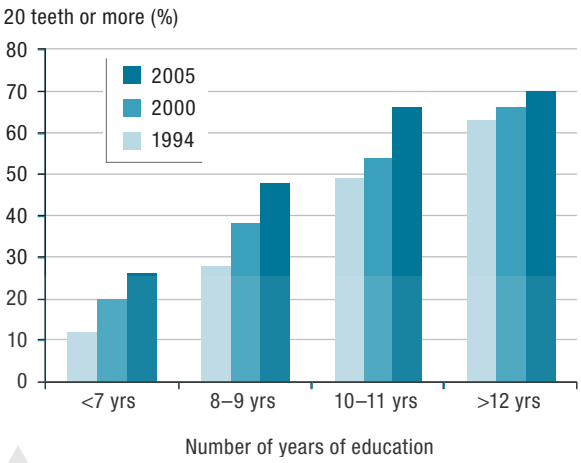
Prevention of oral disease can be hindered by poor availability and affordability of healthy options and oral health services. While toothbrushing with fluoridated toothpaste should be part of the daily oral hygiene routine, the proportion of people who brush their teeth every day is still low in many developing countries and disadvantaged population groups globally (*22, 24, 25, 39, 43, 51, 55, 56*). Some may not have access to a toothbrush or sufficient safe water and sanitation facilities to support this practice. Furthermore, the availability, affordability and quality of fluoride toothpaste remain a major problem (*57, 58*). In some countries, toothpastes

FIGURE 9.3 Relationship between education and dentate status among Danish elderly (65 years or more) with no natural teeth



Sources: Petersen (*3*), Petersen et al. (*5*).

FIGURE 9.4 Relationship between education and dentate status among Danish elderly (65 years or more) with over 20 functioning teeth



Sources: Petersen (*3*), Petersen et al. (*5*).

are considered as cosmetics and are highly taxed, leading to retail prices that are out of the reach of many families. Due to the lack of an adequate technical infrastructure, financial constraints and social and political opposition, the implementation of water, milk and salt fluoridation may prove too challenging for some countries (*59*). Hence, people are not exposed to an optimal level of fluoride that protects them against dental decay without unwanted side-effects. Indeed, the levels of fluoride in drinking water vary widely between and within countries, with the concentration of fluoride being too high in some places but too low in others (*59, 60*).

Noma is a significant problem among young children living in the poorest parts of the world in Africa, Asia and Latin America. It is an extremely painful and devastating form of oral infection that is strongly linked to malnutrition, poverty and poor living and housing conditions with poor access to sanitation facilities and close proximity to animals. Some infectious diseases, such as measles and malaria, are compounded by noma. The mortality rate is high and the majority of sufferers die before accessing health services. The social and economic impact on the survivors is considerable; many of the persons affected suffer from social stigma and discrimination, leading to a downward spiral that further damages health and oral health.

In summary, while genetic and biological factors play a role in differential vulnerability of various population groups, the influence of culture, environment and socioeconomic status may be more significant. It is important to recognize that these factors interact and the influence of one may be dependent on the mediation of another. The environment may trigger certain gene expressions, biological responses to diseases or behavioural responses that may otherwise remain dormant. Stress, as a result of social exclusion and poor social support, can have immunosuppressive effects, as can prolonged exposure to stimuli or pathogens. Poor oral health awareness and attitudes influence self-care practice and may deter dental visiting. People who have limited economic resources may be unable to pay for dental care, particularly preventive care and treatment at the early onset of disease. Similarly, certain cultural beliefs and practices can be detrimental to oral health, for example extraction of healthy teeth in children to help ward off evil spirits; having the gums burned before eruption to reduce diarrhoea and fever; and chewing paan (betel) as a breath freshener and for social reasons.

Differential exposure

The relationship between social position, genetics, biology and the sociocultural environment is complex; people in different countries and different social strata within countries may have varying degrees of exposure to risk factors. The conditions of living, working and lifestyle have a profound impact on health and well-being. In many developing countries, access to safe water, sanitation and other basic amenities may be limited. People in disadvantaged communities are more likely to live in inadequate housing, to be engaged in more risky occupations in polluted and hazardous environments, to have fewer resources to secure the necessities for health, and to experience more barriers to healthy lifestyle choices.

People who are exposed to stressful circumstances may resort to unhealthy behaviours such as a poor diet, smoking, alcohol drinking and drug taking, factors that are also detrimental to oral health, increasing the risk of dental decay, erosion, oral cancer and dental trauma (*61, 62*). Road traffic accidents are one of the top ten major causes of mortality and morbidity worldwide, particularly in low- and middle-income countries (*63, 64*), and the burden of tooth loss through such accidents is likely to be substantial. Together with other causes, such as falls and injuries as a result of violence and bullying, trauma to teeth and other orofacial tissues is a significant oral health problem with lifelong consequences.

While risk behaviours may be linked to an individual's psychosocial circumstances, the influence of socialization, culture and lifestyles is also significant (*3, 65*). Family members are likely to be exposed to similar risks, either directly from the environment or passed on through family contact, such as through transmission of disease and passive smoking. Similarly, peer pressure can alter exposure, as many unhealthy oral health-related behaviours are acquired during secondary socialization. Poor social and family support can lead to a lifestyle that may not be conducive to oral health (*51, 66, 67*). Changing living conditions and adopting new lifestyles following migration alter exposure to disease risk factors, and these changes may be compounded by culture shock.

A balanced diet is essential to health. Inadequate food supply and lack of variety may lead to malnutrition. Overconsumption of unhealthy foods can lead to a number of diseases, particularly dental decay. Access to healthy and affordable foods is not universal, and food poverty is likely to rise in the face of rapidly increasing food commodity prices as agricultural land is switched to other uses, including biofuel production, and populations increase in developing countries in particular.

Disparity in quality food supply contributes to health inequities. The poor are least able to eat healthily and often resort to processed foods that are high in fat, salt and sugars. The relationship between diet and oral disease has been well documented (*62*). In particular, the evidence linking the role of sugar consumption with the development of dental decay is overwhelming (*68*), but the consumption of sugary foods and drinks remains high (*69*). In many countries, over 50% of children drink at least one can of soft drink every day; and children from ethnic minority backgrounds are more likely to adopt this habit (Figure 9.5) (*11*). The increasing availability of sugary products in developing countries may have contributed to the rising levels of dental decay in recent years.

In order to reduce the risk of oral cancer, it is also important to have a balanced and healthy diet with plenty of fruit and vegetables, to avoid using tobacco and consuming excessive alcohol, to limit exposure to the sun and to protect the lips from overexposure (*37, 62, 70, 71*). However, in many countries, children and adolescents are increasingly developing a habit of tobacco use, in the form of cigarette smoking or smokeless tobacco (*69, 72*). The exposure to passive smoking is also a cause for concern.

Exposure to risk factors during early life, through adverse social, cultural and environmental circumstances, can have a lifelong impact on health, including oral health (*73, 74*). A study in New Zealand demonstrated that childhood circumstances have a major influence on oral health in adulthood (*75, 76*). Four categories were used as socioeconomic indicators: persistently high, downwardly mobile, upwardly mobile and persistently low. After controlling for childhood oral health, those who were disadvantaged at the age of 5 years had higher levels of dental decay and gum disease and were more likely to experience premature tooth loss in adulthood. The social gradient is evident in all variables (Figure 9.6).

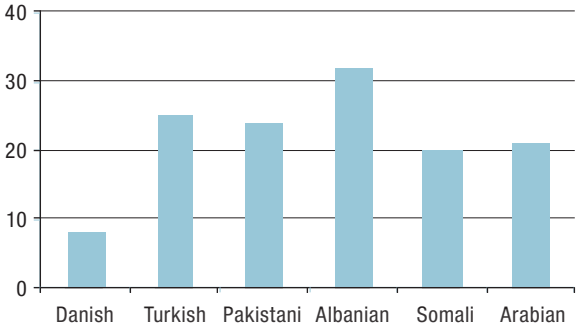
Similar findings have been reported in other countries (*77*). Childhood oral disease experience is associated with adult oral health, after controlling for socioeconomic status (*76*). Undesirable oral health behaviours adopted in early years, which may be shaped by dental experience, are likely to be sustained throughout life and, together with the cumulative effects of exposure to risk factors at sensitive periods of development, can lead to poor oral health outcomes in later life. Conversely, healthy behaviours and lifestyles developed at a young age are more sustainable (*61*).

While exposure to individual risk factors is important, the impacts of the clustering effects of differing socioeconomic circumstances, living and working environments, access to and availability of health services, cultural practices and life-course experiences are considerable (*73*).

Socioeconomic context and position

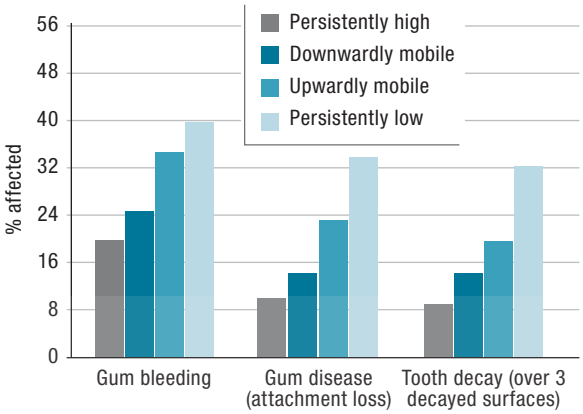
Social position exerts a powerful influence on people's health in societies. Occupation, income and wealth can determine people's social positions in society; education, housing, area of residence and material deprivation have also been used as important indicators. In some developing countries, land ownership, livestock possessions, possession of consumer durables such as shoes and televisions, type of school attended and number of marriageable girls in the family (bridal wealth) can reflect economic status, which in turn has

FIGURE 9.5 Percentage of 7–15-year-old children who consume soft drinks daily, Denmark, by ethnicity



Source: Sundby and Petersen (*11*).

FIGURE 9.6 Oral health problems at age 26 years according to socioeconomic status at childhood, New Zealand



Sources: Poulton et al. (*75*), Thomson et al. (*76*).

an impact on social position. In some cultures other attributes, such as gender, age, religious affiliation, military ranking and celebrity status, may also influence individuals' social standing. The significance of these influences may change over time and vary between cultures and countries.

Inequities exist in oral health and mirror those in general health (*3*). Oral health disparities exist both between and within countries among various social groupings, although the magnitude and extent may vary. In some countries, the gap is widening over time (*4*). Even in high-income countries with advanced public oral health care, inequities in oral health persist (*5–7*). As identified in previous sections, major social determinants at play include social status, social position, economic status, urbanization, gender and access to resources.

Dental decay affects nearly 100% of adult populations and 60–90% of children in many countries worldwide (*2*). However, wide variations between and within countries still exist. Dental decay remains a major problem for disadvantaged groups, with 80% of dental decay occurring among 20% of the population who are disadvantaged – the so-called 80:20 phenomenon (*78–81*).

For gum disease, there are differences between industrialized and developing countries, probably due to varying levels of oral hygiene practices that may be influenced by the availability of resources (*82, 83*). Again, those who are disadvantaged are more likely to suffer from periodontal disease, among other risk factors such as tobacco smoking, stress and genetic factors (*84*).

Oral cancer is one of the most common cancers in the world (*85*), affecting more men than women. The incidence of oral cancer varies across countries, reflecting risk profiles and accessibility to health services (*52*). In South-East Asia, oral cancer ranks among the top three most common cancers (*70*). Those who are disadvantaged are at higher risk, particularly in developing countries, where health resources are scarce. However, sharp increases have been reported from developed countries such as Germany and Denmark (*1*). Rates per 100 000 in 2002 for men are 11.3 in western Europe, 9.2 in southern Europe, 12.7 in southern Asia, 10.2 in Australia and New Zealand and 11.0 in the United States (*86, 87*). These patterns relate directly to risk factors such as smoking and betel quid chewing.

Socioeconomic influences are also important in relation to the risk factors for oral disease. Regular dental attendance is more prevalent among professional and non-manual social classes, as are toothbrushing behaviours and other lifestyle-related determinants, dental knowledge and attitudes to oral health (*3, 15, 25*). For example, in the United Kingdom, 65% of adults in social classes I, II and III NM[2] visit the dentist for regular check-ups, compared with 57% of those in social classes III M and 49% in classes IV and V (*15*).

While most research has been carried out in high-income countries, more evidence is emerging of the rising numbers of people in low- and middle-income countries suffering from dental decay due to changing lifestyles with urbanization and westernization, and the influx of dietary products that are detrimental to oral health (*9, 25*). In Burkina Faso, private sector employees and senior managers are more likely to visit the dentist regularly than those in lower social classes (*88*). In many developing countries, the exposure to protective

2 See key below Figure 9.1.

agents such as fluoride is below optimal levels, compounded by poor availability of oral health services and basic facilities for oral hygiene practices (*21, 22, 39–41, 44, 58, 89*).

9.4 Discussion: entry-points for oral health strategies

Potential entry-points

A number of potential entry-points can be considered when developing strategies for interventions, focusing on where on the pathways of determinants effective action can feasibly be deployed. They include targeting high-risk groups to promote care and service adherence; focusing on settings such as schools and the community, thereby addressing multiple common risk factors and tackling upstream factors and the environment; improving living and working environments, supply of safe water and sanitation, and nutritional status; tackling barriers to access to oral health care; and reorienting oral health services to becoming more responsive to the needs of the disadvantaged. It is important to capitalize on global and national public health strategies (such as tobacco control and promoting healthy choices), as well as other health promotion initiatives, in order to address oral health inequities. There is also a need to continue to lobby for greater legislative support on such issues as water fluoridation, clearer food labelling and provision of healthy environments.

Sources of resistance

A lack of sustainable funding, resources and trained manpower, and conflicting priorities and power struggles between various social groupings, departments and authorities, are some of the major challenges to improved oral health. These problems are more acute in low-income countries, where factors of poverty, gender inequity and political instability may obstruct progress on health issues. Resistance from political interest groups, industry, the private sector and professional bodies cannot be underestimated. For example, manufacturers may be reluctant to produce affordable oral health products and healthy alternatives; opposition from vocal pressure groups, such as anti-fluoride campaigners, can compromise the implementation of public health interventions; and dental professionals may oppose other personnel, such as teachers and school nurses, providing dental care.

9.5 Interventions and implementation

To reduce oral health inequities, action is needed to address the underlying determinants of oral health through the implementation of effective and appropriate oral health policies that are based on the principles set out by Whitehead and Dahlgren (*8*). It is important to tackle root causes rather than symptoms, focusing on upstream factors that cause poor oral health and create inequities. Interventions should be developed to promote and facilitate long-term sustainable improvements in oral health. Oral health initiatives must be linked with broader international, national and local equity programmes and must maximize opportunities to work effectively with all stakeholders across disciplines and sectors to reduce inequities in income, employment, environment, educational attainment, housing and other factors that have a large impact on people's health.

Conversely, measures that focus on downstream factors only, such as lifestyle and behavioural influences, may have limited success in reducing oral health inequities (*90*). These victim-blaming approaches assume that knowledge and skills automatically lead to behavioural change. Such approaches may be counterproductive; they are often ineffective and costly and fail to address the wider social determinants that cause people to get ill in the first place. People in more privileged social positions tend to benefit from the interventions more than those in disadvantaged groups. Hence, inappropriate interventions can widen inequities. It is necessary to address the root causes, tackling social determinants and the environment. Approaches that take into account the principles of the common risk factor approach, which promotes coordinated work across a range of disciplines, and the Ottawa Charter for Health Promotion,[3] may be promising (*1*).

Societies that enable people to play a full and useful role are healthier than those where people feel insecure, excluded and deprived. Similarly, people who have a sense of belonging, participating and being valued are likely to be healthier. While this chapter primarily focuses on oral health, it is important to address wider social determinants that also impact oral health. Policies should be considered that aim to increase the general level of education; encourage equal opportunities; enhance the health of mothers, babies and children; improve social benefits and employment; overcome barriers to health care; promote affordable housing; and protect minority and vulnerable groups from discrimination and social exclusion. The global free market

3 First International Conference on Health Promotion, Ottawa, 21 November 1986.

economy, political stability and control of corruption are also significant issues.

Interventions on socioeconomic context and position

Table 9.2 identifies some interventions that have been, or can be, used in addressing oral health inequities. Oral health should form part of global and national policies that are fair and equitable. Public policies and legislation are important upstream measures to promote oral health, such as legislation to support the implementation of fluoridation programmes and healthy diet policies to create a supportive environment that is conducive to oral health (*61, 62*). Developing the infrastructure for oral health services and population-based interventions (such as water fluoridation) remains critical. Removal or reduction of tax on fluoride toothpaste in developing countries is likely to increase availability (*59, 60*). Other public policies that are significant to oral health include food, sugar and smoking policies. The finding that pricing can positively influence selection of healthy snacks by children is promising (*91*). In order to address oral health inequities, it is important to continue to promote social change and to lobby for policy development to tackle unequal distribution of resources and opportunities between and within countries.

Interventions on differential exposure

Oral health can be promoted through initiatives that support healthy living and working environments. Safe buildings, adequate housing and appropriate road designs, as well as the use of mouth guards for contact sports, will help reduce the exposure to orofacial trauma. Given that smoking, stress and diet are some of the most common risk factors for both oral diseases and general health conditions, interventions that address these factors, such as tobacco control and improved labelling on foods and drinks, are likely to be effective in promoting healthy behaviours and making healthier choices the easiest choices (*6, 92*).

TABLE 9.2 Social determinants, entry-points and interventions

Component	Social determinants and entry-points	Interventions to address oral health inequities
Socioeconomic context and position	Inequality of social structures and socioeconomic positions	Legislate local production of quality, affordable oral health products (e.g. toothpaste, toothbrushes)
	Unequal distribution of resources and opportunities	Removal of taxes for oral health products
	Promoting equitable policies; and the availability of, and access to, resources	Placing oral health within the primary health care approach
	Infrastructure	Fair and equitable policies
	Taxation and legislation	Develop infrastructure for oral health services and population-based interventions
Differential exposure	Water and sanitation	Regulation on tobacco ban, fluoridation, better labelling, amount of fat, sugars and salt in foods and drinks, excess use of alcohol, advertising
	Fluorides and healthy food supply	Promote the use of mouth guards and safety helmets
	Unhealthy environments	Encourage interventions that adopt a common risk factor approach (tobacco, diet, alcohol, stress and personal hygiene)
	Lifestyles, beliefs, attitudes and health behaviours	Support healthy physical and psychosocial environments: e.g. roads (designs, lighting, traffic control, pedestrian facilities); living environments (physical, tackle overcrowding, etc.); schools; workplace; sanitation facilities and safe water supply
	Targeting settings and common risk factors	Encourage optimal exposure to fluorides: support implementation of fluoridation programmes (water, milk, salt and toothpaste) and, in some areas where necessary, defluoridation programmes
	Social stigma of oral conditions	Promote oral health through general health prevention, health promotion and health education
		Promote oral health through "healthy settings" initiatives (schools, workplace, cities and community-based establishments), and encourage them to be part of a larger network such as health-promoting schools networks

Continues…

Continued from previous page

Component	Social determinants and entry-points	Interventions to address oral health inequities
Differential vulnerability	Poverty Stress-induced Responses to risk exposure General health conditions High-risk groups Early life experiences Access to oral health services, oral health products and protective options	Greater availability of sugar-free alternatives and medicine Support interventions and make tools available for breaking poverty and social inequities Support measures that promote healthy eating and nutrition (e.g. healthy school dinners and healthy vending machines), and reduce amount of sugars, salt and fat in foods and drinks Reorient oral health services, including capacity building and community-based oral health care provision to improve access and availability Promote the availability of quality affordable oral health products (e.g. toothpaste, toothbrushes), subsidized oral health products and healthy foods and drinks Regulate sale of harmful or unhealthy products to certain high-risk groups in certain settings Promote oral health through chronic disease prevention, health promotion and health education Integrate oral health into community, local, national and international health programmes Work in collaboration across government departments and with local communities, other sectors, agencies, and nongovernmental and other organizations to promote oral health
Differential health care outcomes	Uptake of oral health services Inadequate oral health care provision and treatment options High-risk groups	Target resources that support disadvantaged or high-risk groups such as children, older people, people with HIV/AIDS, and people with oral cancer Improve early detection of oral cancer and noma with timely treatment and referrals Tobacco cessation services in dental practices Include oral health in training of members of the primary health care team
Differential consequences	Impact on quality of life High personal, social and health service costs Impact on other communities and social groupings Social exclusion, stigma, effect on daily living	Regulate sale of harmful or unhealthy products to certain high-risk groups in certain settings Encourage healthy diets and moderate consumption of alcohol Outreach oral health care towards vulnerable and poor population groups Third-party payment systems reducing inequity in use of oral health service

WHO advocates the effective use of fluoride as an essential approach to prevent dental decay (*59, 60*). Populationwide automatic fluoridation measures are considered the most effective (*93*), and such approaches are supported by systematic reviews (*94, 95*). Water fluoridation is one of the most cost-effective public health measures to improve dental health and reduce inequities through benefiting disadvantaged populations (*95, 96*). Milk and salt fluoridation may be good alternatives where water fluoridation is not feasible. Initial milk fluoridation schemes have shown some success. To date, 19 studies of 15 schemes have been published in 10 countries. Dental decay prevention in 13 of the 15 programmes has been demonstrated. The effectiveness has been shown in both primary and permanent dentitions, according to a systematic review published in 2005 (*97*). The benefits of salt fluoridation have been shown to be significant in countries where it has been implemented (*98*). Fluoridated toothpaste and other topical fluoride agents have also been found to be effective (*99, 100*).

Measures that facilitate healthy settings, such as health-promoting schools, can help reduce inequities (*101*). Effective school-based interventions have been reported in various countries (*14, 102–105*). Oral health can be promoted through a healthy school environment with safe playgrounds and buildings; a smoke-free and stress-free environment; and the availability of nutritious foods, which can help reduce the risk to oral and general health, and promote sustainable healthy lifestyles. Health-promoting schools can help trigger the installation of vital facilities, such as safe water and sanitation, which are essential for toothbrushing drills

at lunchtime and cross-infection control. Oral health promotion should also address the sale of unhealthy foods and drinks and tobacco-containing products to students in the vicinity of school premises. Oral health promotion can be easily integrated into general health promotion and school curricula. In some countries, schools may be the only place for children, who are at the highest risk of dental disease, to have access to oral health care, such as emergency care, tooth extraction and basic restorative and preventive oral health care. Similarly, oral health can be promoted through other settings such as community-based healthy living centres, and health-promoting workplaces and hospitals.

Interventions on differential vulnerability

Following needs assessments, strategies that target certain high-risk groups with complex needs should be considered alongside population approaches. These approaches include raising the competency of the dental workforce, improving the financing system, organizing community resources more effectively, empowering individuals and caregivers and promoting advocacy. A number of models have been reviewed (*106*). In particular for HIV/AIDS, WHO has implemented a number of successful initiatives (*107*). Early detection of lesions with timely treatment and referral is also critical for oral cancer and noma.

Interventions on differential health care outcomes

Oral health services can be reoriented to increase equity by integrating oral health into general health care and national or community health programmes, improving access to oral health care and reducing barriers (*108*). Adopting a primary health care approach to oral health is important. However, barriers to implementation must be addressed (*109*). Community actions can be strengthened through community development strategies. Such approaches have been successfully used to promote oral health among the most disadvantaged communities in a controlled trial in Glasgow, Scotland (*110*). The role of the dental team and primary health workers in smoking cessation, dietary counselling and cancer prevention is evidenced (*111*).

Interventions on differential consequences

Interventions that promote the development of personal skills can be implemented through effective oral health promotion and education programmes. A randomized controlled trial showed that early oral hygiene interventions are effective, particularly for disadvantaged children (*112*). Regulation of the sale of harmful or unhealthy products, particularly to high-risk groups, will help provide a supportive environment and reduce exposure and vulnerability. Finally, inequity in use of oral health services is possible to reduce through establishment of financially fair third-party payment systems and through outreach care programmes oriented towards disadvantaged and poor people.

9.6 Implications

Organizational responses

The lack of sustainable funding for interventions and evaluations of community oral health programmes remains a challenge (*113*). It is important to develop locally sensitive interventions that are responsive to local needs and priorities by working collaboratively across disciplines. While responding to downstream behavioural and clinical influences, upstream determinants should be addressed to create a supportive environment that promotes good oral health. The implications for resource redistribution, policy development, health care system reorientation and capacity building are considerable. Training is essential in order to improve the competency of staff, including policy-makers, public health practitioners and researchers. Closer collaboration between government departments, health and voluntary sectors, industry and other agencies is needed, between and within countries. It is necessary to clearly identify the roles and responsibilities of key stakeholders.

Tackling inequities in oral health is an integral part of resolution WHA60.17, adopted at the 60th session of the World Health Assembly in May 2007, entitled "Oral health: action plan for promotion and integrated disease prevention". The resolution urges Member States to dedicate increased resources to addressing oral health problems, including through workforce planning and provision of funds. It also requests WHO to raise awareness of the global challenge of improving oral health, and the specific needs of low- and middle-income countries and of poor and disadvantaged population groups; to support Member States in adopting integrated approaches to the development and implementation of oral health programmes; to promote international cooperation and interaction among all relevant actors; to communicate to the United Nations Children's Fund (UNICEF) and other organizations the importance of integrating oral health into their programmes; and to strengthen WHO's technical leadership in oral health, including through increased budgetary and human resources at all levels. Having adopted resolution WHA60.17, it is important for

WHO to translate its provisions into concrete well-resourced workplans that recognize the importance of cross-programme collaboration.

Measurement

In common with other programme nodes, oral health is facing numerous constraints and challenges with respect to the availability of data. Research that aims to ascertain the determinants of oral health is essential to the process of improving oral health. However, analysing the social determinants of oral health presents major challenges. One of the criticisms of research into the social determinants of oral health is the lack of a theoretical framework that addresses the complexity of the influences of social processes, the causal pathways between social factors and oral health, and the interactions between these factors and varying forces (*3, 114*). Few studies have been designed to investigate the strong relationships between social factors and oral health. Most publications in the literature on social determinants of oral health focus on isolated risk factors that are based on data from high-income countries (*9*). Some international studies, such as the World Health Surveys, may be criticized for inadequately addressing oral health parameters. It is recommended that more emphasis be given to investigation of social determinants in future research.

There are some systematic epidemiological studies of oral disease available for intercountry comparisons (*2*). Data from low-income countries are still lacking, as are longitudinal studies and international comparisons. While oral health is intricately linked to influences at the macro level (*115*), there is a paucity of reports on the impact of these factors on oral health. The effects of national policies on oral health will also need to be closely observed.

There is a need to improve the quality of the design and methodology of interventions and evaluations (*113*). The process of implementation and lessons learnt are not always documented. Information on structural barriers is needed, together with further analysis on confounding factors that might help explain the observed differential outcomes. Measures of deprivation in oral health may be useful in investigating the causal mechanisms, modifiable factors and effective interventions in addressing these issues (*116*). Inequities in health exist at all levels of the social spectrum, and it is important to ascertain different factors that may be involved in generating inequities within each stratum (*117*). Similarly, given that inequities may vary by age, life-course factors should be taken into account in the design of investigations and analysis of data (*73*).

While data from systematic reviews and randomized controlled trials command the highest scientific support, other types and sources of information may also prove invaluable. These include quasi-experimental designs, routine data, small-scale local surveys, monitoring and surveillance data, basic registration information and company data. The significance and usefulness of both qualitative and quantitative data should be recognized. It would be useful to consider situation analyses at baseline followed by effectiveness and economic evaluations after the interventions have taken place.

However, there are resource implications. Given that oral health shares many entry-points and common risk factors with other conditions or public health programmes it is important to consider oral health in surveillance and monitoring of interventions. Certainly, well-designed information systems and databases will improve the efficiency and effectiveness of the analysis of social determinants of health if duplication of efforts from each programme can be avoided. The development of appropriate indicators and outcome measures that are common to a number of public health programmes merits further consideration.

9.7 Conclusion

The strategies and approaches for improvement of oral health, particularly as regards poor and disadvantaged populations, are outlined in the *World oral health report 2003* (*1*). The emphasis is on community outreach work and integration of promotion of oral health with chronic disease prevention and health promotion, given that oral diseases and common chronic diseases have a number of risk factors in common. The most important modifiable causes of oral disease conditions include unhealthy diet, use of tobacco, excessive consumption of alcohol, poor sanitation and water, poor oral hygiene and infection with HIV.

Promotion of oral health is based on the principles and strategies of general health promotion, including promotion of healthy settings and healthy lifestyles. Children and young people in poor and disadvantaged settings can benefit from the establishment of health-promoting schools within local communities (*62*), and the incorporation of oral health care into school health care programmes may ensure essential care and pain relief for deprived children (*62*). In addition, sanitary facilities and access to safe water in schools are necessary conditions for optimal hygiene. In low- and middle-income societies, community centres in urban and particularly in rural areas are possible settings for promotion of oral health of adults, including the provision of services and affordable care.

Primary oral health care as a component of primary health care in general is vital in serving deprived populations around the world. Most low- and middle-income countries suffer from lack of oral health personnel, and primary health workers and ancillary health workers trained in oral health care can offer assistance in early detection, diagnosis, emergency care, treatment, prevention and referral to special care. In most countries special initiatives are required for the improvement of the poor oral health status of older people, including through age-friendly primary oral health care, outreach activities and organized community work on disease prevention *(54)*.

In several countries around the globe, but particularly in low- and middle-income countries, policies for the promotion of oral health and for the provision of oral health services have not yet been established. Resolution WHA60.17 addressed this issue by calling for the development and adjustment of national oral health promotion programmes in low- and middle-income countries and the adjustment of programmes in high-income countries (*118*). The resolution recommended linkage of oral health programmes with other national and community programmes for general health. For example, prevention of dental caries can be achieved through programmes for improved diet and nutrition (*62*), and prevention of oral cancer through early detection by oral health professionals, where available, or otherwise by specially trained primary health workers. Oral cancer prevention measures should be incorporated into any national cancer prevention programme, and prevention of oral cancer and periodontal disease should also be linked to tobacco cessation programmes and alcohol control initiatives. Further, prevention of periodontal disease should be an element of a national diabetes prevention programme. Oral manifestations of HIV/AIDS are preventable through teamwork within community-oriented HIV/AIDS action programmes. Provision of clean water and adequate sanitation can help improve oral hygiene, and the availability of water with appropriate levels of fluoride will help prevent dental caries on a populationwide basis, with poor and disadvantaged population groups receiving particular benefit (*60*).

Strengthening of oral health promotion and prevention systems is needed in many countries in order to tackle social inequity in oral health. Outreach strategies can improve the oral health of people with little tradition of oral health care. Provision of oral health services should be financially fair and should be geared to the needs of users, in particular the poor and disadvantaged population groups. By and large, oral health personnel are far more sparse in low- and middle-income than in high-income countries, offering scope for primary health workers to play an important role in outreach activities and in the provision of essential oral care for poor population groups and people living in remote rural areas.

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Unintended pregnancy and pregnancy outcome: equity and social determinants

10

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Contents

Figures

1 The authors would like to acknowledge the following for their assistance: Matthews Mathai, Brooke Ronald Johnson, Shyam Thapa , Catherine D'Arcangues and Iqbal Shah

10.1 Summary

Control over fertility and access to safe maternity care are fundamental health and human rights and are strongly influenced by social determinants. Using a variety of methods, this chapter examines determinants of unintended pregnancy and its outcomes and of maternal risks from childbearing, including access to care by a skilled birth attendant.

For unintended pregnancy, the analysis in this chapter was based on a broad review of the literature, supplemented by commissioned articles produced by experts. For pregnancy outcome, the analysis focused on determinants of receiving care from a skilled birth attendant because the proximate causes of maternal morbidity and mortality can usually be successfully treated when women have access to basic health care. This included a comparison of country-by-country statistics on access to skilled birth attendance, pregnancy outcome and various social determinants.

Worldwide, 40% of all pregnancies are unintended. Comparison of desired family size to actual fertility demonstrates that, in almost all countries, the burden of unintended pregnancy disproportionately affects the poor. Other disadvantaged groups that have higher rates of unintended pregnancy in many settings include young people, the uneducated, ethnic minorities and migrants.

Women with an unintended pregnancy may be faced with a choice between terminating the pregnancy or an unwanted birth. Unsafe abortion accounts for 13% of maternal deaths worldwide, and disadvantaged women are less likely to have access to safe abortion services and to proper care to treat complications. Poor women also suffer disproportionate consequences of unwanted childbearing, including health and social consequences for themselves and their children. Vulnerability to unintended pregnancy is strongly influenced by access to and use of effective contraception and by exposure to unwanted sex through child marriage and sexual violence. These all have strong social determinants.

The proportion of births with skilled attendance and per capita health expenditure alone account for 90% of between-country variation in maternal mortality. At given levels of health expenditure, achieving equity by income level in coverage with skilled birth attendance is strongly correlated with high levels of overall coverage, as are education for women, higher levels of public (versus private) expenditure on health and an efficiently performing government. Vulnerability to maternal mortality and morbidity despite access to skilled birth attendance depends on the quality of skilled birth attendant services and the availability of backup treatment (especially blood transfusion and caesarean section) for major obstetric complications.

Addressing unintended pregnancy and improving pregnancy outcome will require interventions specifically designed to achieve equity in the availability of all related health services, especially targeting the poor and disadvantaged for access to contraceptive and skilled birth attendant services. Such efforts will be most effective when combined with addressing upstream determinants, such as improving education for women and the effective functioning of the health sector and of government services in general. For future progress, it will be essential to rigorously measure the impact of interventions.

10.2 Introduction

Background

The ability of women and couples to control their fertility and to have basic, safe maternity care is a fundamental health and human right. This has been endorsed by the World Health Assembly (*1*), and the World Health Organization (WHO) affirms that "sexual and reproductive health is fundamental to individuals, couples and families, and the social and economic development of communities and nations" (*2*). As stated by the International Conference on Population and Development in 1994 (*3*): "All couples and individuals have the basic right to decide freely and responsibly the number and spacing of their children and to have the information, education and means to do so."

The broader field of sexual and reproductive health covers many areas that go beyond pregnancy and its outcomes to include, for example, human immunodeficiency virus and other sexually transmitted infections. These are certainly areas of great importance in which social determinants have long been recognized to play a major role, and the entire field is too broad to be covered in a single chapter of this volume. This chapter therefore focuses on one aspect of sexual and reproductive health – the social determinants of unintended pregnancy and of pregnancy outcome.

Despite significant improvements in the lives of women (*4*), high rates of unintended pregnancy continue to detrimentally impact women's and children's health and restrict opportunities for women (*5*). Selection of unintended pregnancy as a focus of this chapter was based on five main principles:

- Ensuring the ability to choose the number and spacing of children as a means of achieving health and development goals has been neglected as part of key

international and national development frameworks (*6–12*).

- The burden of unintended pregnancy affects a large proportion of society. The growing demand for smaller families, decreasing age at first sex (in some countries) and increasing age of marriage has meant that many women spend much of their adult lives attempting to avoid an unintended pregnancy (*13, 14*).
- Safe and highly effective means of primary prevention (contraception) (*15*) and secondary prevention (termination of pregnancy) (*16, 17*) can reduce the burden of unwanted births.
- While reporting of unintended pregnancy raises some methodological concerns, ample data are available for examination (*10, 18*).
- Assisting women in avoiding unintended pregnancies improves the health of women, children and families, and represents a pledge to the right of all women to control their fertility.

Another focus of this chapter is the risk to women associated with childbirth and with unsafe abortion. The morbidity and mortality associated with pregnancy and childbirth is remarkable among health conditions in the extent to which it can be minimized by access to relatively simple care. One of the targets of the Millennium Development Goals is to provide all women with access to a skilled birth attendant. This chapter includes an examination of the social determinants of access to skilled birth attendance.

Methods

This chapter represents work conducted by two units of WHO: Reproductive Health and Research and Making Pregnancy Safer. Instead of trying to cover the entire broad topic, the approach was for different teams to choose their own focus and analytical methods. This chapter attempts to present and synthesize their findings within the analytical framework of this volume (see Chapter 1).

For unintended pregnancy, the analysis began with a broad review of the literature. The search strategy included studies examining the determinants and effects of "unintended", "mistimed" or "unwanted" pregnancies and births. In addition, nine commissioned articles were written by identified experts in the field. The theme and scope of these articles were defined by an internal working group involving participants from multiple departments within WHO. Bibliographic databases, topic-specific journals and Internet searches were conducted to identify reports and publications within and outside peer-reviewed journals relevant to the analysis. Data from the Demographic and Health Surveys were used to examine gradients of inequity within countries (*19*).

Previous reviews have noted the methodological difficulties in measuring unintended pregnancy (*18*). Authors note the lack of available evidence on pregnancy intention, particularly in developing countries (*5, 18*). Much of the evidence in this review is from surveys that ask women to retrospectively classify their pregnancies as "wanted" or "unwanted". Publications have described the limitations of this approach (*20, 21*), including the inherent bias in recall of intention, underreporting of pregnancies that did not result in a live birth, the tendency to transform past intention to match current realities of parenthood and the influence of culture in classification of pregnancies (*18, 22, 23*).

In addition to self-reported pregnancy intentions, two alternative means of measuring unwanted pregnancy are applied in the research literature: rate of induced abortion and "excess fertility". Pregnancies that are voluntarily terminated are generally considered unintended. A small number of induced abortions may be among women whose conception was intentional, but this number is unlikely to significantly skew observed disparities in incidence or outcome. Excess fertility, another measure of unwantedness, is calculated as the difference between women's reported ideal family size and total fertility rate (number of children a woman is likely to have in her lifetime).

For pregnancy outcome, there were two levels of analysis. The first (presented mainly as a webannex) covers a broad range of proximate causes of adverse pregnancy outcomes. This was based on a consensus process involving staff of the Making Pregnancy Safer Unit of WHO and consultants, and includes estimates of prevalence and risk from the scientific literature. It also includes an appraisal for each health issue of both the strength of its association, if any, with social determinants and of the evidence that the association is causal, based on generally accepted criteria for causality (*24*).

It was clear from this exercise that relatively few factors account for most of the variation in women's chance of giving birth safely. For this chapter, it was decided to focus on the second level of analysis: social determinants of access to skilled birth attendance. The method for this focus was to conduct an original analysis of cross-national (or "ecological") data. The data presented here are mostly drawn from reports published by United Nations agencies, the United States Agency for International Development (USAID) and the World Bank. The principal data sources are the 2006 *Human Development Report* and the 2006 *World Health Report*, and where no other reference is given data were taken from these compilations (*25, 26*).

Compared to what is available in high-income countries, very few data on pregnancy outcomes and the factors that affect them are available from low- and middle-income countries. The quality of data available is also uncertain and variable, and this should be considered when evaluating our results. The United Nations agencies present, as far as possible, data collected using consistent methods and adjusted for well-defined sources of error. Many of the data, however, are collected by national governments, and methods vary. Even in rich countries, official estimates of maternal mortality may be inaccurate: in the United Kingdom, for example, the official rate, estimated from death certificates, is half the true rate (*27*). In low- and middle-income countries estimates based on officially registered deaths systematically and very substantially underestimate maternal mortality, sometimes only including deaths that take place in facilities (*28*).

A key variable in this discussion is the percentage of births attended by a skilled birth attendant. Data collected by different countries are not based on a single definition of "skilled birth attendant", or on any definition of "attended". The WHO definition of a skilled birth attendant is "someone trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns" (*29*). However, data in the *World Health Report* on the percentage of births attended by skilled birth attendants in several countries are based on definitions inconsistent with that of WHO.

No analysis was undertaken of data for countries for which data on the proportion of births with skilled attendance were not available. Most other variables were unavailable for at least some countries. United Nations reports include data for most variables from the great majority of countries in sub-Saharan Africa and from the larger (in population) countries of South and Central America, Asia and North Africa. Smaller countries outside Africa are those for which data are most often unavailable.

Statistical analyses used proprietary statistical software. In keeping with the limitations of ecological data, the analysis was exploratory and hypothesis generating. Spearman rank correlation coefficients are reported for most bivariate correlations to avoid difficulties with variables not normally distributed. Multivariate analysis was used sparingly because of multicollinearity and other characteristics of the data that violate model assumptions. Because a large number of comparisons were made, an arbitrary conservative threshold of $P < 0.005$ was used.

10.3 Analysis

Global burden of unintended pregnancy: context and position

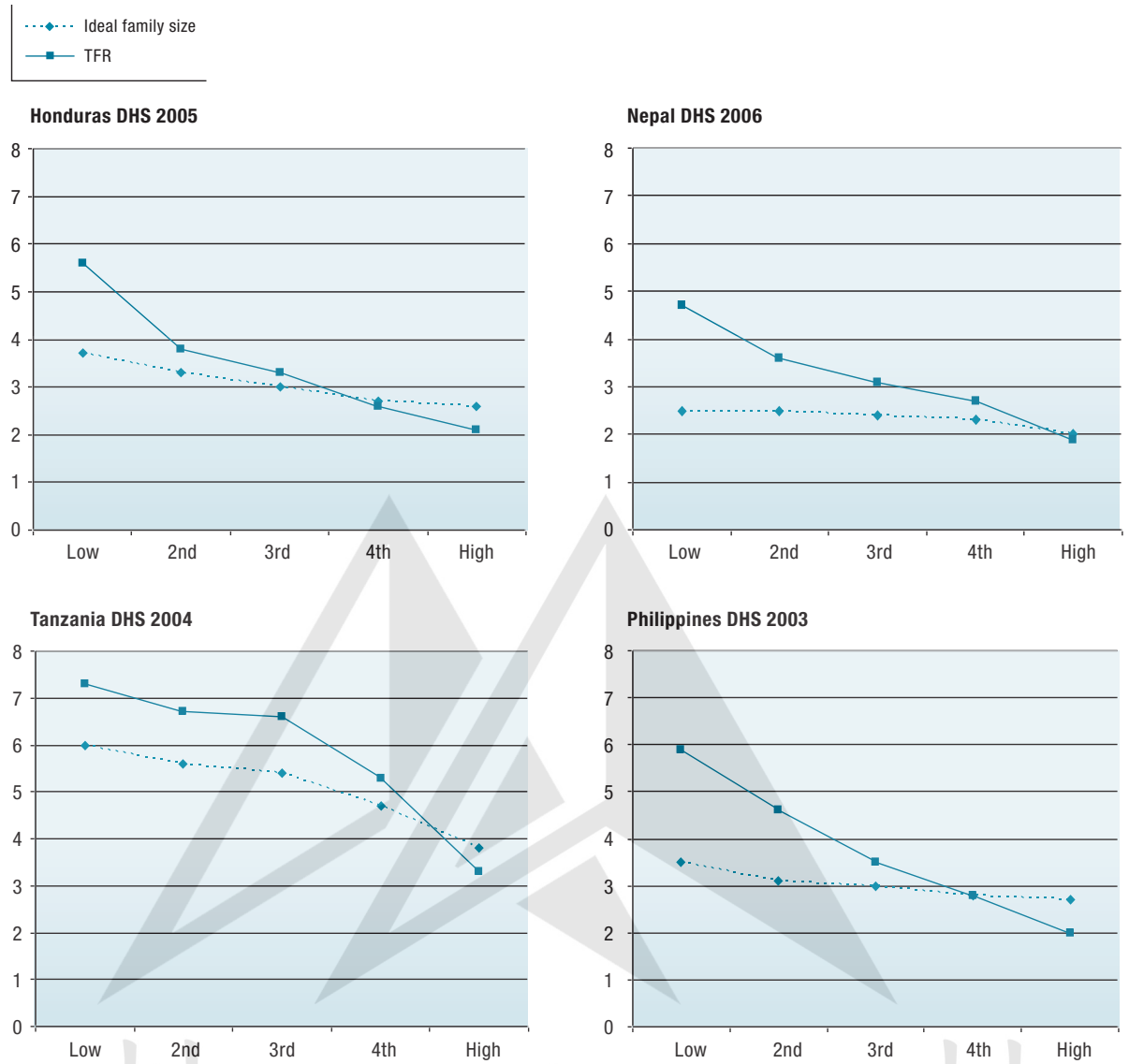
Of all pregnancies worldwide, 40% are unintended. Approximately 20% of pregnancies worldwide are voluntarily terminated. In 2003, an estimated 42 million abortions were induced, 35 million (26 million excluding China) of which occurred in developing countries (*30*).

Women who are unable or choose not to terminate an unwanted pregnancy are faced with an unwanted birth. Analysis of fertility data from 20 low- and middle-income countries estimated that on average 22% of all births were unwanted and that, for most countries, the proportion of unwanted births has grown (*31*). In developing countries where data were available, researchers found that between 14% and 62% of recent births were reported as unintended (*18*).

Within countries, the burden of unintended and unwanted pregnancy is not equally distributed. In the United States of America, for example, rates of unintended pregnancy are consistently higher for poor women, ethnic minorities, women aged 18–24 years, women who have not completed high school and unmarried women (*14, 32–34*). The overall rate of unintended pregnancy in the United States has remained constant for almost a decade, with almost half (49%) of all pregnancies reported as unintended (*32*). Among subpopulations, however, this rate fluctuates. Between 1994 and 2001, the rate of unintended pregnancy declined among adolescents, college graduates and the wealthiest women, but increased among poor and less educated women (*32*). Limited data from other countries have shown similar patterns of disparities, with rates of unintended pregnancy markedly higher among the poor (*35*), migrants (*35*), unmarried (*35, 36*) and adolescents (*36*).

Substantially more evidence is available to examine differences in actual births. Demographic and Health Survey data substantiate higher levels of excess fertility among poor women in developing countries. In 41 countries where data were available, poor women from all countries outside Africa and the majority of African countries reported higher levels of unintended births than women from wealthier households (*37*). Figure 10.1 shows women's ideal family size compared to their estimated total fertility rate (TFR) by wealth quintile in selected countries. In the countries shown, there is substantially less difference in ideal family size between women from the poorest households and those from the wealthiest households than there is difference in the number of children they are likely to bear, given

FIGURE 10.1 Women's reported ideal family size and total fertility by wealth quintile for selected countries



Note: DHS = Demographic and Health Survey; TFR = total fertility rate, the average number of children a woman would be expected to bear in her reproductive lifetime, given prevailing fertility rates.

Source: ORC Macro.

prevailing fertility rates. In other words, poor women are more likely to have larger families than they would prefer in comparison to women from the wealthiest households. It is also of note that women from the wealthiest households are more likely to have fewer children than they would prefer.

Figure 10.1 illustrates gradients of inequities observed in various countries. In some countries, excess fertility is concentrated among the poorest women (for example, Honduras). In other countries, excess fertility is distributed more evenly among the three poorest groups (for example, the United Republic of Tanzania), while a more steady gradient is observed in Nepal and the Philippines.

The experience of pregnant adolescents differs from that of older women and is largely defined by marital status (*38, 39*). While the majority of pregnancies among unmarried adolescents are unintended, married adolescents often seek to bear children early as proof of fertility (*39*). Unmarried adolescents appear to suffer a disproportionately higher burden of unintended pregnancy, with higher rates of induced abortion than older women (*38, 40*). More than 50% of young mothers report an unintended birth in Botswana, Ghana, Kenya, Namibia and Zimbabwe (*41*).

Consequences of unintended pregnancy

Unsafe abortion

Women with an unwanted pregnancy are faced with a difficult decision. Deciding whether to terminate an unwanted pregnancy or have an unwanted child is influenced by many factors, including the availability and accessibility of induced abortion services, the social acceptability of childbearing and induced abortion, and support from social structures. Either choice has social, financial and health consequences that are not equally experienced among women.

Several procedures are currently available to assist women with safe termination of pregnancy. Expansion of safe induced abortion services into remote and rural areas is possible largely as a result of advances in medical technologies, which have reduced cost and simplified procedures (*16, 17, 42, 43*). Complication rates for these procedures are extremely low, with almost all abortion-attributable morbidity and mortality resulting from untrained providers, use of harmful procedures or failure to use appropriate infection prevention procedures (*17, 44*). "Unsafe abortion" is defined as a procedure for terminating pregnancy carried out by attendants without appropriate skills, or in an environment that does not meet minimum standards for the procedure, or both (*17*). Unsafe abortion is a major cause of maternal mortality, accounting for an estimated 13% of maternal deaths worldwide (*16*). The highest estimated rate of unsafe abortion is in Latin America and the Caribbean, where there are 33 unsafe abortions per 100 live births, followed by Africa (17 per 100 live births) and Asia (13 per 100 live births) (*30*).

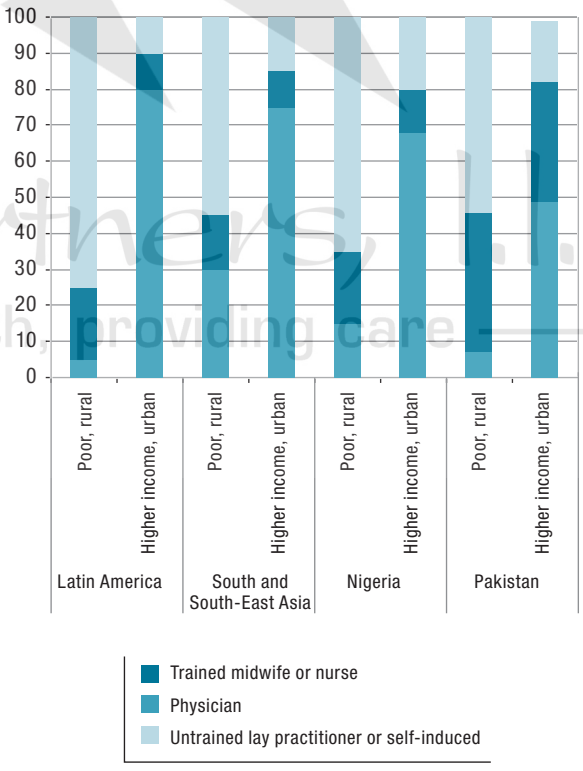
In 2005, an estimated 5 million women were hospitalized for treatment of complications from unsafe abortion (*45*). Rates of unsafe abortion are highest among young women (*46–48*), with almost 60% of unsafe abortions in Africa occurring among women under age 25 (*46*). A number of studies have documented higher complication rates and mortality resulting from unsafe abortion among women of low socioeconomic status (*49–52*).

Factors that contribute to observed differentials in abortion complications include the health status of women (*53*), longer delay in seeking induced abortion (*53, 54*), use of less skilled providers (*43, 53*), use of more dangerous methods (*43, 53*) and longer delay in seeking care for complications (*43*). Figure 10.2 illustrates the differences in care-seeking behaviour among women of varying socioeconomic status (*40, 55*). Women from more affluent households are more likely to obtain an induced abortion from a physician or nurse, while poor women living in rural areas are more likely to use a traditional practitioner or self-induce an abortion.

Women report that socioeconomic concerns are a primary consideration in deciding whether to seek an induced abortion (*54, 56*). Poorer women and adolescents are less likely to have the financial resources (*54*); less likely to have the knowledge of when, where and from whom to seek an induced abortion (*54*); or lack the social support to secure safe abortion services (*57*).

The principal social determinant of recourse to unsafe abortion is real or perceived legal restriction on safe abortion (*58*). Developing countries are much more likely to restrict access to legal abortion than developed countries, and the restrictions disproportionately affect poorer women (*58*). While abortion is allowed to preserve women's physical or mental health in 86% of developed countries, only 55% of developing countries allow this. Many conditions that make pregnancy dangerous, however, such as valvular heart disease, are more common in developing countries and more common among poorer women within those countries, and women in those countries and poorer women within them are less likely to have access to effective treatment. Affected women are then forced to make an invidious choice between a high-risk pregnancy and an unsafe abortion.

FIGURE 10.2 Type of abortion provider by women's status in selected regions and countries



Sources: Alan Guttmacher Institute (*40*) and Population Council (*55*).

Outcomes are much worse for women who lack access to safe abortion. Safe abortion may be available to some women even where abortion is illegal. Studies of abortion providers in contexts where abortion was heavily restricted by law show that higher-income, urban women were more likely to receive safe abortion than poor, rural women (*59–61*). Widespread access to safe abortion generally requires a context in which abortion is legal. But while criminalization of abortion promotes unsafe abortion, unsafe abortion should not be equated with illegal abortion. Legal abortions – like any other medical procedure – may be unsafe where clinicians are poorly trained or facilities are inadequate. Some countries in which abortion is legal for most indications continue to have high rates of unsafe abortion. India and South Africa are countries where high rates of unsafe abortion persist despite changes in the law that should make safe abortion readily available (*16*). Contributing factors include cost, procedural and bureaucratic delays, inadequate numbers of trained practitioners to meet demand and concerns about confidentiality for women below the age of majority.

The medical factors that influence vulnerability to mortality and morbidity after unsafe abortion are the method used and the care received in the event of complications such as sepsis. Where a reasonable standard of hospital care is available, mortality should be low, and the cost of care is relatively modest – US$ 8.51 for drugs and equipment, according to the United Nations Population Fund (UNFPA) (*62*).

The risk of death after an unsafe abortion varies widely. In developed countries, the mortality rate of unsafe abortion is much higher than that of legal abortion (in the United States the mortality of legal abortion is 0.6/100 000 procedures, but in developed countries the mortality of unsafe abortion averages 10/100 000 procedures) (*16*). But this is low compared to rates in developing countries, and since legal abortion is more likely to be available in developed countries and the number of unsafe abortions in these countries is low, the number of deaths from unsafe abortion is tiny. In Latin America, the case fatality rate is also relatively low at about 50/100 000 unsafe abortions; despite the high incidence of unsafe abortion in this region, relatively few deaths result (less than 3% of the world total). In sub-Saharan Africa the mortality rate is 750/100 000 unsafe abortions. Although this region accounts for less than one quarter of the world's unsafe abortions, it accounts for over half of the resulting deaths (*53*).

Unwanted childbearing

Unwanted childbearing detrimentally affects women and children. Women who have an unwanted pregnancy are more likely to delay antenatal care or have fewer visits (*5, 18, 63, 64*). Unwanted children are more likely to experience symptoms of illness, such as acute respiratory infection and diarrhoea (*65*), less likely to receive treatment or preventive care such as vaccinations (*65*), less likely to be breastfed and more likely to have lower nutritional status (*5, 18*), and have fewer educational and development opportunities (*5, 66*). A recent review concluded that "children who are the result of unintended pregnancies are at an increased risk of infant mortality compared with children resulting from intended pregnancies" (*18*).

Unwanted childbearing negatively influences the mother–child relationship (*67*) and maternal health. Unintended pregnancy is associated with maternal depression, anxiety and abuse (*5, 18*). Unintended childbearing among adolescents is particularly detrimental, increasing vulnerability by truncating educational opportunities, increasing welfare dependence and increasing the probability of domestic violence (*68*).

Women with fewer social and financial assets may view unintended childbearing as less problematic than women with opportunities outside the home (*69*). Women faced with poor economic conditions, low self-esteem and lack of moral support may see motherhood as a means of escape (*69*).

Avoiding unintended pregnancy: the role of the health system

Many countries have seen dramatic increases in contraceptive use, the primary means to avert an unintended pregnancy, and evidence indicates that the demand for family planning is growing in many developing countries. Unintended pregnancy occurs even among contraceptive users, mainly through incorrect or inconsistent use. Evidence indicates that some women are more susceptible to contraceptive failure and abandonment than others.

Contraceptive failure

Data from the United States indicate contraceptive failure rates are higher among women from disadvantaged circumstances (*70, 71*). This disparity is partially explained by differences in choice of contraceptive method. The poor, rural residents, adolescents, minorities and unmarried women are more likely to use temporary methods, such as condoms or injectables (*70, 71*), which have higher rates of failure in typical use (*15*). Some women may experience circumstances that are not conducive to consistent and successful contraceptive use, such as lack of funds for resupply of contraceptives, lack of support from their partner or geographical distance from distribution centres. Inexperience with contraceptives, erratic sexual activity, lack of communication with sexual partners and lack

of control over life circumstances may contribute to less successful use.

Contraceptive abandonment

Most women will use a variety of contraceptive methods during their lifetime, switching methods as their circumstances change. Women who stop using an effective method and delay taking up a new one are at greater risk of unwanted pregnancy than women who switch contraceptives without a gap. A six-country study concluded that poor women were more likely to abandon contraception altogether rather than switch methods compared to wealthier women, even though they wanted to regulate their fertility (*72*).

Health services are responsible for providing women with essential information to make an informed choice and sufficient instruction for correct method use. But women often receive differential treatment from providers. Studies from Ghana and Nepal using "simulated patients" indicate that lower-class, uneducated and younger clients receive poorer treatment (*73, 74*).

Where supervision is weak and protocols are ambiguous, providers act as gatekeepers of services and information with discretionary power over which clients receive care, what services they receive and even how much clients pay. Clients of lower socioeconomic status are especially susceptible to restrictive provider practices, as they have fewer options for where to access services (*75*). Documented provider-imposed barriers include restrictions based on outdated contraindications, eligibility restrictions (such as parity or spousal consent), process hurdles, limits on who can provide services and provider bias (*76*). An example of the implications of such restriction was documented in five sub-Saharan African countries, where parity requirements of at least two children were imposed on 48–93% of women seeking an intrauterine device and 27–95% of women wanting injectables, restrictions that have no medical basis (*77*).

The influence of provider behaviour on access may be especially problematic for adolescents. Studies in Kenya, the Lao People's Democratic Republic and Zambia documented that one half to two thirds of providers were unwilling to provide contraceptives to adolescents (*75*). Adolescents may be particularly reluctant to seek services where confidentiality is not assured and to acquiesce to extensive physical examination (*39*). In many countries, adolescents tend to use the private sector, where assurances of privacy and quality are generally greater (*78*) but which are beyond the financial means of many adolescents.

Vulnerability to unintended pregnancy: contraception use

Women who are sexually active but not using contraception are considered to have an "unmet need" for family planning if they do not want to have a child within two years. Comparative analyses demonstrate that (outside sub-Saharan Africa) rural women, women with little or no education, adolescents and poor women have higher unmet need (*8, 79–81*). Women from disadvantaged situations are more likely to cite lack of sexual and reproductive health knowledge, limited access and health concerns as reasons for non-use of contraception (*80*).

Vulnerability of migrants

Increasingly, reproductive health programmes have tried to address the unique vulnerabilities of migrants. In 2005, women accounted for almost 50% of all international migrants. Internal rural-to-urban migrants are increasingly likely to be young, unmarried women with little education. In many Asian countries, internal migration is particularly feminized as women seek work in the free-trade manufacturing sector (*82*). In a variety of settings, female migrants demonstrate low levels of sexual and reproductive health knowledge and high rates of sexually transmitted infection, induced abortion and maternal mortality. Migrants have reduced access to sexual and reproductive care due to restrictive public policies, organization of health services, discrimination, social isolation, lack of information and increased sexual risk-taking (*82*).

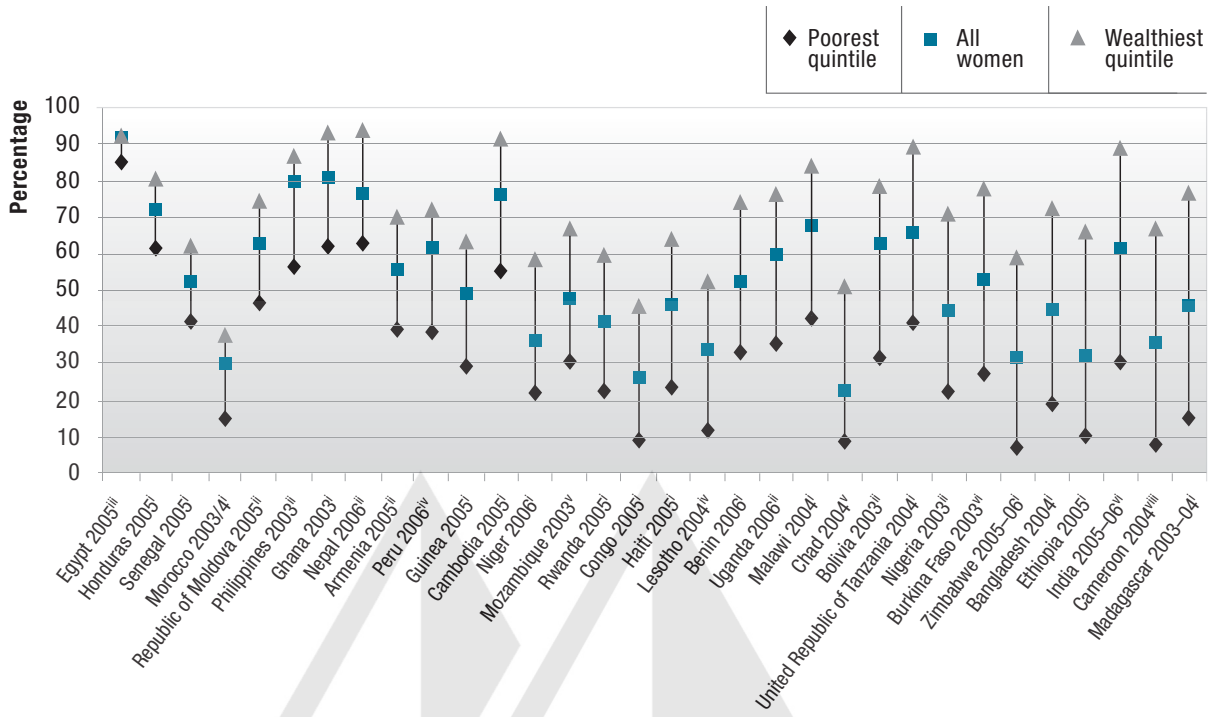
Knowledge of family planning

Knowledge of family planning, as measured by the ability to name at least one modern contraceptive, is nearly universal in most countries (*83*). This measure, however, is unable to differentiate women with correct knowledge of contraception from those with knowledge based on myths and misperceptions. Self-reported access to family planning messages may be a better indicator of contact with correct information. As shown in Figure 10.3, all 32 countries with available data show a positive relationship between household wealth and access to family planning messages. The rich–poor gap ranges from 6 percentage points in Egypt (2005) to 61 percentage points in Madagascar (2003/2004), with an unweighted average gap of 39 percentage points (*84, 85*).

Women's autonomy

The low status of women in many countries restricts their ability to make decisions within the household. One way that Demographic and Health Surveys capture this dynamic is by asking women if they are able to decide for themselves to seek health care. In the

FIGURE 10.3 Percentage of women reporting recent receipt of family planning messages by wealth quintile in selected countries



Countries appear in order by size of gap from smallest to largest. Key to countries: Exposure to family planning messages is based on percentage of women reporting hearing messages from (i) at least one of 3 media sources in the past few months, (ii) at least one of 5 sources in the past few months, (iii) at least one of 6 sources in the past 6 months, (iv) at least one of 3 media sources in the past 2 months, (v) at least one of 3 media sources in the past 6 months, (vi) at least one of 2 media sources in the past few months, (vii) at least one of 7 sources in the past 6 months and (viii) at least one of 4 sources in the past 6 months.

Source: ORC Marco (*84*).

30 countries where data were available, an average of only 37% of women report they are able to seek their own care. In 26 of 30 countries, a smaller proportion of women in the poorest households were able to seek care. The rich–poor gap ranges from less than 1 percentage point in Bangladesh (2004) to 32 percentage points in Peru (2000) (*19*).

Beyond seeking health care, obtaining contraception also frequently requires out-of-pocket expenditure. Women with the autonomy to make decisions about how money is spent are substantially more likely to use contraception than women in couples where the husband makes all such decisions (*86*).

Exposure to unintended pregnancy: unwanted sexual activity

Women are particularly susceptible to unwanted sexual activity (*87*). Sexual violence and child marriage are two common ways women are exposed to sexual activity without full and informed consent. These often result from social norms and practices that condone or even encourage such behaviour.

Sexual violence

A growing body of evidence indicates that sexual violence is part of many women's lives. The WHO Multi-country Study on Women's Health and Domestic Violence against Women documented prevalence rates of forced sex from 15 countries. Lifetime experience of intimate partner sexual violence against women over 15 years old varied from 6% in Japan to 59% in Ethiopia. These figures underestimate the prevalence of sexual violence and coercion as they do not include experience with "unwanted sex" unless it was "forced", and do not include sexual child abuse. In 10 of the 15 settings, over 5% of women reported their first sexual experience as forced, with more than 14% reporting forced first sex in Bangladesh, Ethiopia, Peru and the United Republic of Tanzania (*88*). Beyond the potential consequences of sexually transmitted infection and unwanted pregnancy, evidence suggests that sexual coercion negatively affects victims' general

mental and physical well-being. Sexual violence is also associated with risky behaviours such as early sexual debut and multiple partners (*87, 89, 90*). Key factors associated with higher levels of sexual violence and coercion include armed conflict and legal systems that fail to prosecute sexual violence or protect women's civil rights (*87*).

Child marriage

In countries where early marriage is the norm, 15.5 years is the median age at first intercourse for women. This contrasts to most other countries, where the median age of sexual debut for women is between 16.5 and 20.5 years (*13*). Many countries report persistently high rates of child marriage despite laws prohibiting such practices. Young girls are often physically and mentally unprepared for their new role as wife and mother and pressured into early motherhood as proof of fertility.

A recent analysis in 20 countries with the highest prevalence of child marriage found four factors were strongly associated: education of girls, age gap between partners, geographical region and household wealth. Girls' education, particularly secondary education, demonstrated the strongest correlation with later marriage. Girls with secondary education in Bangladesh, for example, were nine times less likely to be married by their 18th birthday (*91*). A study from Ethiopia concluded that child marriage is rooted in ensuring family status in the community. Fear that older daughters were less marriageable and social pressure to ensure the bride's virginity were cited by community members as reasons for continuing the practice (*92*).

Pregnancy outcome: proximate causes of adverse pregnancy outcomes

A list of health problems known to affect pregnancy outcome, together with an appraisal of the available evidence concerning their impact and their relation to social determinants and of possible entry-points for intervention, is provided as a webannex (*93*). It is clear that the most important contributors to maternal mortality in low- and middle-income countries are postpartum haemorrhage, pre-eclampsia, sepsis, obstructed labour and unsafe abortion. For all of these, the vast majority of mortality outcomes can be prevented by access to adequate health care. This is confirmed by the results of WHO's systematic review of maternal mortality, which found that the proportion of births with skilled attendance and per capita health expenditure alone account for 90% of between-country variation in maternal mortality (*94*).

The relation between the percentage of births with skilled attendance and the maternal mortality ratio is shown in Figure 10.4. Maternal mortality ratios are roughly constant among countries where the percentage of births with skilled attendance is less than 50–60%, but above that level the ratio falls steeply with the proportion of births with skilled attendance.

It is notable that some very poor countries achieve more than 60% skilled attendance at birth, and the data show that this level of access can be associated with maternal mortality ratios in the range of 150–200 – that is, with reduction of maternal mortality by 80–90% compared to its highest levels. This suggests that important improvements in maternal mortality can be achieved with levels of access to skilled birth attendance within the reach of even the poorest countries. The key problem, then, is to identify the social determinants of access to skilled birth attendance.

Care by a skilled birth attendant

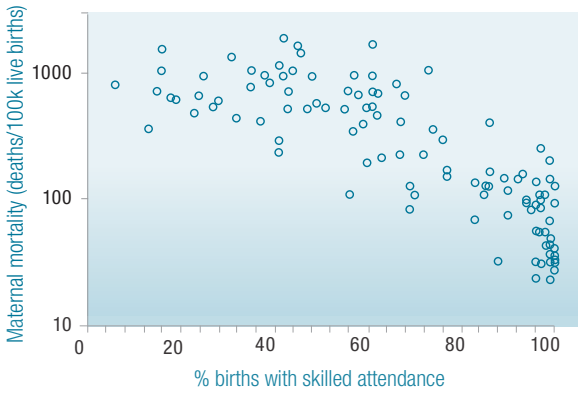
Health spending as a social determinant

The first, obvious candidate social determinant of a woman's chance of having a skilled birth attendant is spending on health: "Many governments allocate too small a portion of the national budget to health care, and, within that budget, not enough is spent towards addressing preventable and avoidable deaths" (*95*).

Figure 10.5 shows the percentage of births with skilled attendance and per capita annual public health expenditure for 114 WHO Member States with per capita gross domestic product (GDP) less than US$ 10 000, adjusted for purchasing power parity (PPP). Countries with higher per capita GDP were not included in this sample because no country with higher GDP reported low levels of access to skilled birth attendance. It can be seen that there is a roughly linear relationship between the logarithm of public health expenditure and access to skilled attendance at birth (Spearman rho = 0.72, $P < 0.0001$). The lowest level of per capita public health expenditure at which it is possible to achieve close to 100% coverage of skilled birth attendance is about US$ 35, although many countries spending more than this amount do not achieve 100% coverage. This may seem an implausibly small amount, but antenatal care and supervision of a normal delivery by a skilled birth attendant are relatively low-cost interventions: the World Bank has estimated the cost of antenatal care and care for a normal delivery at US$ 3 (*96*), though UNFPA has estimated the equipment cost alone at US$ 8.22 (*62*).

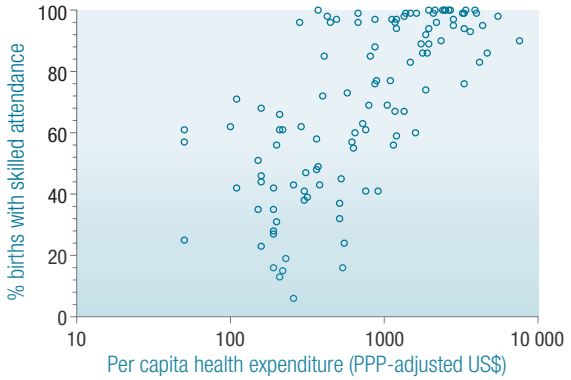
It is notable that only public health expenditure is positively related to access to skilled attendance at birth.

FIGURE 10.4 Maternal mortality plotted against percentage of births with skilled attendance



Note: Each point represents data for a single country.

FIGURE 10.5 Relationship between per capita annual public health expenditure in PPP-adjusted US$ and the percentage of births with skilled attendance for countries with per capita GDP less than US$ 10 000 (PPP)



Note: Each point represents data for a single country.

For the countries in this sample, there is a negative correlation between the percentage of births with skilled attendance and private health expenditure as a proportion of total health expenditure (Spearman rho = –0.33, $P < 0.0001$). Out-of-pocket health expenditure as a proportion of total health expenditure is also negatively correlated with the percentage of births with skilled attendance (Spearman rho = –0.25, $P < 0.003$).

Social and structural determinants such as the size of a country, the proportion of the population living in isolated villages, the state of roads and other infrastructure and the operational efficiency of government all affect the efficiency with which public health funds can be employed. A few countries in central and southern Asia have achieved provision of skilled attendance at birth at close to 100% with expenditure below US$ 100 per capita. But all African countries that achieve close to 90% availability have public health expenditures close to or over US$ 200 per capita.

Providing high levels of access to skilled birth attendance with public health expenditure less than US$ 100 per capita, and in Africa US$ 200 per capita, is an unusual achievement, and even this level of expenditure may be unrealistic in some countries. For countries at the lower quartile of GDP in this sample (US$ 1700) public health expenditure of US$ 100 represents 5.9% of GDP, and public health expenditure of US$ 200 represents 11.8% of GDP; for Sierra Leone these expenditures would be 18% and 36% of GDP, respectively. For very poor countries there may be an absolute poverty barrier, and for most of sub-Saharan Africa a relative poverty barrier, to achieving high levels of access to skilled birth attendance.

Social determinants other than health expenditure

Some of the variation in the percentage of births with skilled attendance at any given level of public health expenditure might be explained by the efficiency with which money is spent. The United Nations' Human Development Index (*97*) combines indices of each country's wealth with its success in achieving high life expectancy and high rates of education and adult literacy and can be used to partially correct for countries' overall efficiency of performance. The percentage of births with skilled attendance in each country is quite closely correlated with the Human Development Index ($r = 0.81$, $P < 0.0001$) and with its gender development index ($r = 0.79$, $P < 0.0001$).

Aspects of society related to the position of women are plausible explanations for disproportionate success or failure in providing access to skilled birth attendance, relative to success in increasing life expectancy and providing access to education. The relation of various markers for gender equity to the percentage of births with skilled attendance was examined. Lower private health expenditure as a proportion of total health expenditure, lower total and adolescent fertility rates, a higher proportion of married women using contraception and higher proportions of females at all levels of education were all associated with access to skilled birth attendance. In multivariate models including all factors with significant ($P < 0.005$) univariate associations, the highest partial correlation coefficients were for total fertility rate ($r = –0.30$, $P = 0.03$), log per capita public health expenditure ($r = 0.29$, $P = 0.04$) and female tertiary enrolment ($r = 0.22$, $P = 0.12$). This model accounted for 73% of the variation between countries in access to

skilled birth attendance. Other factors such as women's participation in government and politics, women's income equality with men and the overall level of income inequality as measured by the Gini index were not correlated with access to skilled birth attendance.

The composition of the health workforce is another plausible candidate to explain differences among countries in providing access to skilled birth attendance, but it appears that achieving a high percentage of births with skilled attendance is not necessarily dependent on first achieving an adequate overall health workforce. High levels of access to skilled birth attendance were reported by a number of countries with fewer than one doctor plus midwife per 1000 population. Conversely, some low- and middle-income countries with adequate supplies of skilled personnel provided relatively low levels of access to skilled birth attendance.

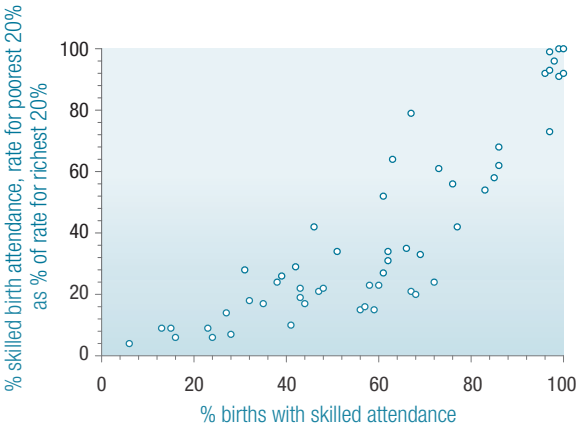
Although doctors can function as skilled birth attendants, having too few midwives relative to doctors might seem likely to impair access to skilled birth attendance. The available data, however, do not support this. For the 58 countries that report their number of midwives, the median number was 25% of the number of doctors, the upper quartile was 65% and the lower quartile 9%. For the sample as a whole, there was a negative correlation between the percentage of births with skilled attendance and the ratio of the number of midwives to doctors (Spearman rho = –0.42, $P = 0.0006$).

Inequities in access to skilled birth attendance

The shape of the relation between countries' overall performance in providing access to skilled birth attendance and equity of access is shown in Figure 10.6. Points in the top right corner reflect the fact that very high overall levels are impossible without high levels of access in all quintiles. But even at very low levels of overall access, better access overall is consistently associated with greater equity of access for the poorest individuals.

Good data comparing regions within countries are very scarce, but in India, at least some states with better overall performance have greater equity of access (*98*). In a northern Indian state where 43% of all women received skilled antenatal care, the rate for the poorest 20% of women was 30% of the rate for the richest 20%, and the rate for women in rural areas was 51% of the rate for women in urban areas. In a southern Indian state where 93% of women received skilled antenatal care, the rate for the poorest 20% of women was 82% of the rate for the richest 20%, and the rate for women in rural areas was 92% of the rate for women in urban areas. Interestingly, these ratios in Indian states lie within the scatter of points for countries in Figure 10.6.

FIGURE 10.6 Relationship of percentage of all births with skilled attendance to ratio of the rate for the poorest 20% of the population to the rate for the richest 20%



Note: each point represents data for a single country.

Vulnerability

Access to skilled birth attendance is not an end in itself, but a means to reduce the morbidity and mortality suffered as a result of complications of childbirth. In the case of maternal sepsis, skilled birth attendance is itself sufficient to reduce risk. In the case of postpartum haemorrhage and pre-eclampsia, skilled birth attendance can be effective only if the attendant has and can administer appropriate pharmaceuticals, and in the case of obstructed labour and placenta previa can identify the problem early and can refer the woman for caesarean section. If these conditions are not met, a woman's vulnerability to the consequences of complications of childbirth may be dissociated from her exposure to the risks.

As shown in Figure 10.4 above, the proportion of births with skilled attendance is highly associated with maternal mortality. But even skilled birth attendance near 100% is still associated with very variable maternal mortality. Some of this variation may be due to weaknesses in the quality of care provided by some skilled birth attendants (*99*), as suggested by recent data from India (*98*). At study sites in north India only 54% of women cared for by a doctor and 20% cared for by a nurse reported that their blood pressure had been measured during pregnancy, compared to 93% of women cared for by a doctor and 48% cared for by a nurse at study sites in south India. Notably, the quality of care received by the poorest women in south India was superior to that received by the richest women in north India, emphasizing the dominant role of public service provision in effective maternal health care.

10.4 Discussion

Social determinants play a key role in both unintended pregnancy and pregnancy outcome. Women from disadvantaged social circumstances are more likely to experience an unintended pregnancy than women with greater financial and social resources. When faced with an unwanted pregnancy, women with less means are also more likely to face more severe consequences from an unsafe abortion or an unwanted birth than more advantaged women (*100*). These disparities in unintended pregnancy and its consequences are the result of social, political and economic systems that do not provide access to correct knowledge of sexual and reproductive health and to necessary services.

Unintended pregnancy and pregnancy outcome are affected by social determinants that operate at all five levels of the analytical framework used in this volume (see Chapter 1). At the level of socioeconomic context and position, women living in poorer countries and poorer women within countries clearly do worse on all counts. They have less access to modern contraception, more unintended pregnancies, less access to pregnancy care and worse pregnancy outcomes. Other aspects of context and position are also crucial. These include broad gender issues, especially the importance of education for girls.

At the level of differential exposure, poor and disadvantaged women are more likely to be exposed to unwanted sex, including through sexual violence and child marriage. At the level of differential vulnerability, they are at higher risk of unintended pregnancy because they are less likely to have the necessary knowledge, access and skills to use contraception when they do not wish to become pregnant. Even when they seek such services, the poor, the young and the disadvantaged often receive inferior care.

Poor women are especially vulnerable because they are less likely to deliver under the care of a skilled birth attendant, sometimes resulting in rates of maternal morbidity and mortality orders of magnitude higher than for richer women. Even when they do have skilled birth attendance, they may still suffer from differential outcomes of care because not all "skilled" birth attendants have the same level of skill or the same access to hospital back-up when complications arise. For women who choose not to keep an unwanted pregnancy, the lack of access to safe abortion services can also increase risk by orders of magnitude. Further, certain groups of women are more likely than others to receive differential treatment, including being subject to provider biases and value judgements not necessarily in line with official policy.

Differential consequences add to the burden of the poor and disadvantaged. While an unintended pregnancy can be a life-changing event for any woman, poor women have fewer resources with which to cope with resulting health, social and economic strains. This can quickly turn to tragedy if an abortion or childbirth results in serious maternal morbidity or mortality or if another unintended child means not enough food for that child or its siblings.

10.5 Interventions

This section describes structural interventions to improve the accessibility, availability and acceptability of services at the micro and macro levels (*101*). Beyond service provision, avoiding unintended pregnancy involves complex behaviours that require consistent contraceptive use over an extended period of time.

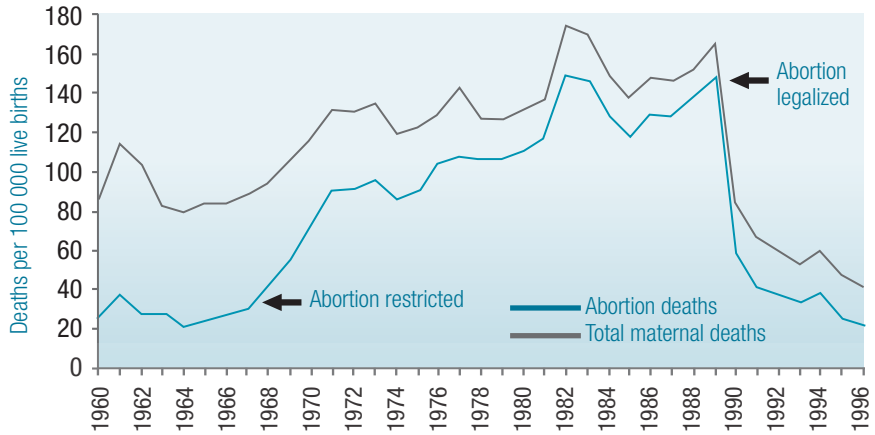
Macro-level approaches

Within the health sector, programmes can shift human and financial resources to reach underserved populations, increasing overall availability of services. Policies can improve the accessibility and acceptability of services by protecting reproductive rights and expanding knowledge of sexual and reproductive health. Also, communities can reduce gender inequity by ensuring equal access to educational and financial opportunities for women.

Redistribution of health sector resources

One of the most ambitious attempts at extending coverage to underserved populations involves the redistribution of health system resources to the periphery. The Matlab experiment in Bangladesh is perhaps the most widely known example of this approach. Beginning in the 1970s, the government, with support from international donors, sustained nearly 20 000 female community health workers whose jobs involved visiting households, meeting with residents, caring for the health needs of mothers and children and offering contraceptives (injectable, oral and barrier methods) (*102*). Doorstep services were supported by clinic-based professionals who offered permanent contraceptive methods along with basic primary health care services. Evaluations of the programme have shown improvements in maternal mortality, contraceptive use and child survival indicators (*51, 102, 103*). Although the programme has not been directly linked to equitable availability of family planning services, nationally representative surveys show little variation in contraceptive use among socioeconomic groups (*85*).

FIGURE 10.7 Number of maternal deaths per 100 000 live births, by year, Romania, 1960–1996



Source: Ahman and Shah (*44*).

The Government of Ghana is currently undergoing a similar revolution in service delivery with the Community Health Planning and Services Programme. Initial evaluations of the programme demonstrate improved child survival and fertility indicators among some of the poorest populations in the region (*104*). Evaluators found that the programme's success hinged on the effective use of research, involvement of a wide range of stakeholders and strategic planning (*104*).

Community-based insurance

Cost, especially out-of-pocket expenditure, is in many poor countries a major obstacle for poor women seeking to have their labour attended by a skilled birth attendant. Community-based health insurance can lower out-of-pocket expenditure and improve access to care in poor African communities, with an odds ratio for any professional care in pregnancy of 1.65 (*105*). However, in the same study it was shown that although prepayment increased access to modern health care, most care remained basic, and per capita expenditure on health care increased fivefold. High-quality care may not be affordable for very poor communities even with prepayment systems.

Ensuring sexual and reproductive rights

The number of unsafe abortions can be reduced by decreasing the number of unintended pregnancies or by increasing access to safe abortion. The most effective means of reducing the overall number of abortions (safe and unsafe) is to decrease the number of unintended pregnancies by increasing use of modern contraception (*106*). Changes in legislation that liberalize access to safe induced abortion services have substantial effects on women's health, as demonstrated by recent experience in Romania and South Africa (*16*). After the introduction of restrictive abortion policy in 1966, Romania saw an increase in abortion-attributable mortality (Figure 10.7). By 1989, mortality rates had risen sevenfold and abortion accounted for 87% of maternal deaths. Reversal of the law in 1989 coincided with a drop in mortality by more than half within the first year and by 2002 the mortality rate had been reduced to 9 per 100 000 live births (*16*). South Africa has experienced a similar trend with a 91% drop in abortion-related deaths from 1994 to 1998/2001 after the Choice on Termination of Pregnancy Act went into effect in 1997 (*16*).

In the absence of programmatic effort to expand services, legislation alone may not lead to such dramatic improvements (*16, 107*). Even where safe abortion is not legally restricted, high-quality services may not be widely accessible or providers' skills and methods may be inadequate (*107*). In the United States, for example, where abortion is legal, 34% of women (mostly in rural areas) live in regions with no abortion provider (*108*).

Countries unwilling for whatever reason to legalize safe abortion should at least consider a policy of harm minimization. The legal basis for harm minimization is removal of penalties for a woman who has an abortion, as prefigured in the 1995 Beijing Platform for Action on the human rights of women, to which most WHO Member States are signatories (*109*). In harm minimization programmes, women who have decided to have an illegal abortion are steered towards less unsafe methods of abortion and followed up to ensure identification and treatment of complications. Such programmes are simple to mount and effective (*110*).

Raising awareness through mass media

Use of mass media is a particularly cost-effective way of disseminating information to large groups. Broad dissemination of information has been shown to be effective in changing attitudes and increasing knowledge of sexual and reproductive health and in reducing harmful practices such as sexual violence and promoting healthy behaviours among young people. Programmes targeted to adolescents can increase knowledge of HIV transmission and prevention, improve condom use, influence social norms and improve awareness of health providers (*111*). Appropriate use of mass media, however, is dependent on the level of literacy, availability of technology such as television and radio, and social norms regarding open discussion of sexual health.

Empowering women and communities

While the relation between women's empowerment, gender equity and reproductive health is generally acknowledged (*111, 112*), a recent review found that few programmes include rigorous evaluation, many are limited in scope, and it is difficult to isolate the effects of the gender component from other programme elements (*113*). Successful interventions to reduce unintended pregnancy responded to women's requests for services or activities outside the health sector, such as job training, literacy, legal rights and social mobilization (*113*).

Expanding access to educational opportunities for girls shows the greatest promise for improving both immediate and long-term health outcomes. Girls attending school are much less likely than their out-of-school peers to have had sex, and the risk of initiating sex increases once an adolescent drops out of school (*91, 114*). Girls in school who are sexually active are also more likely to use contraception than out-of-school adolescents.

School also provides an important mechanism for disseminating sexual and reproductive health information (*111*) and formal education plays a role in developing aspirations among young people, potentially increasing motivation for safe sexual behaviour. School performance appears to be an important factor in this relationship. Studies from South Africa show that students who do better in school are less likely to initiate sex, more likely to use a condom if sexually active and less likely to become pregnant or drop out if pregnant (*114*). Greater educational opportunity for women is also associated with better access to skilled birth attendance and improved pregnancy outcome. Based on this evidence, investments that increase access to or quality of schools in settings where learning outcomes remain poor are likely to have beneficial effects on a wide range of health behaviours and outcomes, including sexual and reproductive health.

Programmes designed to empower and educate communities have the potential to reach inaccessible populations and empower women to mobilize for social change. Many programmes have used community mobilization strategies to promote changes in attitudes and behaviours related to gender norms and violence against women. An evaluation of programmes aimed to increase gender-equitable norms found that awareness-raising campaigns can successfully influence young men's attitudes towards gender roles and lead to healthier relationships (*87, 115*).

Tostan, a community education programme implemented in several countries in West Africa, serves to increase awareness of hygiene, problem-solving, women's health and human rights. Emphasis is placed on enabling participants, mostly women, to analyse their own situation more effectively and thus find solutions to problems for themselves. The programme increased awareness and improved attitudes towards reproductive health (*116*). But behaviour change, such as use of contraception and reproductive health services, was less marked.

Micro-level programmes

Altering provider–client interaction by eliminating provider-imposed barriers, ensuring financial accessibility of products and services, and equalizing the power balance between providers and clients can reduce barriers to services.

Eliminating provider-imposed barriers

At a minimum, a health system needs to ensure that providers have the necessary knowledge, skills, equipment and infrastructure to do their jobs. Services can be improved by ensuring that providers and supervisors have a clear understanding of job responsibilities and what behaviours are acceptable, providers are given regular feedback on their interactions with clients and performance is rewarded or penalized based on clearly defined criteria. A review of programme approaches to improve provider practices concluded that the most effective interventions involve a multifaceted approach including elements of training, clear and up-to-date provider guidelines, supportive supervision and provider incentives for improved service delivery (*75, 111*).

Promising results in improved quality of care have been obtained in some poor countries by introducing performance-linked funding for local health authorities (*117*). However, these results depend on the system being run by administrators who are skilled and not corrupt,

which is likely to be a major obstacle to extending performance-linked funding beyond pilot schemes (*118*).

Ensuring financial accessibility

The affordability of services and products is particularly important for poor people. Cash transfers and voucher programmes seek to reduce the financial burden of accessing services and also to empower clients (*119*). The largest such programme to date has been the Mexican Progresa/Oportunidades initiative – a conditional cash transfer, where poor families receive direct cash transfers for meeting criteria for child education (sending children to school regularly) and paediatric and maternal health (immunizations and antenatal care). An evaluation of the programme demonstrated increased child survival and height. Voucher schemes have also been used to improve utilization of treatment services for sexually transmitted infection and uptake of contraception (*119*).

Accommodating service delivery approaches

One approach to addressing the social, cultural or linguistic needs of vulnerable groups is to create specialized services. In India, for example, the South Asian Study Centre in New Delhi provides an estimated 200 000 migrants from Nepal with information about education, health, labour rights, financial management and remittances (*82*). These broad-based efforts to tackle cultural and linguistic barriers, including provider training and social and political integration of migrants, have improved pregnancy outcomes (*82*).

Quality improvements that target specific marginalized groups, such as young people, migrants or ethnic minorities, can also be effective. A review of programmes for young people concluded that training service providers and other clinic staff, structural improvements to ensure confidentiality, and informing and mobilizing communities to generate demand and community support increased use of services (*111*).

Taking services closer to where clients live and work is another approach to reducing social and economic barriers. Some programmes at the community level rely on paramedical or volunteer workers to deliver services in communities with limited access to clinics. In Pakistan, for example, "lady health workers" began the social marketing of contraceptives in 1992. These health workers were village based and supplied various contraceptive methods to local women, reaching some of the poorest people. Between 1995 and 1997, contraceptive use in rural areas rose from 11% to 19% (*86*). Community-based distribution programmes in other countries in Asia, Latin America and sub-Saharan Africa have produced similar results (*120*).

Workplace interventions can also facilitate access to appropriate services for individuals unable to visit services during working hours, such as migrants or low-wage workers. The commitment and cooperation of employers, governments and other stakeholders are essential to meeting the health needs of these populations (*82*).

10.6 Implications

Measurement and data issues

The analysis presented here benefited from a large evidence base, including numerous population-based surveys, such as the Demographic and Health Surveys (*19*). Such surveys offer a wealth of information regarding social norms and sexual and reproductive health and behaviour, but little information is collected on programme quality and availability of services. The Service Provision Assessment was recently introduced to fill this gap, but to date only 11 countries have chosen to invest in conducting this survey. A key limitation to this analysis is the lack of longitudinal data for evaluating causal relationships. Almost all the information was based on cross-sectional data; more longitudinal data are needed. To examine equity issues, it is also crucial that data allow disaggregation by key population groups, including economic status, urban or rural residence, education, region and ethnicity.

Well-designed testing of interventions is important to provide decision-makers with reliable information about their effectiveness. As the World Bank has pointed out, the disparity between the large number of hypothesis-driven interventions for health problems of low- and middle-income countries and the comparatively tiny number of methodologically sound evaluations of the outcomes of these programmes is not merely an academic inconvenience but a threat to progress (*121*). The majority of intervention programmes presented in this chapter are based on small-scale studies. Future evaluations should incorporate measures of scope of coverage while also placing greater emphasis on monitoring and documenting inputs and impact. An important methodological problem in testing interventions in low- and middle-income countries is that their health care systems often have no methods for measuring costs and health outcomes. Methods for measuring resource utilization in these settings should be a high priority (*122*).

Programmatic implications

The associations between socioeconomic factors and both unintended pregnancy and pregnancy outcome are well established and a large body of evidence

exists. Nevertheless, programmes and policies often do not reflect the broader social context and its influence. Effective strategies will involve a broad-based approach that includes macro-level and micro-level interventions. Inequities can be reduced through strategic improvements in the health system and creating an environment supportive to sexual and reproductive health. Expanding coverage to marginalized populations and increasing accessibility through quality improvement are likely to reduce inequities in utilization of essential services.

Central to reducing adverse maternal pregnancy outcomes is an increase in the percentage of births with skilled attendance. This is well established and universally accepted, and the level of access to skilled birth attendance seems to be primarily a function of health system investment and performance, as demonstrated by the close association of the percentage of births with skilled attendance and other aspects of primary health care provision. Providing access to skilled birth attendants falls squarely within the domain of the health sector, as does assuring that they are adequately trained and supported by facilities where major obstetric complications can be managed – that is, hospitals. Maximizing the proportion of deliveries taking place where the common emergency obstetric procedures (blood transfusion and caesarean section) are available should therefore be an additional goal.

Abortion is certainly a controversial issue that goes beyond the health sector to include important social, cultural, political, economic, ethical and religious perspectives. From the health perspective, it can be argued that debate about abortion should be separated, whenever possible, from the need to have safe abortion services available for women who make this choice. At the very least, the process by which policies are made should be evidence-based, and the policies that result should be equitable, coherent and respectful of the human rights of women.

An example of an inequitable abortion policy would be allowing individual medical practitioners to apply their own values to decisions about whether women should have access to safe abortion or making safe abortion services accessible to rich women but not poor women. An example of incoherent policy would be a community that placed a high priority on reducing the rate of abortion but did not facilitate access to contraception. Examples of unfairly punitive policies would include insisting that a woman pregnant as a result of rape must continue the pregnancy while failing to provide care that makes the pregnancy safe or failing to provide adequate medical care to women who suffer complications from unsafe abortion.

10.7 Conclusion

Adequate funding of services that increase the safety of pregnancy and delivery is essential, and the level of funding is certainly a useful indicator. When assessing whether funding for maternal health services is adequate, the focus should be on public health systems. Given that many low- and middle-income countries find it difficult to spend enough on their public health systems to ensure a high level of access to skilled birth attendance, the efficiency of service provision is also an important issue. Adequate and consistent funding is also essential to assure equitable access to contraception. This includes not only providing facilities and health personnel but also programmes that reach out to poor and disadvantaged communities. And no family planning programme can be successful without an uninterrupted flow of basic contraceptive commodities.

Reproductive health services provided to women by the health sector are often not equitably distributed and are determined by social factors. In theory, it should be within the power of the health care system to substantially reduce disparities in pregnancy outcome. But in practice, an inadequate or inequitable health care system may only serve to widen these disparities.

Almost everyone would agree that healthy mothers and families should be a high priority for any society. The means to greatly reduce unintended pregnancy and morbidity and mortality associated with pregnancy are well within our knowledge and not overly expensive. Because the burden falls so disproportionately on the poor and disadvantaged, it is impossible to make significant strides in improving overall rates without concentrating on reaching poorer women. This means that a broader social perspective will be essential to achieve the results we all desire.

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Tobacco use: equity and social determinants

11

Annette David, Katharine Esson, Anne-Marie Perucic and Christopher Fitzpatrick

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11.1 Summary

Tobacco use is the single largest preventable cause of death and chronic disease in the world today, causing 5.4 million deaths in 2005. It is a risk factor for six of the eight leading causes of death, including heart disease and several cancers and lung diseases.

Tobacco use disproportionately affects males and lower socioeconomic groups in developed and developing countries, and is increasingly prevalent in poorer parts of the world. In developed countries, multiple indices of social disadvantage contribute independently to smoking status. Poor households in low-income countries carry a particular heavy burden from tobacco use, with significant health, educational, housing and economic opportunity costs. Negative social gradients in tobacco use translate into substantial negative gradients in relation to premature death and disease.

There are two stages of life where inequities in vulnerability and exposure to tobacco use are most evident: during adolescence, with those from lower socioeconomic backgrounds most at risk of taking up tobacco; and during adulthood, especially young adulthood, where tobacco use cessation is more difficult for those from disadvantaged backgrounds. At both stages, vulnerabilities such as social, psychological and physical health issues and disproportionate levels of exposure due to family and peer tobacco use, targeted advertising, social norms permissive to tobacco and less access to affordable cessation services often tip the balance towards tobacco use take-up and continuation.

Tobacco use is supported by a vast network of business and commercial interests. Globalization has facilitated the spread of the tobacco epidemic to the developing world. However, tobacco use is unique in that the World Health Organization (WHO) Framework Convention on Tobacco Control offers a wide-ranging set of affordable, evidence-based demand- and supply-side tobacco control measures impacting at the societal and individual levels.

Key measures include price and tax increases to reduce tobacco availability; structural environmental interventions to reduce tobacco availability and acceptability (tobacco-free environments, banning tobacco advertising and promotion, packaging and labelling initiatives, countermarketing); and structural interventions to address differential vulnerability (increasing access to accurate information, using role models to influence perceptions of tobacco use).

Evidence indicates that these measures are effective and cost-effective in reducing tobacco use. However, despite this, the recommended interventions of the WHO Framework Convention on Tobacco Control remain underimplemented and fail to reach all layers of the population.

An equity lens needs to be applied to all of the Convention's measures. Innovative approaches are needed to ensure that all groups are impacted upon, including those in the informal economy and living in informal settlements not captured by the usual regulatory mechanisms. For example, rallying political support for key strategies, such as raising tobacco taxes and channelling these tax revenues to fund tobacco prevention and cessation for disadvantaged groups, can be an effective way to reduce disparities. Conscious targeting of measures to the most disadvantaged will help overcome social inequities.

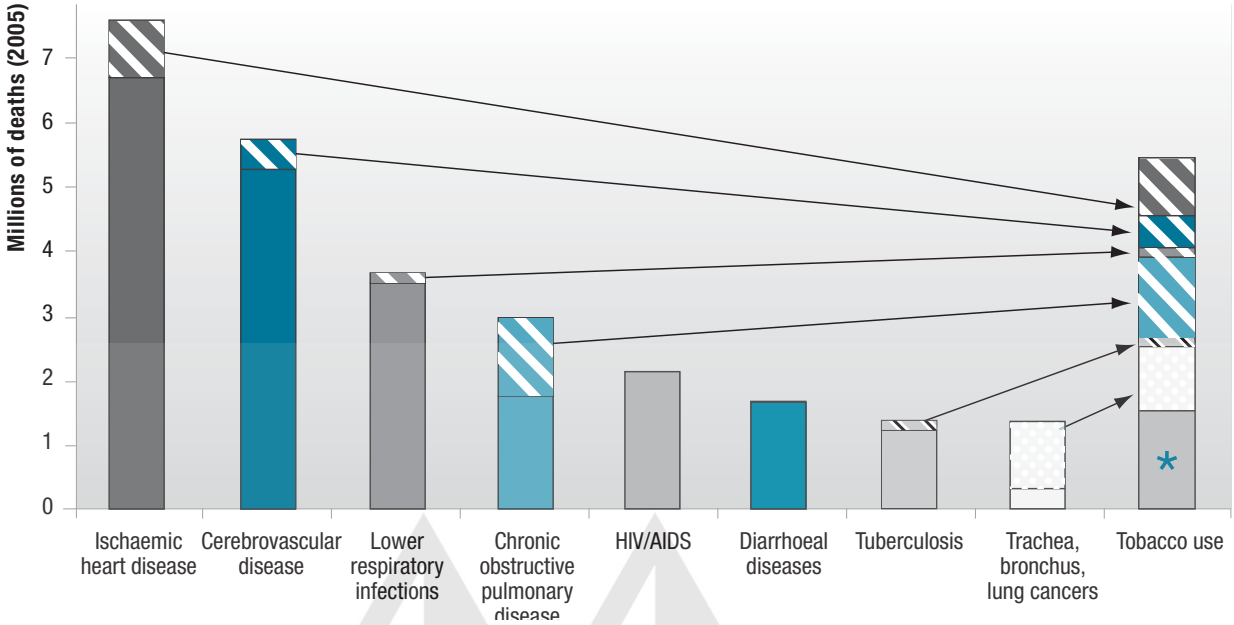
11.2 Introduction

This chapter addresses tobacco use as a priority public health condition. Tobacco use meets the following criteria defining priority public health conditions:

- **It contributes to a large aggregate burden of disease.** Tobacco use is directly implicated in ischaemic heart disease, chronic obstructive pulmonary disease, lower respiratory infections, cerebrovascular disease, tuberculosis, diabetes, and trachea, bronchus and lung cancers. Globally, tobacco use is a risk factor for six of the eight leading causes of death in the world (Figure 11.1) and caused 5.4 million deaths in 2005. This figure is set to rise to 8.3 million by 2030 (*1*).
- **It displays large disparities across and within populations and disproportionately affects certain populations or groups.** Tobacco use is significantly greater among males, and among lower socioeconomic groups within countries at all income levels, and is becoming increasingly prevalent in poorer parts of the world (*1*). Young people are at particular risk of tobacco use. A socioeconomic gradient exists in relation to exposure to second-hand smoke and successfully quitting smoking, with consequent health effects.
- **It is an "epidemic" that has spread throughout the world.** Tobacco use is proliferating through different parts of the world in line with economic development, beginning in industrialized countries and then moving inexorably into eastern Europe, Latin America, Asia and northern Africa, and, increasingly, sub-Saharan Africa. The tobacco industry has targeted low- and middle-income countries, and vulnerable groups such as women and young people (*2*).

Efforts to prevent and control tobacco consumption among disadvantaged groups are not likely to succeed other than through an integrated approach that seeks to reduce underlying social inequities. In this chapter,

FIGURE 11.1 Tobacco use as a risk factor for six of the eight leading causes of death in the world



Hatched areas indicate proportions of deaths related to tobacco use and are coloured according to the column of the respective cause of death.

* Other tobacco-caused diseases: mouth and oropharyngeal cancers, oesophageal cancer, stomach cancer, liver cancer, other cancers, cardiovascular diseases other than ischaemic heart disease and cerebrovascular disease, diabetes mellitus, and digestive diseases.

Source: World Health Organization (*1*).

evidence is presented for classifying tobacco use as a priority public health condition, and interventions are outlined that, taken collectively, comprise a comprehensive response to the tobacco epidemic within the context of the WHO Framework Convention on Tobacco Control (*3*).

11.3 Analysis

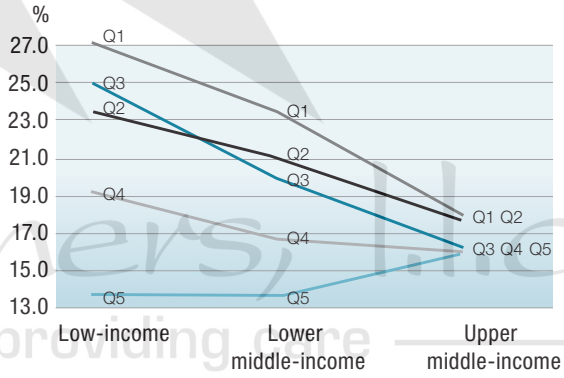
Inequities in tobacco use

Inequities by income

Tobacco use is associated with low socioeconomic status, whether measured by national income, household or individual income, occupational status or level of education, in many countries around the world.

Data from the World Health Survey 2003 indicate that tobacco smoking is most strongly related to household permanent income or wealth (*4*). The poorest individuals in the lowest-income countries appear to exhibit a markedly higher level of tobacco smoking relative to their richer compatriots (Figure 11.2). The inequity tends to become less stark with the level of development of countries. The World Health Survey data also show that poorer groups in low-income countries

FIGURE 11.2 Prevalence of daily tobacco smoking by income group and income quintile



Notes:

1. Q1 to Q5 indicate income quintiles, Q1 being the lowest income group and Q5 the highest income group.
2. The graph was made using average prevalence figures from 44 countries. Prevalence of China and India were removed from these averages to avoid skewed results from their large population weights.

Source: Authors' calculation, using World Health Survey data.

seem to smoke more tobacco in terms of quantity compared to higher-income quintiles. The important conclusion to draw from this and from Figure 11.2 is that poor households in low-income countries are likely to be carrying a heavier burden of the tobacco

TABLE 11.1 Cigarette smoking/tobacco use prevalence (%) by sex, age, WHO region and country income groups

Current cigarette smoking	Adults (15 years and older)		Adolescents (aged 13–15 years)	
WHO Region	**Males**	**Females**	**Boys**	**Girls**
Africa	14.93	1.50	13.5	5.2
Americas	29.70	18.65	13.5	15.0
Eastern Mediterranean	28.21	2.05	7.3	2.0
Europe	46.09	24.62	21.0	17.4
South-East Asia	35.07	2.22	9.5	2.0
Western Pacific	56.08	4.95	18.5	8.4
Current tobacco use	**Adults (15 years and older)**		**Adolescents (aged 13–15 years)**	
Income group	**Males**	**Females**	**Boys**	**Girls**
High	33.3	21.4	–	–
Upper middle	44.4	18.3	–	–
Lower middle	51.7	4.6	–	–
Low	30.1	4.0	–	–

Sources: Based on data from the *WHO report on the global tobacco epidemic* (*1*), United Nations population statistics, the Global Youth Tobacco Survey (*8, 9*) and *World Health Statistics* (*4*).

epidemic because tobacco smoking is more prevalent among them and they also consume greater quantities of tobacco compared to higher-income groups.

With regards to non-smoked forms of tobacco, country-specific data mirror the association between poverty and tobacco use. For example, a survey in India during 1998–1999 showed that men in the poorest quintile had 3.7 times higher unadjusted odds for chewing tobacco than those in the richest quintile. Women in the lowest quintile were even more likely than those in the richest quintile to smoke or chew tobacco (*5*). In Viet Nam the less educated, regardless of sex, were found to be more likely to use smokeless tobacco, while in Uzbekistan the least educated women had the highest prevalence of smokeless tobacco use (*6, 7*).

But it is not the case that tobacco use is just about poverty. It is not even the case that tobacco use is positively and unambiguously related to poverty consistently, across all countries, with patterns of inequity in tobacco use across income quintiles ranging from a strictly negative gradient (for example Nepal) to a positive gradient (for example Mexico). Identifying the precise pattern of inequity in tobacco use among different income groups within a country is important, as the pattern prevailing in a given country has implications for the design of interventions to tackle tobacco use among the poorest segments of its population.

The relationship between tobacco use and poverty or, more broadly, socioeconomic status is compounded by factors such as sex and age.

Inequities by sex and age

Table 11.1 compares cigarette smoking prevalence (15 years and older) by gender by WHO region to youth smoking prevalence. Population smoking prevalence is noticeably higher for males, with a smaller difference for the Region of the Americas and the European Region. When countries are grouped by income group, the gender difference in tobacco use is greater for lower middle-income and low-income than for high-income and upper middle-income countries. Data from the Global Youth Tobacco Survey, which surveyed students aged 13–15 in over 130 countries, demonstrate a narrowing of the gender difference for cigarette smoking (*8, 9*).

Sex and age frequently compound the impact of socioeconomic disadvantage on tobacco use. For example, in several countries in Europe, youth combines with sex and socioeconomic inequalities to make smoking most common amongst the poorest of young women. Ethnicity complicates the analysis further.

Inequities by ethnicity

An example from New Zealand demonstrates the complex interplay between ethnicity, socioeconomic

status and tobacco use (*10*). A marked social gradient exists for tobacco use among Maori women, with a less marked gradient for European women. However, the social gradient does not apply to Pacific women. Extremely high smoking prevalence rates (40–50%) exist among the poorest Maori women.

Inequities by other factors

"An individual's smoking trajectory is related to the accumulation of social disadvantage over the entire life course" (*11*). Groups more likely to smoke include single mothers, the long-term unemployed, new immigrants, the homeless, the mentally ill and members of ethnic minorities – all of whom are also more likely to be in lower socioeconomic groups. The effects of various forms of social and financial disadvantage appear additive in relation to tobacco consumption. Graham et al. found that four socioeconomic factors contributed independently to smoking status among women: childhood disadvantage, educational disadvantage, early motherhood and current financial hardship (*12*). Of women who experienced all four, 63% were current smokers, compared to 18% of women who had not experienced these disadvantages.

Quit rates for tobacco use also follow a steep socioeconomic gradient, and are much lower in developing countries. In the 1990s, 20–40% of users had quit in developed countries, compared with 2% of men in China and 5% in India (*13*). Within countries and population groups, quit rates are lower for the poor and for those living in socially disadvantaged areas. For example, in the United Kingdom, 60% of the most affluent British smokers are now ex-smokers, compared with 15% of those living in the poorest circumstances (*14*).

Likewise, the social gradient in smoking results in a social gradient in exposure to second-hand smoke for lower socioeconomic families, especially for children (*15*). A study of American women aged 18–64 found that nearly one in five women at or below the poverty line reported workplaces with no official smoking policy, compared to 10% of more affluent women (*16*). With the majority of smokers now in the developing world, exposure to second-hand smoke is increasingly a health hazard.

Finally, at the global level, the distribution of tobacco use over the past 40 or so years has changed, with dramatic reductions in smoking prevalence in the developed world. In the United Kingdom, for example, the male smoking rate more than halved between 1960 and 1998 (*17*). Male smoking levels have been decreasing among all socioeconomic levels in Europe in the past 20 years. In contrast, smoking and other forms of tobacco consumption are increasing in developing countries.

It is clear that tobacco use, successful cessation and exposure to second-hand tobacco smoke are unevenly distributed within and among populations and countries. In the next subsection the health and other consequences of this unequal distribution are examined.

Inequities in tobacco-related health outcomes

Tobacco is the single largest preventable cause of death and chronic disease in the world today. Tobacco use kills up to one in two long-term users, many of them before age 65. Studies undertaken in the United States of America and the United Kingdom between the 1950s and 1990s show that among smokers aged 35–69, death rates were three times those of non-smokers (*18*). In the Russian Federation, the average number of years lost per death from smoking is 19 for males and 16 for females (*19*).

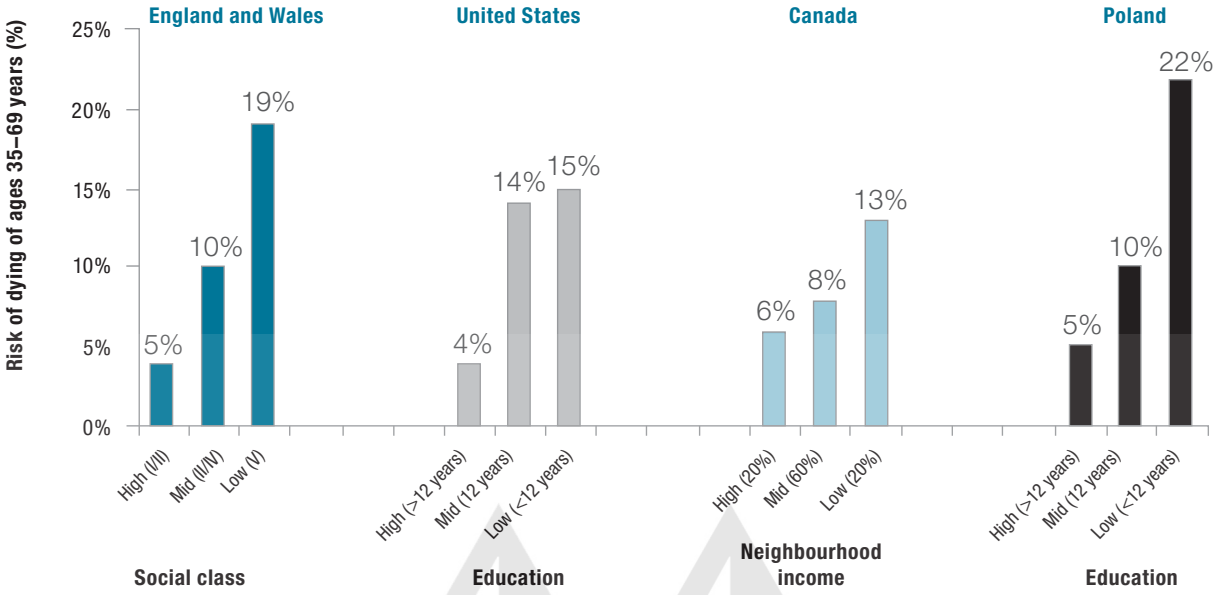
Tobacco is implicated in excess mortality due to its association with a range of fatal diseases. Smoking accounts for nearly 90% of all lung cancers (*20*), and is also implicated in other cancers. Among those under 65 years, 45% of coronary heart disease in men, and 40% in women, is caused by cigarette smoking. Overall, the share of tobacco-related diseases in the total disease burden worldwide is expected to climb from 2.6% in 1990 to almost 10% in 2015, killing more people than any other single disease (*2*).

Tobacco use is a powerful and pervasive cause of health disparities. Like tobacco use itself, deaths from tobacco use follow a marked socioeconomic gradient. A study of adult male mortality rates across different social strata (based on social class, education or neighbourhood income) in England and Wales, the United States, Canada and Poland found that the risk of dying from smoking is significantly higher in the lowest social strata than in the highest strata – more than four times, in the case of Poland (Figure 11.3) (*21*).

In the developing world the figures are just as stark, with tobacco accounting for rising morbidity and mortality. Tobacco use is directly implicated in a disease associated with poverty and disadvantage: tuberculosis. A recent study in India found that the mortality rate from tuberculosis among smokers was four times that among non-smokers (*22*). Smoking has been found to contribute more than 20% of the cause of tuberculosis worldwide (*23*).

Exposure to second-hand smoke, which itself shows a socioeconomic gradient, also increases morbidity and mortality. Non-smokers exposed to second-hand smoke at home or work increase their heart disease

FIGURE 11.3 Low socioeconomic status and differential health outcomes due to smoking



Note: Social inequalities in male mortality in 1996 from smoking. Values are percentages of 35-year-old men dying at ages 35–69 years from smoking if the population death rates of 1996 were to remain unchanged.

Source: Jha et al. (*21*).

risk by more than 20%, and their lung cancer risk by 20–30% (*17*). The evidence indicates there is no risk-free level of exposure to second-hand smoke.

Inequities in consequences of tobacco use

In addition to its serious health consequences, tobacco use carries with it significant opportunity costs due in large part to its highly addictive nature. This is particularly so for less advantaged population groups. A 2004 report on the Millennium Development Goals and tobacco control delineates how national and individual poverty go hand-in-hand with tobacco use (*24*). In Bangladesh, for example, nearly half the men used tobacco while half the children under 5 were malnourished. World Bank studies of household disposable income find that for poorest households with at least one smoker, around 10% of income goes on tobacco – money that is not available for education, health care, housing or savings (*25*). A study in Indonesia showed that in households with a smoker, less money was spent on quality foods such as eggs, fish, fruit and vegetables (*26*).

Especially in developing countries, where accessible, affordable health services protecting individuals from the costs of illness are often lacking, the economic consequences to individuals of tobacco-related ill-health can be catastrophic (*27*). The costs to governments are likewise high; the total medical expenditure of the National Health Insurance of the Republic of Korea related to smoking increased by 27% from US$ 324.9 million in 1999 to US$ 413.7 million in 2003, representing a substantial economic burden to the country's insurance system (*28*). Furthermore, ill-health resulting from tobacco use compounds poverty and perpetuates the poverty trap.

Social determinants of tobacco use

Looking upstream: socioeconomic context and position

Tobacco use is not spread by animal vectors, in contaminated water or through airborne droplets. Tobacco use is a public health problem because it has been intentionally built into the social structure and environment of most societies by an industry that profits from continued trade in tobacco products. A vast network of multinational, national and subnational business and commercial interests underpins the production and distribution of tobacco products, contributing to employment, individual and company profits and national balance of payments. The combined net revenue of the three biggest multinational tobacco companies – close to US$ 100 billion per annum – surpasses the gross domestic product of all but the 35 richest countries in the world (*29*).

The tobacco industry, and sometimes governments that profit from tobacco trade, have used their power to successfully combat developing country efforts to restrict tobacco imports, as in Thailand (*30*), overcome national restrictions on advertising imported tobacco products, as in Japan (*31*) and Singapore (*32*), and proactively position itself favourably as markets in the developing world open up to global trade, as in China (*33*).

Globalization has assisted the tobacco industry and its allies in promoting the tobacco epidemic in the developing world, for example by using international trade agreements to prioritize corporate rights over the right to health by eliminating barriers to tobacco importation and restrictions on advertising (*34, 35*). Globalization has also accelerated the tobacco epidemic through its asymmetric impact on economic status at both the national and individual level. That is, the redistribution of resources and capital facilitated by globalization has not occurred equitably, leading to widening socioeconomic differentials among and within countries. Given the strong link between tobacco use and disadvantage, when globalization leads to greater inequities, it promotes social conditions that reinforce tobacco consumption, particularly in the informal sector (*36*).

The other major factor shaping the socioeconomic context of tobacco use is governance. Ultimately, the fate of the tobacco epidemic will be decided by political will, as reflected by governments' commitment and effectiveness in implementing tobacco control strategies and interventions, at the cost of forgoing revenues derived from the production, manufacturing and trade of tobacco products.

Downstream determinants: differential exposure and vulnerability

This analysis of tobacco use within the priority public health conditions framework is derived primarily from research conducted in developed countries, where there is widespread understanding of the dangers of tobacco use, making it instructive to consider why some groups still use tobacco. Whenever available, research from developing countries is used to augment the evidence from developed countries.

There are two stages of life where inequities in vulnerability and exposure to tobacco use are most pronounced, and where intervention may be beneficial: at adolescence, when young people begin smoking and risk nicotine addiction; and in adulthood, especially young adulthood, when they try to quit smoking (*11*). The pathways to differential tobacco use at these two life stages are complicated, with many intersecting variables. While the interrelationships among these variables have not been fully investigated, what is currently known is summarized in the following subsections.

Tobacco use initiation during adolescence

Differential vulnerability. Adolescence is a vulnerable period for initiation into tobacco use. Smoking uptake is strongly associated with family background and socioeconomic and educational status, with adolescents from lower socioeconomic backgrounds most at risk. Low parental income and low parental educational status are independently associated with higher adolescent smoking rates, and the association becomes stronger as socioeconomic status declines. Other factors affecting young people's likelihood to take up tobacco use include:

- **Ability to resist peer pressure.** The ability to resist peer pressure and tobacco advertising is related to social competence and self-confidence, skills less common among disadvantaged young people (*37*).
- **Adequate awareness of tobacco's harms.** Disadvantaged young people may have insufficient knowledge and awareness of the adverse impacts of tobacco use (*38*).
- **Scepticism about smoking prevention.** People from lower socioeconomic groups, particularly adolescents, are less receptive to health education messages and may underestimate the risks of smoking (*39*).
- **Prevalence of social problems.** Psychosocial stresses in the lives of less advantaged adolescents, including problems with their families and schooling, increase the risk of smoking (*40*).
- **Co-occurring psychological or psychiatric problems.** Adolescents experiencing psychiatric and behavioural problems, or feeling pessimistic about their lives, are more likely to smoke.
- **School performance.** Poor school performance and skipping school are related to increased susceptibility to smoking, while good academic performance confers resilience.

Differential exposure. These vulnerabilities are compounded by the differential exposure of disadvantaged young people to pressures within the physical and social environment that encourage the uptake of tobacco use and discourage successful quitting. These include:

- **Preponderance of adults who model tobacco use.** Disadvantaged young people are more likely to have parents who smoke and who have a more permissive attitude to tobacco. Among developing countries that have conducted the Global Youth Tobacco Survey, parental smoking is one of the most frequently identified risk factors for tobacco use by young people (*8*).
- **Prevalence of peer smoking.** Studies indicate that smoking by peers is a very strong predictor of adolescent smoking, and is itself influenced by parental smoking (*41*).

- **Availability of tobacco products.** In poorer neighbourhoods, there are often more tobacco outlets (for example convenience stores) that advertise cigarettes at point of sale. In several developing countries, single-stick sales of cigarettes make tobacco more affordable. Even in countries that ban the sale of tobacco to minors, poor or inconsistent enforcement make tobacco products accessible to young people.
- **Targeted advertising and promotion.** Tobacco advertising targets young people (*42*). Analysis of tobacco company documents indicates the industry's awareness that a key segment of their market in the developed world is young people of lower socioeconomic status (*43*). Advertising has been particularly successful among young adolescent girls with less education and from lower socioeconomic backgrounds, with smoking often used as a symbol of the emancipation of women, including in developing countries (*44*). Tobacco advertising can be very subtle, such as through the promotion of smoking in films and television shows (*45*). Research conducted within developing countries consistently identifies exposure to advertising and smoking in movies and on television as independent predictors of smoking by young people (*38*).
- **Paucity of environments supportive of being tobacco free.** Qualitative studies in deprived areas, whether in developed or developing countries, find that tobacco consumption is a socially and culturally ingrained behaviour, arising out of a poorly resourced and stressful environment, social reinforcement of smoking and limited opportunity for other forms of respite. The relative lack of smoke-free places reinforces tobacco use as normative.

Tobacco use cessation or continuation during adulthood

Differential vulnerability. Another key difference between advantaged and less advantaged groups is the likelihood of continuing tobacco use during adulthood. Studies from the developed world demonstrate that in young adulthood, less educated smokers are more likely to fail at quitting and to become more addicted. Population groups suffering multiple disadvantages, such as low education, income and unemployment, have the most difficulty in quitting, though they are just as likely as those from higher socioeconomic groups to attempt quitting. Evidence suggests that smoking cessation follows the same patterns as initiation: people start and stop smoking in social clusters, and clusters of clusters (*46*). So while quitting can have a ripple effect prompting an entire social network to break the habit, those clusters with no social ties to the earliest quitters risk being left out of any positive spillover effects. Factors making disadvantaged groups more vulnerable to continuing smoking and less likely to give up include:

- **Higher levels of nicotine addiction.** Disadvantaged individuals are likely to take up smoking earlier and smoke more cigarettes per day than their more advantaged peers; they therefore tend to be more addicted, making it harder for them to quit.
- **Low self-efficacy and greater perceived barriers to quitting.** Lower socioeconomic groups tend to be less confident in their ability to quit and face more perceived barriers to quitting, including the challenges of coping in stressful environments, social isolation and a perception of smoking as an affordable pleasure with minimal risks (*47*).
- **Higher levels of stress.** For those who have greater life problems to deal with on a daily basis, including unemployment and poverty, smoking may be seen as a coping mechanism associated with pleasure and reduction of stress.
- **Co-occurring health and other problems.** Smoking is associated with other problems such as other drug abuse, depression, psychiatric difficulties, homelessness and social isolation or exclusion.
- **Working conditions.** Exposure to hazards and risks at work, job monotony and limited control over one's employment contribute to greater occupational stress for disadvantaged workers, for whom smoking may reduce boredom, raise alertness and increase friendships with work colleagues (*43*).

Differential exposure. Adults, like adolescents, are exposed to factors making it more likely that they will continue to smoke and have difficulty giving up smoking. The factors contributing to differential exposure include:

- **Social norms permissive to smoking.** In less advantaged neighbourhoods there is more likely to be a culture of smoking, with high levels of addiction among an individual's family and friends (*48*). Workplace norms may also be conducive to the continuation of smoking. In these settings, institutional cues that support and reinforce tobacco-free lifestyles are lacking, while social acceptability for smoking is high. Poor enforcement of existing tobacco control laws in disadvantaged neighbourhoods also contributes to this situation.
- **Lack of social and instrumental support to quit.** Those from more disadvantaged backgrounds are less likely to have supportive social networks, particularly at home and work, if they want to stop smoking, due to the lack of a culture of quitting and reduced awareness of methods available to help smoking cessation (*43*).
- **Availability of cigarettes, and advertising where allowed** (see above).
- **Barriers to affordable cessation services.** In many countries, nicotine replacement therapy is expensive and not available over the counter, and other services, such as cessation counselling or telephone helplines, are absent or rare. Even if available,

cessation services may be difficult for disadvantaged tobacco users to access, due to cost, distant location or procedural barriers, for example a requirement for proof of residence, automatically excluding tobacco users who live in slums and informal settlements (and who therefore have no official address) (*49*).

11.4 Discussion: potential entry-points for a social determinants approach to tobacco control

Tobacco use as a priority public health condition demonstrates the vital importance of using a social determinants perspective in designing an effective framework for action.

The WHO Framework Convention on Tobacco Control (*3*), approved by the World Health Assembly in 2003 and now counting more than 160 Parties, consists of a series of tobacco control measures that encompass both structural and service interventions at each level of the priority public health conditions analytical framework. Moreover, the Convention directly attempts to redress the power imbalance between entities and governments that benefit from continued tobacco consumption, and those countries, mainly in the developing world, who seek to control the tobacco epidemic and reduce their burden from tobacco-related disease and premature mortality. Within the social determinants of health model, the Convention can be considered as a levelling force that pushes countries towards a more equitable platform for adopting and implementing a sound and comprehensive mix of tobacco control interventions.

The Convention offers a comprehensive set of affordable, evidence-based demand- and supply-side tobacco control measures affecting all sectors of a country's economy, not only its health sector. This includes structural interventions that aim to reduce consumption of tobacco products by reducing their availability, acceptability and accessibility, and service interventions designed to assist individuals to give up tobacco use.

Actions under the WHO Framework Convention on Tobacco Control are focused on the following key areas: price and tax measures; banning tobacco advertising, promotion and sponsorship; bans on sales to and by minors; using strong health warnings on tobacco product packs; banning smoking in all public places; measures to contain illicit trade in tobacco products; education training and public awareness; and treatment of tobacco dependence. It is important that the impact of these measures is assessed not only in aggregate terms, but in relation to the most disadvantaged groups and individuals.

Effectiveness of WHO Framework Convention on Tobacco Control interventions in reducing inequities in tobacco use

The *World Health Report* (2002), calculating the cost-effectiveness of various tobacco control measures for 14 subregions of the world, found that four interventions requiring government action were very cost effective[1] in all subregions: taxation, smoke-free indoor public places, bans on advertising and information dissemination (*50*). Taxation was found to be the most cost-effective intervention everywhere, followed by comprehensive bans on advertising. A recent study (*51*) found that 5.5 million deaths could be averted by the implementation of the four elements of the WHO Framework Convention on Tobacco Control alone (price increase, health warnings, media campaigns and advertising bans).

Two recently published studies (*52, 53*) made a systematic review of population-level tobacco control interventions and their impact on social inequities in smoking. In one study, results showed that measures such as smoking restrictions in schools, restrictions on sales to minors and tobacco price increases had the potential to benefit disadvantaged groups and contribute to the reduction of health inequities. The other study concluded that there was preliminary evidence that increases in the price of tobacco may have the potential to reduce smoking-related health inequities.

The conclusions of these recent reviews are very important given the little evidence and research on the issue. Their conclusions are, however, still preliminary and while population-level interventions can be effective in reducing inequities in health, it is important to bear in mind that targeting specific populations may be necessary for full implementation of the articles of the WHO Framework Convention on Tobacco Control.

1 Interventions were defined as cost effective if the cost per DALY (disability-adjusted life year) averted was less than three times the country's gross domestic product per capita, and very cost effective if each DALY could be averted at a cost less than the gross domestic product per capita.

Strengthening implementation of the WHO Framework Convention on Tobacco Control with a social determinants approach

Despite strong evidence of the effectiveness, cost-effectiveness, feasibility and replicability of the Convention's recommended interventions in diverse political and socioeconomic settings, they remain underimplemented (*1*). In relation to tobacco control and inequities, three generalizations can be made:

- While overall prevalence of tobacco use has reduced significantly in much of the developed world, this is not evidenced across all population subgroups, including young people and lower socioeconomic groups.
- Few countries, even in the developed world, have fully implemented the range of tobacco control measures outlined in the Convention, including mechanisms to enforce compliance.
- In many developing countries, where implementation of tobacco control measures lags behind the developed world, tobacco use is actually increasing.

Hence, the key element that ultimately will determine the success of the WHO Framework Convention on Tobacco Control in controlling the tobacco epidemic is the degree to which policy agreements are implemented as concrete actions within countries. This highlights the importance of enhancing implementation and enforcement capacity and monitoring compliance.

The equity lens is needed when assessing implementation of the Convention's provisions. In particular, governments and implementing agencies need to be aware of the "inverse equity" principle, in which higher socioeconomic groups are better positioned to access, utilize and derive health benefits from effective interventions than poorer, more disadvantaged groups. Innovative approaches will be required to reach those groups, such as workers in the informal economy and those who live in informal settlements, that are not captured by the usual regulatory mechanisms. Augmenting government capacity for implementation of the Convention's provisions will need to be accompanied by community-based efforts to build capacity for self-enforcement, ensuring that communities of disadvantage are engaged as partners through participatory approaches, and can thus play a role in adapting tobacco control policies and interventions to local contexts and equity issues.

11.5 Interventions

Interventions have been assigned to the category of the priority public health conditions analytical model where the best fit exists, though in reality, many of the interventions described below address multiple entry-points.

Structural interventions addressing socioeconomic context and position in society

Entry-point: reducing availability of tobacco and tobacco products

Price and tax measures to reduce the demand for tobacco (Article 6 of the WHO Framework Convention on Tobacco Control). There is a clear relationship between cigarette price and consumption. Increasing the tax on tobacco is an effective upstream intervention reducing tobacco's availability, particularly for the most vulnerable groups. It also reduces tobacco's acceptability (as people may feel uncomfortable paying more for a product that is damaging) and, when coupled with mechanisms to funnel tax revenues into cessation and other preventive programmes, serves a redistributive function to increase access to health services.

The two groups that are particularly sensitive to increases in the price of tobacco products are the young and the poor. Studies have shown that a 10% price increase reduces smoking by as much as 8% in low- or middle-income countries, versus 4% in high-income countries (*54*). Young people are especially influenced by price, as they have less disposable income and are less addicted to nicotine. In one study, lower-educated women were particularly responsive to price (*55*). On prima facie grounds, then, raising the price of tobacco confers preferential protection to the most vulnerable groups in society.

At present, many countries do not tax tobacco products to a sufficiently high level. The World Bank recommends that taxes comprise two thirds to four fifths of the retail price. The tobacco tax divide is evident when comparing developed and developing countries: more than four fifths of high-income countries tax tobacco at more than 50% of retail price, while less than a quarter of low- and middle-income countries tax tobacco at 50% or more of retail price (*1*). This is disturbing given the shift in the epidemic from high-income countries to developing countries. In many developing economies, local tobacco products (for example bidis, chewing tobacco) are not taxed as heavily, and

are sometimes not taxed at all, allowing users to simply transfer to cheaper products.

Two potentially negative side-effects of tobacco taxation need to be considered. First, continuing poor smokers spend even more on their habit, while their families bear the consequences of a further reduction in household income, making tobacco taxation regressive. Second, a reduction in consumption from increased tobacco control could negatively affect local tobacco farmers and workers in tobacco-producing developing countries. In these cases, programmes to provide alternative and additional sources of income may be needed.

Resistance to change also needs to be recognized and overcome. Tobacco companies have worked hard, especially in developing countries, to influence governments against increasing tobacco taxes. Governments and international agencies involved in setting taxation policies need to be fully cognizant of the evidence that tobacco taxation does not cause economic destabilization and, in most cases, augments government revenues while protecting health through decreased tobacco consumption.

Governments may also fear the political consequences of raising taxes. One way to offset this is to earmark a proportion of the additional tax revenues for health and other welfare programmes, particularly for the most disadvantaged. In Thailand, for example, 80% of non-smokers surveyed and 65% of smokers supported a tobacco tax increase when a proportion of the funds was directed to health promotion programmes (*56*).

Ideally, implementation of tobacco tax policies should be coordinated across countries, especially those in close proximity to each other. Otherwise, if cross-border travel is fairly easy, residents of countries levying higher tobacco taxes can easily visit a neighbouring country to purchase cheaper tobacco products. This underscores the important role of the WHO Framework Convention on Tobacco Control in facilitating coordinated implementation of tax policy measures across countries.

Lessons learnt from countries' experiences in tobacco taxation affirm that the benefits to individuals and countries alike outweigh any negative effects. In South Africa, for example, an increase in tobacco taxation by 215% between 1994 and 1997, augmented by other measures (reducing tobacco advertising, sales to minors and smoking in public places), resulted in tobacco consumption falling by one third and government revenues doubling. Smoking prevalence amongst the young and in the lowest-income households decreased, with low-income households reducing their smoking the most, thus reducing the regressivity of the tax (*57*).

Elimination of illicit trade in tobacco products (Article 15 of the WHO Framework Convention on Tobacco Control). The substantial black market in smuggled cigarettes, estimated at up to 9% worldwide, pushes down prices, further encouraging consumption (*58*), particularly among disadvantaged groups, exacerbating tobacco-related health inequities. The Framework Convention Alliance, in a recent estimate, puts contraband cigarettes at 5% of the North American market and as much as 20% of the market in Latin America and the former Soviet States (*59*). The WHO Framework Convention on Tobacco Control Conference of the Parties has established an Intergovernmental Negotiating Body for a Protocol on Illicit Trade in Tobacco Products.

Prohibition of sales to minors (Article 6 of the WHO Framework Convention on Tobacco Control). Banning sales of tobacco products to and by minors will limit availability of tobacco for children and adolescents. Sales to minors are banned in many developed countries, but not in many developing countries. A key challenge of regulating sales to minors is enforcement, with many countries lacking the necessary resources. Also, scientific research on the effectiveness of this intervention is still in its nascent stage.

Entry-point: increasing the acceptability of tobacco control as a global public good

This measure aims to shift global norms by situating health as an essential component of development and institutionalizing "health over profit" as a core value of development programmes, international aid and trade agreements.

The pivotal role of health in the development process needs to be formally articulated as a core value of all development programmes, international aid and global trade agreements. This is fundamental to ensuring that health interventions such as tobacco control are fully integrated into the global development agenda, and not viewed as contrary or detrimental to development (for example by the tobacco industry and its allies).

In particular, given ongoing trade liberalization, action is needed to legitimize the right to health for all over the right to wealth for some. The International Federation for Human Rights recommends that the Universal Declaration of Human Rights, adopted by the General Assembly of the United Nations in 1948, prevails over any trade agreement (*60*). The WHO Framework Convention on Tobacco Control provides a vital opportunity to reinforce a rights-based approach to trade agreements concerning tobacco products by promoting tobacco control as a requisite global public good for development.

Moreover, tobacco control interventions can and should be designed as a component of welfare and community development initiatives. For example, the United States Department of Health and Human Services requires as a condition for funding support that grantees adopt a smoke-free workplace policy, demonstrating the feasibility of integrated approaches that address the priority public health condition together with its social determinants.

Entry-point: enhancing accessibility to tobacco control

The WHO Framework Convention on Tobacco Control serves an important redistributive function at the global level for tobacco control, conferring power on the many developing countries that otherwise would not be able to stand up to the tobacco industry. Thus, the Convention can be viewed as an equity lever, and ensuring its success is an intervention at the level of socioeconomic context and position (Articles 22 and 26 of the Convention).

Channelling tobacco tax revenues into tobacco control programmes is one strategy to make cessation services accessible to the most disadvantaged tobacco users, enabling governments to provide free services to the poor and those without private health insurance.

Provision of resources for tobacco control, especially in developing countries, is addressed in Articles 22 and 26 of the Convention. Establishing access to sufficient resources to fully implement the various Convention provisions will be critical in developing countries, which bear the major and increasing burden of the tobacco epidemic.

Structural interventions addressing differential exposure

Entry-point: increasing the availability of environments supportive of tobacco control

Establishing tobacco-free environments, for example by banning smoking in workplaces and public places, is an intervention addressing differential exposure to tobacco (Article 8 of the WHO Framework Convention on Tobacco Control). This intervention works at several levels: it reduces the availability of tobacco by limiting the times and places where tobacco users can use tobacco products; it reduces exposure to second-hand smoke; it reduces the acceptability of tobacco by changing social norms; and it influences accessibility through the requirement for government regulation or legislation to enact and enforce it.

Smoke-free workplaces reduce the number of cigarettes smoked and encourage quitting (*54*), and protect non-smokers from second-hand smoke. Workplaces employing unskilled labourers, especially within the informal economy, are less likely to have smoke-free policies than white-collar workplaces (*61*). In both the developed and developing worlds enforcement of such bans is an ongoing challenge, but one that becomes easier as societal norms concerning smoking shift. Complementing workplace smoking bans with bans on smoking in public places reinforces the unacceptability of tobacco use and increases the availability of supportive tobacco-free environments. Despite widespread public support for and demonstrated effectiveness of smoke-free policies, few countries have smoke-free legislation covering all types of public places (*1*).

Entry-point: reducing the social acceptability of tobacco use

Banning tobacco advertising, promotion and sponsorship (Article 13 of the WHO Framework Convention on Tobacco Control). Banning tobacco advertising and sponsorship is designed primarily to reduce the acceptability of smoking and other tobacco use by changing social norms. Countries vary greatly in the extent to which they have implemented comprehensive bans on tobacco advertising and promotion – to which young people and disadvantaged groups are particularly susceptible – despite the effectiveness of the measure.

Banning tobacco advertising is a cheap and relatively easy political act on the part of governments. Banning sponsorship, for example of sporting events, is trickier, as these often occur across borders, and some sports may require substitute funding from government or other private sources. However, the elimination of tobacco marketing is an obvious and successful strategy in denormalizing the use of tobacco, with particular benefits for disadvantaged groups. In Hong Kong, for example, ever-smoking rates and cigarette brand recognition decreased significantly after the introduction of comprehensive tobacco advertising bans (*62*).

Despite the evidence supporting the effectiveness of advertising bans, the *WHO report on the global tobacco epidemic 2008* revealed that only 20 countries in the world had complete bans on tobacco advertising, promotion and sponsorship (*1*). Resistance to tobacco advertising bans from the tobacco industry can be overt, such as through manipulating trade agreements over intellectual property rules regulating advertising and labelling; or subtle, such as through promotion, product placement and glamorized depictions of smoking in television programmes and films (*63*). A study on India's film industry ("Bollywood") revealed that tobacco portrayal was prevalent in 76% of the films

reviewed for the 1991–2002 period, and the frequency of smoking among the "good guys" rose sharply from 22% in 1991 to 53% in 2002 (*64*). Attempts to circumvent traditional advertising bans are being considered by the Conference of the Parties to the WHO Framework Convention on Tobacco Control through the work of its expert group on cross-border advertising, and the elaboration of a possible protocol for cross-border advertising is under discussion.

Packaging and labelling of tobacco products (Article 11 of the WHO Framework Convention on Tobacco Control). Cigarette packages are designed to be intentionally colourful and attractive. Effective health warnings on tobacco packs are aimed at reducing the acceptability of smoking by countering the attractiveness of cigarette packaging, therefore shaping the social environment to be less supportive to tobacco use. The use of graphic picture warnings on cigarette packs can be particularly effective in conveying health messages, and is critical in reaching those who cannot read (*1*). Experience in Australia (*65*), Brazil (*66*), Canada (*67*), Thailand and other countries (*68*) shows that strong health warnings on tobacco packages, particularly pictorial warnings, are an important information source for younger smokers. Cigarette packets reach all smokers and offer an inexpensive way to communicate tobacco's harms, but they are currently underutilized as a vehicle for promoting health warnings. Of the 176 countries that provided information on pack warnings for the *WHO report on the global tobacco epidemic 2008*, only five countries, representing 4% of the world's population, met all criteria for pack warnings (*1*).

Other interventions to reduce the acceptability of tobacco use: promoting tobacco-free role models. One of the key factors promoting tobacco use in communities of disadvantage, particularly among young people, is the preponderance of tobacco-using role models. Some public health agencies have responded by promoting alternative, healthy, tobacco-free role models. The Department of Health in Hong Kong features Jackie Chan, a martial arts expert and movie actor who is well known for championing the tobacco-free lifestyle. In the Republic of Korea, which has one of the highest adult male smoking rates in Asia, the popular comedian Lee Joo II went public with his battle against lung cancer in 2002, and spent the rest of his life encouraging people to stop smoking. One year after he began his public campaign, adult male smoking prevalence decreased by almost 10%. In 2004, the Republic of Korea passed smoke-free legislation for public places (*69*). While efforts involving role models need to be evaluated, the strategy has intuitive value in altering the social context surrounding tobacco use.

Other interventions to reduce the acceptability of tobacco use: countermarketing. Public information campaigns, including counteradvertising campaigns, seek to influence the acceptability of using tobacco by changing how tobacco is perceived, either by the population in general or among certain vulnerable groups. One of the best-studied examples is the Truth campaign, launched in 1998 in Florida, which aimed to counter tobacco influences with hard-hitting advertisements featuring young people confronting the tobacco industry. Results from the Florida Youth Tobacco Survey showed a drop in smoking among middle and high school students of 40% and 18%, respectively, after year 2 (spring 1998 to spring 2000). Smoking rates declined faster in Florida than the rest of the country among high school students during this period (*70*).

Entry-point: regulating tobacco product disclosures

Tobacco product contents and emissions are not uniformly disclosed by tobacco companies to the public. Early studies indicate that smokers absorb information from written disclosures about the constituents of cigarettes (*71*). Requiring public disclosure of tobacco products' contents increases the public's access to information that could potentially alter their behaviour, leading to tobacco cessation (Article 10 of the WHO Framework Convention on Tobacco Control).

Entry-point: increasing accessibility to cessation support

This issue will be discussed in the subsection on provision of cessation services, below.

Structural interventions addressing differential vulnerability

Entry-point: increasing availability of information

By providing knowledge on tobacco's adverse effects, and on tobacco control resources and tools, this intervention increases intellectual capital and empowers vulnerable populations to resist the effects of exposure to pro-tobacco influences (Article 12 of the WHO Framework Convention on Tobacco Control).

Entry-point: reducing the acceptability of tobacco use within populations

Identifying community opinion leaders and engaging them in culturally competent efforts to denormalize tobacco use within selected communities can be a powerful and effective strategy to ameliorate vulnerability

to tobacco use. In Cambodia, for example, where 95% of the population is Buddhist, the Adventist Development and Relief Agency and the WHO country office partnered with Buddhist monks to launch the Smoke-free Monks Project. The project focused on establishing smoke-free policies in Buddhist temples (wats), but it also tapped monks to act as messengers in spreading tobacco control messages to local communities. In the four years of the project, smoking among adult men in five provinces decreased from 53% to 43%, and smoking among adult women decreased from 7.6% to 3.9% (*72*).

Entry-point: tying tobacco control interventions into community development and empowerment initiatives

Integrating tobacco control interventions into community development and empowerment initiatives provides opportunities to address the upstream determinants of tobacco use while redressing some of the differential consequences of tobacco use (for example greater reductions in discretionary income for poorer tobacco users).

The Smoke-free Cyclo Project in Phnom Penh, Cambodia, was conceived primarily as a financial assistance programme with the secondary goal of promoting health through tobacco-free lifestyles. A cyclo is a tricycle with the passengers seated in front of the driver, and is a popular means of public transport in Cambodia. Cyclo drivers were supported to become smoke free in exchange for financial assistance to purchase their own cyclo through an extended payment plan. Smoking cessation services and education on the harmful effects of tobacco were provided at the Cyclo Centre, which was run by a local nongovernmental organization. In addition to the health benefits from quitting, drivers also saved a considerable sum of money after giving up cigarettes (*72*).

Intervention addressing differential health care outcomes and consequences: provision of cessation services

The provision of cessation services to tobacco users constitutes the major service intervention for reducing tobacco consumption, and has the potential to reduce health inequities if designed to target current tobacco users from disadvantaged groups. Cessation interventions are accessibility interventions (requiring government investment to guarantee access to the least advantaged groups in society), and are also compliance and adherence interventions (as they offer remedial services to individuals).

Quitting tobacco use dramatically reduces health inequalities for users, reducing risk of stroke, lung cancer and coronary disease, with overall mortality risk 15 years after quitting about the same as for those who have never smoked.

Though cessation interventions work, comprehensive cessation packages are available in very few countries (*1*). The challenge is to provide cessation services to disadvantaged groups in ways that maximize their accessibility, appropriateness and effectiveness. At the individual level, appropriate measures might include eliminating user fees for cessation, subsidizing and deregulating nicotine replacement therapy and other cessation aids, bringing cessation services into disadvantaged communities and into settings where the informal sector, the poor, informal settlers and other disadvantaged groups congregate, and incorporating brief interventions for cessation into the basic package of essential health services.

To address compliance, providers should be compensated for performing cessation interventions, and training in cessation should be incorporated into the education of all health care workers. In particular, knowledge and familiarity with brief interventions for cessation should be considered a core competence for all primary health care workers.

Quitlines, which have been shown to be effective in reaching disadvantaged populations within developed countries, need to be examined for their utility in the developing world. Of the 1 million people who become new mobile phone subscribers every day, about 85% live in emerging markets (*73*), and may be reluctant to use their credit for quitlines. Alternative approaches are needed to reach these individuals, such as making quitline calls toll free (paid for through tobacco tax revenues), and using cheaper SMS messaging.

On a societal level, channelling tobacco tax revenues to subsidize cessation services for the poor and disadvantaged is an excellent example of the interrelationship between structural and service interventions, and the need for innovative and broad thinking when designing interventions to reduce health disparities due to tobacco use. The health sector should promote incorporation of cessation into primary care practice guidelines, and integrate brief interventions into all appropriate programmes, including paediatrics, obstetrics, diabetes and cardiac health programmes.

11.6 Implications

Monitoring inequities in tobacco use

Currently, there are a number of research initiatives and organizations undertaking research in global tobacco control that provide information on specific aspects of the tobacco epidemic. They include the Global Tobacco Surveillance System (comprising the Global Youth Tobacco Survey, Global Health Professional Student Survey, Global School Personnel Survey and Global Adult Tobacco Survey, jointly undertaken by WHO and the Centers for Disease Control); the *WHO report on the global tobacco epidemic*; Research for International Tobacco Control under Canada's International Development Research Centre; the International Tobacco Control Policy Evaluation Project; and the Institute for Global Tobacco Control, Johns Hopkins Bloomberg School of Public Health. In addition to these dedicated tobacco use and control surveys, there are integrated surveys of multiple risk factors, such as the STEPwise approach to chronic disease risk factor surveillance (STEPS) and the WHO World Health Survey. No doubt there are other agencies involved in tobacco control research, and one urgent task is to formulate an operational framework to collate and synthesize the findings from the various research initiatives to provide useful information that can guide the work in reducing tobacco-related health inequities.

The main limitation of both tobacco surveys and broader risk factor surveys is that they are contingent on external funding, and long-term sustainability is not guaranteed. Building the capacity of countries to independently sustain tobacco use monitoring systems is essential to track the progress in tobacco control and its impact on population well-being and the social determinants of health.

An important part of building country capacity in monitoring is to build capacity in applying the equity lens to the monitoring instruments and methodologies themselves. For example, population sampling frames are often based on physical address area codes, excluding the many vulnerable, informal settlers who do not have an official physical address. The public health community needs to be highly critical of its monitoring and surveillance tools and methodologies, to apply the equity perspective to how we measure impacts and gather data, and to strive to design monitoring mechanisms that are inclusive and equitable. One example that should be looked at is the Tobacco Research Network on Disparities (TReND), a collaborative initiative developed by the United States National Cancer Institute and the American Legacy Foundation (*74*).

To monitor and evaluate the effect of tobacco control interventions on the social determinants of tobacco use, an indicator that tracks trends in distribution of tobacco use across the socioeconomic groups is required. If tobacco control interventions are implemented effectively and succeed in reaching the most vulnerable and the most exposed populations, the distribution of tobacco use will demonstrate a reduction in disparities across these groups.

Effective monitoring will require moving beyond simple ratios of the prevalence among first and fifth income quintiles. One potential measure of the distribution of tobacco use across all socioeconomic strata is an adaptation of the Gini coefficient. The Gini coefficient was developed to measure income inequality in a society. Its values range between 0 and 1: a low coefficient (close to 0) indicates more equal income or wealth distribution, while a high coefficient (close to 1) indicates more unequal distribution. A Gini-like measure of health inequity in tobacco use should be considered (*75*).

A social determinants approach to tobacco control programming

The set of interventions proposed in this chapter encompasses both extremes of the spectrum of tobacco control programming. At one end of the spectrum, policy and environmental interventions, such as tobacco taxation, target the entire population, and require a whole-of-government, whole-of-society approach, with the health sector playing a vital role in advocacy and partnership with other sectors to effect change. At the other end, cessation services target individual tobacco users and rely heavily on the health system for service delivery. In reality, governmental and societal action at the macro level has impacts on clinical practices, and, correspondingly, the health sector plays a role in determining policies at the macro level. Hence, to address the entire spectrum of tobacco control, political and community leadership, intersectoral partnership, community mobilization and health system strengthening are critical.

Mobilizing intersectoral support for population-based interventions that address the social determinants of tobacco use requires the strategic utilization of existing mechanisms for multisectoral discourse. At the global level, within the United Nations system, the United Nations Ad Hoc Interagency Task Force on Tobacco Control, established in 1999, presents one such opportunity. The Task Force's 19 members have already examined and affirmed the linkage between tobacco and poverty. Extending the review process to include issues related to gender, age, employment or development, in collaboration with the relevant United

Nations and other international agencies, will help address the socioeconomic challenges associated with tobacco consumption. The Task Force also provides a forum for WHO to advocate integration of tobacco control strategies into the ongoing and future initiatives of other United Nations agencies and institutionalization of health over profit as a core value of development assistance, international aid and trade agreements.

At the regional and country levels, the creation and utilization of existing multisectoral networks can serve as vehicles for the health sector to proactively engage with other political sectors in developing integrated approaches to reduce tobacco-related health inequities and addressing the social determinants of tobacco consumption. A national multisectoral steering committee for tobacco control is a fundamental building block for national tobacco control capacity building (*29*). In Nigeria, for example, the Network of Nigerian Parliamentarians for Tobacco Control oversees the implementation of the national tobacco control law in partnership with other tobacco control stakeholders in the country. Such national bodies provide the opportunity to introduce the concept of linking tobacco control interventions with national development initiatives, to integrate tobacco control into the work of other sectors and to raise political support for tobacco taxation as a source of sustainable local funding for health programmes. For instance, partnerships between the ministries of health, labour, education, transport and environment can facilitate the expansion of smoke-free and tobacco-free policies into workplaces, schools, public transport and other public places.

Consistent with the social determinants of health model, comprehensive health measures to improve access to tobacco prevention and cessation services can be viewed as poverty reduction strategies because they enhance human capital by improving health. The converse is equally vital: social empowerment and poverty reduction can boost the capacity of disadvantaged groups to resist and reject tobacco use (as in the Smoke-free Cyclo Project described above). Civic and other community groups, in partnership with ministries of health, can play a vital role in reaching these disadvantaged population subgroups and in administering innovative programmes that incorporate health interventions into strategies designed to ultimately address the root causes of social inequity and poverty. Efforts to prevent and control tobacco consumption among disadvantaged groups are not likely to succeed outside an integrated approach that seeks to reduce the underlying social inequities that predispose these groups to tobacco use and confer on them a relative disadvantage in accessing cessation services.

However, within the health system itself, pro-poor measures can significantly improve access to prevention and cessation services at all stages of care-seeking. The health sector should therefore institute actions to minimize barriers to tobacco prevention and cessation services for disadvantaged groups, for example by bringing health services into the community or workplace (such as through workplace-based cessation programmes) (*76*); advocating the elimination of user fees for cessation support within primary health care settings in the public sector; encouraging public–private partnership for preventive and treatment services to reach the most difficult disadvantaged groups, such as those working within the informal economy and living in informal settlements; incorporating gender-sensitive approaches to patient education and cessation; and addressing health system barriers through enlightened policies and practices that do not discriminate against the poor and socially disadvantaged. Ministries of health can ensure that brief interventions for cessation are incorporated into the basic package of essential health services.

To enhance compliance, training in cessation should be elevated into a core competence area for all health care workers. Providers of cessation services should be compensated for performing this service. Ministries of health should promote tobacco cessation in national primary health care practice guidelines, and integrate brief cessation interventions into all appropriate health programmes, such as paediatrics, obstetrics, women's health, environmental health, occupational health, and diabetes, pulmonary and cardiovascular disease prevention programmes.

11.7 Conclusion

Tobacco use is a marker of social inequity. There is a preponderance of global evidence demonstrating that tobacco use and exposure to second-hand smoke across the five levels of the priority public health conditions analytical framework are consistently and strongly related to unequal status. As a result, the health consequences of tobacco use and second-hand smoke exposure are disproportionately borne by the most socially disadvantaged groups in society.

Within the social determinants of health model, ratification of the WHO Framework Convention on Tobacco Control can be considered as the first step in the process of addressing health inequities resulting from tobacco use. The Convention is a levelling force that pushes countries towards adoption and implementation of a sound and comprehensive mix of basic tobacco control interventions assuring equitable coverage of the most disadvantaged sectors of society. The integration of the equity lens into the negotiations of the Conference of the Parties, and into the work of public sector and civil society partners in delineating

mechanisms for implementing the Convention, are vital. WHO has a critical role to play in supporting the work of the Conference of the Parties and capacity building at national and subnational levels.

In addition, while supporting the process of capacity building for enforcement of the WHO Framework Convention on Tobacco Control, the health sector can already begin taking action to:

- elevate tobacco control on the development agenda at the global and national levels;
- engage with other sectors internationally and at country level to link tobacco control interventions with national development initiatives and to integrate tobacco control into the work of these sectors;
- rally political support for key strategies, such as raising tobacco taxes and channelling these tax revenues to fund tobacco prevention and cessation for disadvantaged groups, that bridge structural and service interventions to reduce disparities;
- support partnerships with civic and community organizations to ensure that evidence-based tobacco control interventions are linked to community development and empowerment of disadvantaged groups;
- within its direct sphere of influence, institute measures that minimize barriers and increase access to tobacco prevention and cessation services for disadvantaged population subgroups.

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Tuberculosis: the role of risk factors and social determinants

12

Knut Lönnroth, Ernesto Jaramillo, Brian Williams, Chris Dye and Mario Raviglione

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12.1 Summary

Background

The main thrust of the tuberculosis (TB) control strategy of the World Health Organization (WHO) is to ensure equitable delivery of quality-assured technologies for the appropriate diagnosis and treatment of TB. However, options for combining curative approaches with preventive efforts that address social determinants of TB have not been fully considered in the context of TB control programmes. Underpinning the curative focus of the current strategy is an epidemiological model that predicts that detecting at least 70% of the incident cases of highly infectious TB and treating at least 85% of them successfully would cause incidence to decline at 5–10% per year. The Stop TB Strategy clearly acknowledges that various social factors put certain vulnerable groups at especially high risk and recommends specific actions to reach and treat these groups effectively. The strategy does not, however, explicitly address the factors behind their vulnerability. The aim of the analysis presented in this chapter is therefore:

- to assess the need to broaden the scope of global TB control and to explicitly incorporate preventive approaches;
- to review proximate TB risk factors and the social determinants behind them;
- to identify entry-points for additional interventions that are not fully covered in the global Stop TB Strategy.

Main findings

Recent analyses of the impact of national TB control programmes that have followed the WHO recommended strategy have shown positive impact on treatment outcomes, prevalence and death rate. However, after several years of successful implementation, TB incidence is not falling as rapidly as expected, and the current rates of decline in prevalence and death rates will be inadequate to achieve all the TB-related Millennium Development Goal and Stop TB Partnership targets. Even if the Stop TB Strategy results in the expected reduction in incidence, the global incidence rate in 2050 is predicted to be about 100 times greater than the elimination target to reduce TB incidence to less than 1 per million population by 2050. These analyses suggest there is a need to both speed up the current strategy and implement additional preventive actions, in particular those that reduce the likelihood that people with latent TB infection will develop active disease. This may be done by addressing proximate TB risk factors as well as their upstream social determinants.

In an analysis applied to the 22 countries with a high TB burden that together account for 80% of the global TB burden, the population attributable fraction for selected TB risk factors that impair the host immune defence was estimated. This analysis suggested that HIV infection, malnutrition, smoking, diabetes, alcohol abuse and indoor air pollution may all contribute substantially to the population-level risk. Those in lower socioeconomic groups are on average more exposed to these risk factors. They are also more likely to be exposed to tuberculosis bacilli through contact with people with active TB disease or through living and working in crowded and poorly ventilated conditions. Many TB risk factors are prevalent among the urban poor and this may explain the particularly high TB burden in many metropolitan areas.

Additional intervention entry-points

TB vulnerability is thus influenced directly by a set of proximate risk factors, which are in turn related to the individual's socioeconomic status, and indirectly by broader processes of social and economic change. Additional entry-points for interventions to reduce vulnerability can therefore be identified on several levels, including:

Programmatic public health actions

Such actions would aim to improve management of comorbidity and to reduce the prevalence of HIV, malnutrition, smoking, diabetes, alcohol abuse and indoor air pollution. Interventions to address these risk factors would not be the responsibility of national TB programmes alone. Rather, the role of such programmes would be to help analyse the relative importance of different risk factors in different settings and establish or improve collaborative interventions with other public health programmes. This could also include intensified surveillance efforts coupled with TB screening of people exposed to particular risk factors and for whom treatment of latent TB infection might be appropriate.

Health systems strengthening

Public health programmes that address the above conditions depend on a well-functioning health system. If national TB programmes help to strengthen health systems this will further improve TB diagnosis and treatment while helping to address TB risk factors. Encouraging close collaboration between national TB programme services and other clinical or preventive services concerned with TB risk factors may further strengthen both the general health care system and TB control.

Upstream interventions, beyond the health sector

The Commission on Social Determinants of Health has developed knowledge frameworks within which a wide range of upstream social determinants of health are addressed, including aspects of globalization, urbanization, poor access to health services, social exclusion, employment conditions and gender inequity. National TB programmes and technical partners supporting them need not develop separate frameworks for action in these areas, but should rather focus on collecting and analysing necessary information and providing additional intellectual ammunition to back up existing frameworks, while helping with their implementation as appropriate and feasible. Political commitment should concern not only commitment from governments to invest in and support TB diagnosis and treatment programmes, but also commitment to address the upstream drivers of the TB epidemic. History has shown that the most dramatic reductions in TB burden have occurred when economic, social and medical advances have proceeded in tandem.

12.2 Introduction and background

The condition and its determinants: an introductory overview

Tuberculosis is caused by *Mycobacterium tuberculosis*, which, when inhaled, can lead to a local lung infection. If the immune system is functioning well, the initial local infection can be contained without causing any symptoms. However, in certain individuals the infection proceeds towards active disease, most commonly occurring in the lungs. The disease is mainly spread by individuals with active pulmonary tuberculosis coughing and producing infectious airborne droplets. About one third of the world's population is currently infected with *M. tuberculosis*. About 5% of infected individuals develop active TB within the first two years following infection, while the rest enter a state of latent infection. An additional 5% of infected individuals develop active disease later than two years after infection, and thus about 10% of infected individuals develop active disease during their lifetime (*1, 2*).

The risk of being exposed to the tubercle bacilli is determined by a number of factors related to the level and duration of infectiousness of the source case and this in turn depends on access to TB diagnosis and treatment, the closeness and duration of the contact and the physical environment where contacts take place, such as the level of crowding and the quality of the ventilation. The risk of being infected once exposed is determined by the level of exposure, the virulence of the specific strain of *M. tuberculosis* and the status of the exposed person's defence systems against infection (*1*).

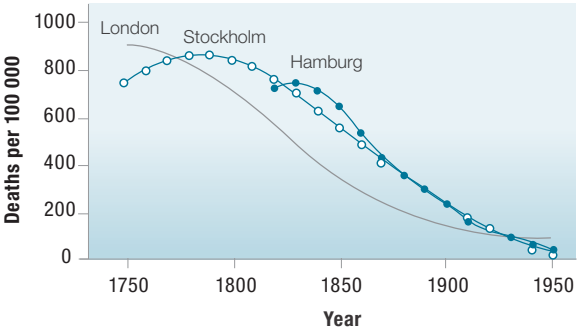
The risk of breakdown from infection to active disease is determined by the virulence of the bacterial strain and the capacity of the host immune system to neutralize the primary infection, which in turn is determined by genetic predisposition, age, sex and several medical conditions that may affect the immune system, such as HIV/AIDS, malnutrition, alcoholism, smoking-related conditions, silicosis, diabetes, malignancies, a wide range of chronic systemic illnesses and immunosuppressive treatment, and, possibly, pregnancy (*3*). The risk of being affected by these conditions is determined by a wide range of social and biological determinants.

If untreated, up to 65% of people with active TB will die of the disease. However, chemotherapy is effective and the vast majority of people with drug-susceptible forms of TB are cured if properly treated. Successful treatment requires that the health system provides, and the patient adheres to, appropriate case management over at least six-month duration of treatment. Thus, the risk of treatment failure, development of drug resistance and death depends on social determinants that influence the patients' ability to complete treatment, as well as, through the risk factors mentioned above, the status of the immune system and the virulence of the specific strain of *M. tuberculosis* (*1, 2*).

TB is normally diagnosed using a combination of sputum smear microscopy, chest X-ray, culturing of the bacteria in sputum samples, drug susceptibility testing and clinical assessment. The diagnostic procedures can be complex, time consuming and expensive for both the health system and the patient. The probability of being diagnosed correctly and quickly, being properly treated and receiving supportive case management depends on the capacity and coverage of the health care system as well as on the knowledge, willingness and ability of people with TB to access services. Education level, income, gender, ethnicity, stigma and social position may all determine health care-seeking and access. Health financing, the competence of the workforce, payment mechanisms to health staff and other incentives determine the overall performance of the health care system.

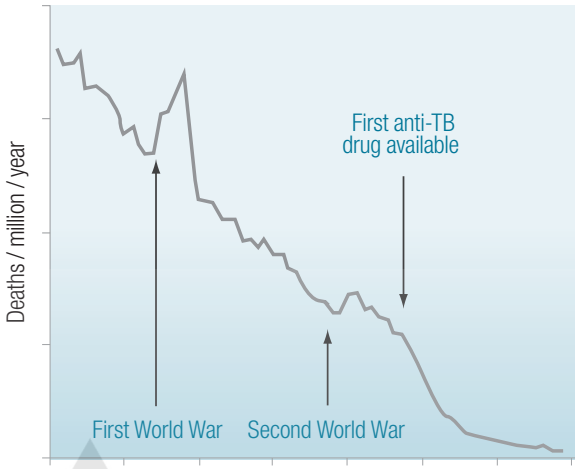
As well as the direct health consequences associated with TB there are social and economic consequences of the disease. They may include social exclusion, losing one's job, direct health care costs and indirect costs related to time lost from work due to health care-seeking and poor work capacity. The risk of adverse health, social and financial consequences is determined by socioeconomic status, gender, social values and traditional beliefs in the community, the availability of

FIGURE 12.1 Tuberculosis deaths modelled from available data



Source: Rieder (*1*), reproduced from Grigg (*11*).

FIGURE 12.2 Decline in TB mortality in England and Wales, and its association in time with the two world wars, and the introduction of chemotherapy against TB



social support services within the health care and social welfare systems, labour laws, and sick leave and pension systems (*4–6*).

In summary, many biological, genetic, physical, social and economic factors combine to form the complex causal web that determines TB disease and its adverse consequences. The analysis of TB determinants should therefore combine biomedical with social analytical frameworks (*7*). Such an approach is further supported by the historical link between TB epidemiology and socioeconomic development.

TB epidemiology and social change: a historical review

Epidemiological data on TB morbidity and mortality prior to the 20th century is of questionable validity and comparability. However, some broad trends have been identified with a reasonable level of certainty. The incidence of TB seemed to have increased in the 17th and 18th centuries, peaking at different times from the middle of the 18th century in Great Britain to the early 20th century in Japan. From these trends, a temporal association has been suggested between increased TB incidence and rapid industrialization and urbanization. A plausible explanation is that transmission increased as the rise in population density led to crowded living conditions, while poor nutrition was a factor in increased progression of disease (*1, 8–10*). This led, at the peak of the epidemics, to TB death rates close to 1% per year in some urban areas (Figure 12.1) (*1, 11*).

Apart from the exceptional peaks during the two world wars, TB incidence declined steadily in most industrialized countries throughout the 20th century, which was generally a period of economic growth, social reform, gradual decline in the level of poverty, improved living conditions and important advances in medicine and public health (Figure 12.2). The relative importance of the various factors that may have contributed to the decline in TB in these countries in the 20th century has been debated. McKeown and Record (*12*) suggested that the decline in TB until the end of the 1940s, when chemotherapy became available, was almost entirely due to improved nutritional status and living conditions. Others have convincingly argued that specific public health interventions, such as isolation of infectious TB cases in sanatoria and the pasteurization of milk to prevent bovine tuberculosis, also contributed significantly to this decline (*10, 13–15*).

The discovery of the TB bacillus in 1882 was a major advance in the understanding of transmissible diseases, and was important in the development of the germ theory of disease. Following this discovery, and the development of the bacille Calmette–Guérin (BCG) vaccine, the control of TB was increasingly based on the biological understanding of the disease. This approach received a final boost with the discovery in the 1940s and 1950s of drugs that cure TB. Eventually these discoveries led to the development of the paradigm that "prevention starts with cure" (see below), while the environmental and social interventions that were previously promoted were progressively discarded (*16*). The expanded pharmacopoeia of anti-TB drugs in the postwar years of the 1950s and 1960s probably helped accelerate the decline in TB incidence in countries that had developed health systems capable of delivering the recent medical advances to those in need (Figure 12.2). But this was not only a period of rapid medical and health care advances but also of rapid eco-

nomic growth and accelerated welfare reforms in many industrialized countries (*17*).

Thus, it appears that the highest TB rates ever recorded were in places where rapid urbanization was coupled with very poor living conditions for the disadvantaged. Industrialization brought about rapid economic growth but uneven distribution of wealth and limited social reform. The most rapid declines in TB incidence and death rates ever recorded were, on the other hand, in places where economic growth was coupled with social and health sector reforms and important medical advances. Progress in TB control in the industrialized countries over the past century was brought about by a combination of economic, social, public health and medical advances. The future success of TB control may depend on progress in all of these areas (*18*), especially because rapid urbanization, inequitable economic growth, widening income gaps and the presence of large pockets of social deprivation are still common in many countries with a high TB burden.

Current global TB control strategy

Targets

The medium-term goal of the WHO TB control strategy is to begin to reverse the trend of TB incidence, and to halve TB prevalence and death rates by 2015 compared to 1990 levels, in line with the TB-related Millennium Development Goal and the Stop TB Partnership targets (*19, 20*). A long-term goal is to eliminate TB as a public health concern by reducing TB incidence to less than one case per 1 million population by 2050.

Mathematical models, fitted to historical data for developed countries, suggest that detecting at least 70% of the incident cases of highly infective TB and treating at least 85% of them successfully would lead to a 5–10% per annum reduction in incidence, with faster rates of decline in prevalence and death (*21–23*). Since the early 1990s, the two most important outcome targets for national TB programmes have therefore been to reach at least 70% case detection and at least 85% treatment success (*24*).

"Prevention starts with cure"

The so-called DOTS strategy was developed in the mid 1990s.[1] Realizing that essential medical technologies for appropriate diagnosis and treatment were not being used optimally, if at all, in most parts of the world, the response was to devise a strategy that ensured that the key elements of a good basic health care system were in place to enable the effective delivery of those technologies (*25, 26*). In 2005–06, a new Stop TB Strategy was developed in response to a number of challenges that were not explicitly included in the original DOTS strategy, in particular the need to deal with multidrug-resistant TB and the impact of HIV on TB, but more generally the challenges presented by weak health systems and reliance on outdated medical technologies (*19*).

The main thrust of the new Stop TB Strategy, as was also true of the DOTS strategy, is to create better mechanisms for equitable delivery of quality-assured medical technologies. The focus remains on curative rather than preventive approaches, with a few exceptions, namely isoniazid preventive treatment of selected risk groups (people living with HIV and children under the age of 5 who have had close contact with a person with infectious TB); and contribution to HIV diagnosis and treatment, which reduces the risk of TB disease and death among people with HIV. BCG vaccination is part of the strategy, though the protective effect is limited to preventing TB meningitis and miliary TB in children (*1*). The new Stop TB Strategy also promotes development of new medical technologies, some of which would be for prevention, including new vaccines and new preventive pharmacological treatments.

Underpinning the mainly curative focus of the current TB control strategy is the epidemiological model that predicts rapid decline in TB burden if current programme outcome targets are met. Furthermore, TB treatment according to the DOTS principles is a highly cost-effective health intervention with regards to disability-adjusted life years[2] saved (*27*). It is also a sound investment from a cost–benefit perspective: the financial return in TB control, resulting from the positive impact on health and productivity, and reduced future

1 DOTS was originally an abbreviation for Directly Observed Treatment Short-course, but later became the brand name for the five-element intervention package recommended by WHO: (a) government commitment to TB control; (b) case detection among symptomatic patients; (c) standardized short-course chemotherapy to, at least, all confirmed sputum smear-positive cases provided under proper case management conditions; (d) a system of regular drug supply; and (e) a monitoring system for programme supervision and evaluation.

2 Disability-adjusted life years (DALYs) reflect a combination of the number of years lost from early deaths and fractional years lost when a person is disabled by illness or injury.

health care needs, could be up to 10 times the initial investment (*28*).

However, the mathematical model on which the DOTS and Stop TB strategies were premised did not include explicit assumptions about key factors that drive TB epidemics, apart from HIV, which was included in modelling exercises (*20, 22*). Implicitly, the approach also does not rely on actions to reduce vulnerability to TB infection and disease.[3] It certainly does not say that preventive approaches are unimportant. But it suggests a way forward that is independent of them (*16, 29*).

Reaching the poor with effective curative interventions

Access barriers

Since most people with TB are from the poorer segments of society, TB control targets cannot be met unless they are reached and reached early, with quality health services. Furthermore, early diagnosis and treatment minimizes the health, social and financial consequences of the disease for both TB patients and their families. Consequently, no influential policy documents on TB control published during the last decade fail to highlight that it is essential to ensure good access to quality TB diagnosis and treatment for the entire population, including the most vulnerable groups (*19, 20, 26, 30, 31*).

There is an extensive literature on barriers to access to quality TB services, and on challenges facing national TB programmes attempting to operationalize the strategies to reach the poor (*5, 32, 33*). In most countries, diagnostic and treatment services for TB are integrated into the general and primary health care system. A weak and inequitable health care system creates access barriers for quality TB services, especially for the poor and vulnerable. Many of the barriers that make access to TB control difficult are similar to those discussed in other chapters of this volume, but some are particularly severe for TB. For example, in many societies TB carries a strong social stigma, especially for women, which may make people with TB reluctant to approach formal TB services in the public sector, so that they avoid or delay health-seeking or turn to the informal sector or the private sector for care (*4, 34, 35*).

Barriers to successful treatment

Very high cure rates can be achieved even for the poorest and most vulnerable TB patients, as was demonstrated by Ramakrishnan et al. in India in the 1950s (*36*). This landmark study, in which most of the subjects were poor and malnourished, found that over 90% were cured through ambulatory treatment. This study showed that TB treatment could be effectively delivered through the primary health care system in poor communities, and concluded that "Successful treatment of patients in their home in developing countries need not await an increase in the standard of living. Successful treatment of patients on a mass scale can begin as soon as adequate supplies of medicaments are available" (*36*, page 357). High cure rates have subsequently been achieved in many national TB programmes applying similar case management principles in similar populations (*24*).

The findings in the above-mentioned study that poor people have a good chance of cure does however not mean that they have the same chance as the non-poor, nor that they have the same chance to avoid relapse or other adverse consequences of the disease and its treatment. Problems with adhering to a treatment (which needs to last at least six months) is a main barrier to treatment success, especially for the poor. Factors that determine adherence to treatment include poverty and the financial burden of treatment; gender; working conditions and migration for work; education level and knowledge, attitudes and beliefs about treatment; degree of family and community support; and organization of services (*6, 32, 37*). The few studies that have directly assessed the impact of poverty and socioeconomic status on critical treatment outcomes show that poor and vulnerable people have worse outcomes than the better-off, with related factors including homelessness, unemployment, previous imprisonment and alcohol abuse (*38–40*).

The social and economic burden of TB

Several studies have shown that the cost of TB disease and TB treatment can be devastating, especially for the poor. In these studies, the average total cost incurred by TB patients was between 20% and 40% of the annual family income, and up to 70% of the annual per capita income (*5, 32, 33, 41–46*). Furthermore, studies in Myanmar and in Bangalore, India, showed that the average cost of care as a proportion of annual income was much higher for patients in the group with lowest socioeconomic status compared to those in groups of higher socioeconomic status (68% versus 32% of annual per capita income in the case of Myanmar) (*44, 45*). One result of these high costs was that between 40% and 70% of the poor patients become indebted as a result of the disease and its treatment (*42, 44, 45*).

In these studies, most of the cost of TB treatment was incurred before treatment started. The costs included direct costs for medical tests, medicines, consultation

3 Throughout this chapter, vulnerability refers to high risk of being exposed to tuberculosis bacilli, high risk of being infected once exposed or high risk of developing active disease once infected.

fees and transport, and indirect costs due to loss of income. Much of the cost was incurred in the private sector. Studies from Bangalore (*45*) and from India and Viet Nam (*47, 48*) have shown that the direct cost for TB treatment is substantially higher when people access care in the for-profit private sector. Other studies have shown that the very poorest people often access the for-profit private sector and incur large costs unless these providers are linked with national TB programmes and provide free or subsidized diagnostic and treatment services (*35, 49*).

Adverse social consequences of TB, such as rejection by family and friends, divorce, expulsion from school and loss of employment, have been reported in many studies, and seem to be particularly severe for women (*4, 34, 50–52*).

Strategic response to address access and adherence barriers

The first element of the DOTS strategy is "political commitment", which implies a commitment to public funding of TB services in order to secure high-quality services with minimal financial barriers for the poor. Free-of-charge TB diagnosis and anti-TB drugs have long been a part of national TB programme strategies, at least for infectious cases. Even before the DOTS strategy was launched, a shift from hospital-based to ambulatory primary health care-based TB care was promoted as a mechanism to improve access and reduce some of the barriers to treatment adherence, and to minimize the financial impact of lengthy inpatient treatments (*2, 36, 53*).

Despite the efforts under the DOTS strategy, access barriers remain a severe problem for TB control and many people with TB still experience excessive health expenditure related to TB care-seeking. Moreover, the goal to reach the poorest has sometimes been compromised by a quest to treat as high a number of infectious TB cases as possible with available resources, and the aim to maximize cost-effectiveness in terms of epidemiological impact has in some instances led TB programmes to neglect the segments of the population that are hardest to reach, such as people in remote areas or urban slums, or are most difficult to support for full treatment completion, such as homeless people and internal migrants (*54, 55*).

The new Stop TB Strategy and the Global Plan to Stop TB acknowledge these shortcomings and have emphasized the need for pro-poor strategies to facilitate access to treatment (*19, 20*). The Stop TB Strategy has among its specific objectives: "to achieve universal access to high-quality diagnosis and patient-centred treatment; to reduce suffering and socioeconomic burden associated with TB; and to protect poor and vulnerable populations from TB, TB/HIV co-infection and MDR-TB" (*19*). Consequently, the new Stop TB Strategy has several components intended to improve access and adherence. There is a specific emphasis on high-risk populations and vulnerable groups, such as prisoners (*56*) and refugees and displaced populations (*57*). This entails both targeted interventions to ensure early case finding and incentives and enablers to improve adherence, including cash incentives, food packages, transport vouchers and various social support elements (*58*).

There is a component on health systems strengthening, as improvement of the general health system is needed to secure equity in access to TB services (*19, 59*). The strategy includes empowerment of people with TB, which emphasizes the need for social mobilization and community participation and engagement (*19, 20, 57, 59*).

Furthermore, a component on "engaging all health care providers" acknowledges that the poorest people access the full range of health services – from for-profit private health care providers to tertiary hospitals and university clinics – but are often impoverished as a result (*52*). Finally, there is a component that deals with development of new tools for TB diagnosis and treatment, which has a built-in element of securing delivery channels for new tools that reach the most vulnerable groups of the population.

To summarize, the new Stop TB Strategy clearly acknowledges that various socioeconomic factors put some people at higher risk of the disease and its adverse consequences. The strategy includes specific recommendations on how to provide them with effective TB treatment, and how to reduce the economic and social consequences of the disease. However, the strategy does not explicitly address the underlying factors that make these people more vulnerable to TB infection and disease in the first place. This is the focus of the following sections of this chapter, which will assess whether the current TB control strategy is sufficient to eliminate TB as a global public health concern, and will identify potential additional intervention areas, with a special focus on prevention, equity and social determinants.

Objectives

The main aim of the analysis presented in this chapter is to assess the potential need to broaden the scope of global TB control to explicitly incorporate aspects of prevention through addressing social determinants of TB. The analysis addresses the following specific questions:

- What are the prospects of controlling TB without including prevention more explicitly into global TB

control efforts, and without addressing social determinants of TB?
- What are the broad social determinants of TB and what are the possible causal pathways through which they increase the risk of TB?
- What is the epidemiological importance of the different downstream[4] TB risk factors that are on the causal pathway between upstream social determinants and biological TB pathogenesis?
- What additional intervention possibilities for addressing social determinants and downstream risk factors are most important and most feasible?
- What changes in TB control planning and implementation will be required to incorporate such interventions?
- How can the progress and impact of such interventions be monitored?

As discussed above, the current TB control strategy already has a strong focus on addressing factors that lead to poor access to quality curative services. Therefore, the analysis presented here mainly focuses on social determinants and risk factors that are relevant for TB prevention. The focus is mainly on determinants that may be influenced through social and behavioural interventions and other factors, such as sex, age and genetic factors, have not been covered.

Methods

Global TB surveillance data were analysed with a view to predicting future trends in TB incidence under the full implementation of the current global TB control strategy. Country case studies, based on routinely collected country-level surveillance data, were carried out to explore reasons for the apparent absent or slow decline in the TB incidence rate in countries with well-performing TB control programmes. A literature review was undertaken in order to identify the main social determinants and their most important proximate risk factors. Two systematic reviews were done, one on alcohol use and TB risk and one on malnutrition and TB risk. These data were used to estimate the population attributable fraction of the main proximate risk factors in the 22 countries with a high TB burden that together account for 80% of the estimated global TB burden.[5] Possible causal pathways linking upstream social determinants with risk of TB were then explored qualitatively.

The analysis was carried out by the Stop TB Department at WHO in collaboration with other relevant WHO departments, including those responsible for tobacco control, nutrition, alcohol and drug abuse, environmental health, diabetes and HIV/AIDS. Experts at the Centers for Disease Control (Atlanta), the Institute of Health and Society (Newcastle University) and the School of Public Health (University of North Carolina) were also consulted. Throughout the process, the Priority Public Health Conditions Knowledge Network of the Commission on Social Determinants of Health provided technical support and feedback on the analytical process.

Based on the literature review and the analytical work, broad areas for possible additional interventions were identified, beyond those that are already incorporated in the current global TB control strategy. Additional measurement requirements for monitoring process and impact of such additional interventions were also identified.

12.3 Analysis of findings

Epidemiological challenge ahead and the scope for prevention

Successful DOTS implementation has been associated with a decline in TB incidence or prevalence in some settings, including China, Cuba, parts of India and Peru (*60–63*). Some countries in Latin America, including Chile and Uruguay, experienced a rapid decline in TB incidence in the 1960s to 1980s, which was associated with implementation of TB programmes that had the basic DOTS elements in place, but were not labelled DOTS programmes (*64, 65*). However, it has been difficult to disentangle the effects of DOTS from those of social and economic improvements in these countries.

Some recent country-level investigations of the impact of DOTS programmes have shown that, after several years of successful implementation (as measured by high case detection and treatment success), incidence is not falling as expected. Viet Nam seems to have reached the targets for case detection and treatment success since 1997, and yet the case notification rate remained approximately stable over that period (*66*). The explanation for this is unclear, but it has been shown that a decrease in incidence among older people was offset by an increase among young people, especially among men in urban and remote rural areas. This may be explained by the effects of migration or exposure to risk factors for TB infection and disease

4 Downstream, or proximate, factors refer to those risk factors that assert their effect more or less directly on biological and physical mechanisms related to disease pathogenesis. Upstream, or distant, factors are those factors that cause exposure to the downstream risk factors ("the causes of the causes") (see Figure 12.5).

5 Afghanistan, Bangladesh, Brazil, Cambodia, China, Democratic Republic of Congo, Ethiopia, India, Indonesia, Kenya, Mozambique, Myanmar, Nigeria, Pakistan, Philippines, Russian Federation, South Africa, Thailand, Uganda, United Republic of Tanzania, Viet Nam and Zimbabwe.

such as HIV, smoking, malnutrition and crowded living conditions in these young men (*67*). In Morocco the decline in incidence has been less than anticipated considering the successful implementation of the DOTS programme for many years, and here too the problem seems to be associated with young men in urban areas (*68*). This changing pattern in case notifications by age and sex is also found in routine surveillance data from Sri Lanka. In Myanmar, TB patients in the age group 15–54 years are becoming younger on average, but the average age should be increasing if transmission and incidence are falling (*69*). Several states of India that have been implementing DOTS since 1998 have not yet seen any detectable decline in case notification rates (*70*).

At the same time, some countries have experienced a decline in TB burden without having a high-quality TB programme. For example, a national survey in Indonesia in 2004 found that the prevalence of smear-positive TB had fallen by a factor of 3 since 1979–1982, when a set of regional surveys was carried out. At the time of the 2004 survey the DOTS programme was still in its early stages of scale-up, and the case detection rate had only reached 50% in 2004 (*71, 72*) and treatment results outside the programme were poor (*73*). Similarly, in many countries of Latin America, the Eastern Mediterranean region and Asia, TB case notification rates were falling well before the implementation of DOTS programmes, while non-DOTS TB programmes implemented services of varying quality. In Oman, there was a dramatic decline of 15% per year from 1981 to 1993, which coincided with a reasonably well-functioning national TB programme and rapid economic development (*74*).

The uncertainty about the relative importance of DOTS for reduction in TB incidence is reinforced by an analysis of predictors of trends in TB incidence rates between 1997 and 2006, as reported by 134 countries (*75*). This analysis suggests that the variation in the rates of change over the last 10 years is strongly associated with various biological, social and economic factors. National development indicators, including the Human Development Index, gross domestic product per capita, under-5 mortality, access to clean water and adequate sanitation, and health expenditure per capita were important determinants of trends in incidence rates. The analysis suggested that DOTS programmes have not yet become the main determinant of trends in TB incidence in any region of the world, while broad socioeconomic development and access to and quality of health services are important (*75*).

Although incidence, prevalence and death rates are falling globally, the rate of decline is still not fast enough to meet the Millennium Development Goal targets to halve TB prevalence and death rates by 2015 compared to 1990 levels (*76*). The global incidence seems to have been falling since 2004, which means that the target to begin to reverse incidence may already have been met. However, the rate of decline is very slow, at less than 1% annually (*76*). The biggest challenges to reach these targets are in sub-Saharan Africa, eastern Europe and former Soviet Union countries. These regions showed striking increases in TB burden during the 1990s, but for different reasons. In eastern Europe and countries of the former Soviet Union the resurgence of TB, after decades of steady decline before the 1990s, is best explained by economic decline and the failure of TB control and other health services after 1991 (*77*), together with other factors such as social deprivation, alcoholism and the mixing of prison and civilian populations (*78–80*). In Africa, on the other hand, it is likely that this increase was largely due to the increase in HIV prevalence (*81*), compounded by general underdevelopment of health services and poor access to existing ones.

In most countries of sub-Saharan Africa (*82*) the HIV epidemic is probably now in decline and the incidence of tuberculosis may also have reached a peak and started to decline (*75*). In eastern Europe TB incidence has been steady since around 2000, and incidence, prevalence and death rates are still considerably higher than they were in 1990 (*75*). Reaching all the TB-related Millennium Development Goal targets by 2015 in these regions seems unlikely, even if there is a massive scale-up of available technologies to diagnose and treat TB, multidrug-resistant TB and TB-HIV coinfection (*83*). In order to bring about a rapid reduction in TB it will be necessary to address and reverse the impact of the factors that made the populations in these regions more vulnerable to TB infection and disease in the 1990s.

Recent modelling suggests that even if the Stop TB Strategy is successfully implemented and results in the expected rapid reduction in incidence foreseen by the Global Plan to Stop TB, the global incidence rate by 2050 would still be of the order of 100 per million population, i.e. about 100 times greater than the elimination target (*84*). To eliminate TB by 2050 the incidence rate must fall at an average of 15% annually (Figure 12.3). This rate of decline might be achieved for a few years through massive efforts to scale up curative services, which would reduce transmission of TB, but it is unlikely to be sustainable. One reason is that when transmission falls, a growing proportion of cases arise from the slow reactivation of long-standing latent infections, rather than from the rapid progression of recent infections. Currently, one third of the world population, or more than 2 billion people, are infected with *M. tuberculosis*. The proportion is much higher in the countries with a high TB burden.

These analyses of epidemiological trends point to a need to extend the current strategy to include ways to

FIGURE 12.3 Predicted trends of global TB incidence 2007–2050, with full implementation of Stop TB Strategy, and desired for reaching TB elimination target

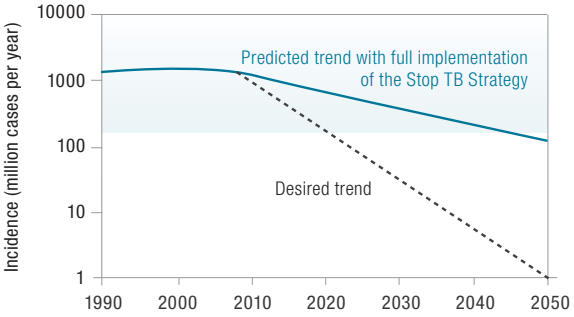
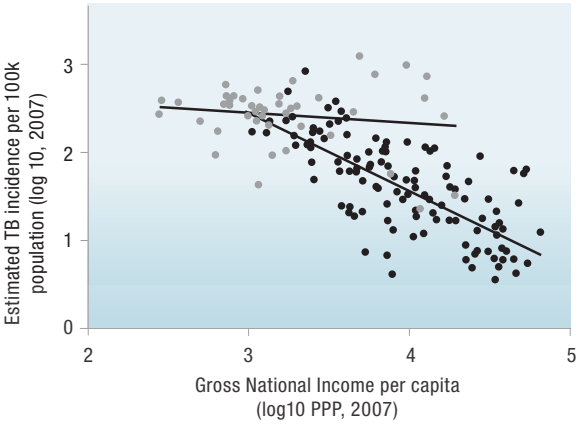


FIGURE 12.4 Association between GDP per capita (US$ purchasing power parities) and estimated TB incidence



Note: Grey dots are African countries, black dots are countries from other regions. The upper trend line is for African countries, the lower trend line is for the rest of the world.

reduce people's vulnerability to TB. In particular, the combination of curative interventions to stop transmission and interventions that reduce risk of progression to active TB disease would in theory be powerful, and could force TB incidence close to or below the elimination threshold by 2050 (*84*). Interventions to reduce progression to disease may include preventive treatment with anti-TB drugs, a new vaccine that prevents progression from infection to disease, and reducing exposure to various social, environmental and biological risk factors for TB.

To summarize, recent analyses suggest that, in order to reach and sustain long-term impact targets for TB control, curative interventions need to be complemented by preventive interventions aimed to reduce people's vulnerability to TB infection and disease. Such interventions may target both downstream risk factors for vulnerability and more upstream social determinants.

The socioeconomic gradient

There is a strong association between national TB incidence and GDP per capita, though the trend is much weaker across countries in the African region due to high HIV prevalence in several African countries with relatively high GDP per capita (Figure 12.4). About 95% of TB deaths occur in developing countries, and over 60% of deaths are in the poorest 20% of countries. Fifteen of the 22 countries that together account for 80% of the global TB burden are low-income countries; the remaining are middle-income countries (*33*).

The socioeconomic gradient is also strong within countries. Several studies have reported a strong geographical correlation between social deprivation and TB. D'Arcy Hart (*85*) reported consistently higher rates of TB among poorer people in Germany, Norway and Viet Nam at the beginning of the 20th century.

Studies in New York City from the 1940s onwards have found geographical variations in TB mortality closely associated with socioeconomic indicators (*86–88*). Cantwell et al. (*89*), using United States national TB notification data 1987–1993, found that areas with the lowest socioeconomic level had two to six times higher incidence than areas with the highest level, depending on which indicator of socioeconomic status was used. The incidence of TB in areas of British Columbia, Canada, with the lowest socioeconomic score was 41 times higher than in the areas with highest score (*90*). Holtgrave and Crosby (*91*) demonstrated a strong correlation between TB incidence and income and social capital score across different states in the United States.

Recent studies in low- and middle-income countries have shown the same pattern. Sanghavi et al. (*92*) found that the prevalence of TB in a shantytown in Lima, Peru, was three times higher than in the city as a whole. Van Rie et al. (*93*) reported a strong association between TB incidence and the education level of children and income of adults in South Africa. TB prevalence in the poor urban areas of the Philippines was 50% higher than in other areas (*94*). Antunes and Waldman (*95*) found a significant correlation between socioeconomic index and TB mortality across different areas of São Paolo, Brazil. Ahktar et al. (*96*) reported that the prevalence of TB in poor peri-urban areas of Karachi was three times the national average.

Studies assessing the burden of TB in specific vulnerable populations also support a strong association between social deprivation and TB risk within countries. TB prevalence rates significantly higher than for

the general population have been found in studies of homeless men in the United States (*97*), drug users and social service clients in New York City (*98*, *99*) and prisoners in the Russian Federation (*100*). Many studies have shown that migrants from countries with high TB incidence have a much higher incidence of TB, and this is the dominant group of people with active TB disease in many high-income countries (*1, 101*). Several studies have also shown that certain ethnic groups, for example Native Americans, African-Americans and Hispanics in the United States, are at higher risk (*102, 103*), and that this increased risk is partly explained by low socioeconomic status (*89, 104*).

Abundant anecdotal information from clinicians and staff of national TB programmes suggests that in most countries the majority of TB patients are from the lower socioeconomic strata. Socioeconomic data are not routinely collected as part of national TB programme monitoring and surveillance. Several clinic-based case control studies that have measured different aspects of socioeconomic status show an association between low status and TB risk (*105–108*). However, other case control studies have not found any significant association, or only found a weak association, with socioeconomic status (*109–111*). Detection bias is likely to be present in studies that include as cases patients who are routinely diagnosed in health facilities, particularly in settings where health care access is limited for the poor. Notified cases may not be representative of TB cases in the community with regards to socioeconomic status in such a situation, due to poor access to health services (*5, 112*).

The best way to assess socioeconomic status as a risk factor for TB disease is either by using a cohort study or a TB prevalence survey that ascertains disease status through active case finding. However, such studies require a very large sample size and are therefore rarely done. Two studies of the required scale, undertaken in India, found a higher TB prevalence among people with low standards of living than among those with high standards of living (*113, 114*). Similarly, a study based on self-reported TB (recent as well as lifetime), based on a demographic and health survey in South Africa, found that the risk of recent TB was six times higher among people in the lowest versus the highest asset score quintiles, while the risk was four times higher for lifetime TB prevalence. This study also found that income inequality was associated with risk of TB, after controlling for a large number of factors, including individual socioeconomic status (*115*).

In summary, the available data show that the TB burden follows a socioeconomic gradient, across countries, within countries and within communities. This observation lends strong support to the conclusion from the review of the historical data presented above that poverty reduction and socioeconomic development, in its broadest sense, would lead to an absolute reduction in TB burden. Addressing the upstream social determinants as outlined in Chapter 1 of this volume, and analysed in detail by other knowledge networks of the Commission on Social Determinants of Health, would thus contribute to TB control. A better understanding of the reasons behind the socioeconomic gradient, and the causal pathways linking poverty to increased risk of TB, would further help identify additional entry-points for interventions that target more downstream determinants.

Understanding the gradient: from downstream risk factors to their upstream determinants

The framework presented in Figure 12.5 identifies the different stages of TB disease development and highlights two broad mechanisms through which known risk factors for TB are most likely to operate. It then considers different risk factors that influence these mechanisms and the determinants of these risk factors ("the causes of the causes").

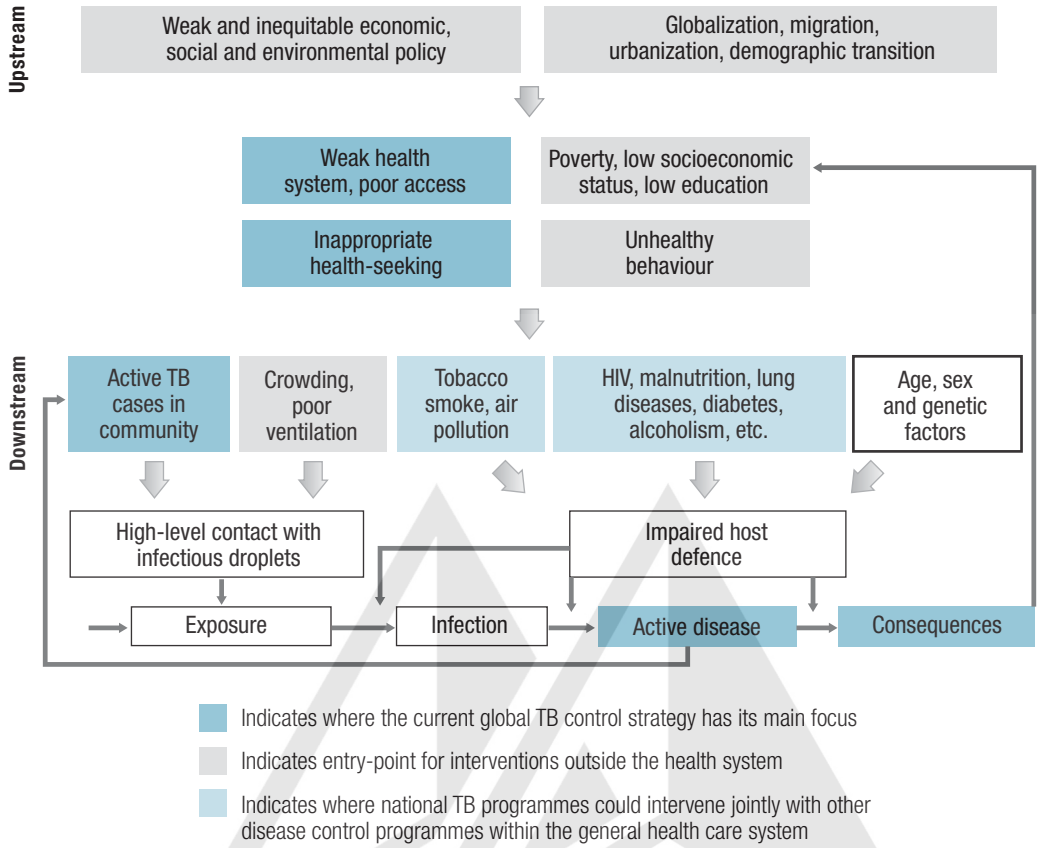
Downstream risk factors

Downstream risk factors include those that directly increase the level and duration of exposure to infectious droplets. A necessary risk factor for TB infection is contact with a person with active TB disease. The likelihood of having such a contact is determined by the underlying disease burden in the community and the likelihood that people with active TB in the community will be diagnosed and cured quickly. Therefore there is a strong link between the performance of the health systems and risk of TB infection in the community. As discussed above, this is the main intervention entry-point for the current global TB control strategy, which ultimately aims to cure people with active TB as quickly as possible and thereby eliminate the source of infection.

The risk of high exposure to infectious droplets is also determined by the physical environment where the contact takes place. Crowding and poor ventilation, for example in households, in health care settings, in workplaces, in public transportation and in prisons, increases the risk of high exposure and therefore the risk of infection (*1, 116*).

Furthermore, downstream risk factors include those that impair the host defence through reducing the ability to clear bacilli from the airway (damaged clearance of secretion of the tracheobronchial mucosal surface), including tobacco smoke and other types of air pollutants. Indoor air pollution caused by burning of solid

FIGURE 12.5 Framework for downstream risk factors and upstream determinants of TB, and related entry-points for interventions



fuels in dwellings with poor ventilation has been associated with higher risk of TB disease (*117, 118*). There is limited evidence that outdoor air pollution is a risk factor for TB (*119*). Outdoor air pollution has been associated with increased risk for respiratory infections in general, but the association with TB has been studied to a very limited extent (*120*).

Weakening of the host immune defence may be due to old age, HIV infection (*5*), malnutrition (*121, 122*), alcoholism (*123*), smoking (*124*), indoor air pollution (*118*), diabetes (*125, 126*), silicosis, malignancies, a wide range of chronic systemic illnesses and immunosuppressive treatment (*1, 127*). Mental disorders, including depression and severe mental stress, have been discussed as risk factors for tuberculosis. Depression and stress can have a negative effect on the cell-mediated immune system and could therefore in theory increase the risk of TB (*128*), but there is little published research on the putative association between depression or mental stress and risk of TB disease.

Several of the risk factors mentioned above also affect the risk of adverse treatment outcomes. HIV coinfection increases the risk of death, acquired drug resistance (*129*) and relapse (*130*). It is likely that smoking, diabetes, malnutrition and alcohol abuse increase the risk of treatment failure, death and relapse, though the research on this is limited and inconclusive (*121, 124–126, 131*).

The evidence base for the importance of the different risk factors is variable and there are few data on their population-level impact. Little is still known about the number of TB cases and TB deaths attributable to the different risk factors. Such information would help to narrow the focus of possible preventive interventions and may help to provide a better understanding of the reasons for the strong socioeconomic gradient of the burden of TB.

Population attributable fraction for selected risk factors

In a preliminary analysis covering the 22 countries with high TB burden, the population attributable fraction was estimated for selected TB risk factors that weaken the immune system (*3*). The analysis has recently been updated and the results are summarized in Table 12.1.

TABLE 12.1 Relative risk, prevalence and population attributable fraction of selected downstream risk factors for TB in 22 high TB burden countries

Risk factor (reference for relative risk and prevalence estimates respectively)	Relative risk for active TB disease (range)[a]	Weighted prevalence, total population, 22 high TB burden countries[b]	Population attributable fraction (range)[c]
HIV infection (*76, 132*)[d]	26.7 (20.4–34.9)	0.9%	17.6% (13.7–22.1)
Malnutrition (*121, 133*)[e]	4.0 (2.0–6.0)	17.2%	34.1% (14.7–46.3)
Diabetes (*126, 134*)	3.1 (2.3–4.3)	3.4%	6.6% (4.1–9.9)
Alcohol use > 40g/day (*123*)[f]	2.9 (1.9–4.6)	7.9%	13.1% (2.8–10.3)
Active smoking (*124, 135*)[g]	2.6 (1.6–4.3)	18.2%	22.7% (9.9–37.4)
Indoor pollution (*117, 118*)[h]	1.5 (1.2–3.2)	71.1%	26.2% (12.4–61.0)

a. Range is equal to 95% confidence interval, except for malnutrition.

b. 22 countries that together have 80% of the estimated global TB burden (*24*).

c. Population attributable fraction = [prevalence x (relative risk – 1)] / [prevalence x (relative risk – 1) +1].

d. Relative risk 26.7 for countries with HIV prevalence between 0.1% and 1%. The relative risk for countries with HIV prevalence > 1% is 20.6 (95% confidence interval: 15.4–27.5).

e. Relative risk range based on range in studies reviewed in this qualitative systematic review. Point estimate is the midpoint of the range.

f. Prevalence from unpublished data provided by Jürgen Rehm (personal communication).

g. Relative risk from pooled estimate across high-quality studies comparing active to never smokers.

h. Point estimate for relative risk from Rehfuess (*117*) and 95% confidence interval from Lin, Ezzat and Murray (*118*).

These estimates suggest that all these factors may be of population-level importance. The analysis is preliminary and does not take account of interactions between the different risk factors, or of the dynamic effects of transmission from people who develop active disease due to risk factor exposure, and should only be taken as indicative.

The relative importance of preventive interventions depends on the prevalence of exposure to the particular risk factor and will be different for different countries and regions. For example, HIV is a much more important risk factor in the Africa Region (population attributable fraction for HIV > 50%) than elsewhere. However, it is likely that the high TB burden in the Africa Region is the result of high population exposure to several risk factors in addition to HIV, particularly malnutrition (population attributable fraction = 47%). Malnutrition is important in all regions except Europe. Smoking is the most important risk factor for TB in the Western Pacific Region, smoking and alcoholism are the dominant risk factors in Europe, and prevalence of diabetes is highest in Europe, the Eastern Mediterranean Region and the Region of the Americas.[6] The prevalence of alcohol abuse, diabetes and smoking are increasing in developing countries and may become the dominant risk factors for TB in Asia and Africa in the future (see Chapters 2, 5 and 11 respectively) (*125, 126, 136*).

6 Designated WHO regions.

Upstream determinants

Causal pathways linking socioeconomic status and TB risk

It is reasonable to assume that the higher risk of TB among people in groups of low socioeconomic status is largely an effect of their greater exposure to some or all of the risk factors discussed above. Little research has been carried out to investigate the extent to which variation in the risk of TB across socioeconomic groups is explained by differences in exposure to these risk factors. However, a recent multilevel analysis of TB risk factors from South Africa, which found an association between the risk of TB and smoking, alcohol and undernutrition, offered a partial explanation of the underlying association between low socioeconomic status and TB risk, suggesting that these proximate risk factors are on the causal pathway between poverty and TB risk (*115*). On average, people from groups of low socioeconomic status are more likely than those in groups of high status to have more frequent contact with people with active TB disease; more crowded and poorly ventilated living and working conditions; more limited access to safe cooking facilities; more food insecurity; lower levels of awareness or less power to act on existing knowledge concerning healthy behaviour (for example safe sex, smoking, diet and alcohol use); and more limited access to high-quality health care (*19, 133, 137, 138*).

Exposures to each of the downstream TB risk factors listed in Table 12.1 are to some extent determined by socioeconomic factors. Malnutrition and indoor air pollution are direct markers of poverty (*117, 133*). Smoking prevalence is consistently higher among groups of lower socioeconomic status than among groups of higher status in all regions of the world, and smoking prevalence is increasing rapidly in low-income countries, while it is decreasing in high-income countries (see Chapter 11). For HIV, alcohol and diabetes, the picture is more complex. On average, HIV prevalence is higher in poor countries than in rich countries and in countries with more unequal distribution of wealth. However, there is a wide variation in national HIV prevalence across countries with similar levels of national wealth (*139*). Furthermore, on an individual level the association between socioeconomic status and HIV prevalence is less clear (*140–142*). When examining the association between socioeconomic status and HIV it is necessary to consider the different characteristics of different types and stages of HIV epidemics.

Alcohol dependence is more common in rich than in poor countries. However, within countries, at least for men, harmful drinking patterns and alcohol-related morbidity and mortality follow a reversed socioeconomic gradient: those with low socioeconomic status are at highest risk (see Chapter 2). The association between socioeconomic status and diabetes is also complex. Economic development, reduced poverty and improved food security can lead to increased diabetes prevalence. The prevalence is generally higher among the better-off than among the worse-off in poor countries. However, in middle- and high-income countries the reverse is true. Here, people from groups of low socioeconomic status have higher prevalence, and this is probably linked to a less healthy diet and less physical activity (see Chapter 5).

Gender differentiation in TB incidence and risk factor profile

In most countries, the ratio of male to female patients among those notified with TB under national TB programmes is about 2:1. However, some countries, and some settings within countries, show a different ratio, and in Afghanistan and in neighbouring parts of Pakistan and Iran it is 1:2 (*24*). The reasons why men are more likely than women to get TB in most places have been widely debated. Some studies suggest that it may be that women have less access to health care access or that diagnostic tests are less sensitive in women than in men (*6, 34, 50, 51*). However, prevalence surveys of the general population shows that the population prevalence of TB is indeed higher among men in many countries (*143*).

Biological factors have been discussed in relation to the differential sex ratio for TB. Sex hormones may play a role as the male:female ratio is close to 1:1 before puberty, and because risk of TB seems to be elevated for women during or directly after pregnancy (*1, 34*). Differential exposure to TB risk factors also plays a role. In general, men smoke more and drink more alcohol than women. One study has shown that variation in the difference in smoking prevalence for males and females can explain at least some of the variation in the male:female TB notification ratio (*144*). Difference in HIV prevalence varies with stage of the HIV epidemic and sociocultural context. In recent years, as the HIV epidemic in Africa south of the Sahara has gradually affected more women than men, the male:female TB notification ratio has fallen (*69*). Indoor air pollution, on the other hand, may affect women more than men, while occupational exposure to air pollutants, including silica, may be higher among men. Variation in risk factor profiles for men and women, and in the socioeconomic and cultural factors that lie behind them, may partly explain the variation in male:female ratio across settings.

Urbanization and poverty

Economic development and globalization are coupled with increased industrialization and urbanization (*145, 146*). Unless accompanied by good urban planning, social reforms, health education, environmental protection and a strong and well-coordinated urban health system, the process can create ideal conditions for TB epidemics to flourish (*138*). The burden of TB is generally higher in urban than in rural areas (*40, 147*). As discussed above, there seems to have been a temporal association between rapid urbanization and increase in TB incidence in Europe in the 19th century. There are also indications from recent analyses that TB control is particularly challenging in urban areas (*40, 68–70*). These tendencies of higher TB burden and more difficult challenges for TB control in urban areas may be due to the following:

Demographic changes. Urbanization leads to increased population density, crowded living and working conditions, and increased mobility as poor urban populations migrate in search of temporary work. These populations are likely to be vulnerable to TB disease due to weakened host defence against the disease. Frequent migration poses a great challenge for completion of TB treatment, and requires that the health system develops effective referral and information exchange systems. Cross-border migrants, including those from countries with high TB burden, are more likely to settle in urban areas.

Changing lifestyles. As discussed above, smoking, alcohol abuse and unhealthy diets are generally more

common among people in groups of low socioeconomic status in any given setting, yet are on average less common in poor settings. These risk behaviours may increase if the prevalence of absolute poverty falls at the same time as access to tobacco, alcohol and unhealthy foodstuff increases and sociocultural transition leads to changed nutritional and health behaviour patterns. Such changes are likely to appear first in urban areas, which may explain why smoking, diabetes and alcohol abuse are often more common in urban areas than rural areas (*138*). These changes in risk factor profile are more likely to affect the urban poor, especially if inequality increases and basic education level remains low. Changed nutritional patterns combined with less physical exercise due to poor urban planning and lack of health-promoting policies in schools and workplaces can explain why obesity and diabetes can exist in parallel with malnutrition in poor urban settings (*138*). HIV prevalence is on average 1.7 times higher in urban than rural areas (*82*), and this is linked to various social determinants of unsafe sex, which may play out in particularly deleterious ways in urban areas.

Poor physical environment. Indoor air pollution in poorly ventilated households may be more common in urban than in rural areas. Furthermore, the risk of exposure to outdoor air pollution and air pollutants in workplaces is elevated in urban and industrialized areas (*138*).

Fragmented health systems. Health systems in large urban areas are often complex due to multilayer health authorities and a broad spectrum of poorly linked public and private health providers, from superspecialists in tertiary hospitals to informal private providers in urban slums. Making sense and the best use of these authorities, levels, sectors and specific provider types pose immense challenges for both national TB programmes and for patients looking for appropriate TB care (*40*). The common problem of patients shopping around for care and experiencing long diagnostic delays is often more pronounced in urban areas due to more health care options, weak referral chains and poor mechanisms for coordination (*148*). This may lead to longer duration of infectiousness among people in urban areas, especially among the poor in urban slums.

This clustering of risk factors among the urban poor may explain why the TB burden is generally higher in urban than in rural areas. Special attention to urban TB control is required, and it should entail both special efforts to reach the urban poor with curative interventions, and addressing the determinants that make them susceptible to TB infection and disease.

Summary and way forward

There are different possible causal pathways linking low socioeconomic status with high risk of TB. Some of these pathways go via a set of well-defined downstream risk factors that have a range of social determinants. From the preceding analysis it is clear that socioeconomic development may induce a mixed set of changes in the TB risk factor profile for a country and thus influence the TB burden in different directions. It can reduce TB vulnerability through improvements in general living standard, education and nutrition. However, it can also give additional financial capacity that allows higher uptake of alcohol use, smoking and unhealthy dietary habits. Economic development coupled with industrialization, migration, urbanization and certain behaviour changes can create conditions under which TB epidemics flourish. Globalization is partly fuelling such changes (*145, 146*). This risk is greater if economic development does not also lead to equitable access to basic education and better health services, as well as to equitable income distribution and social reform aimed at minimizing the degree of relative deprivation.

There is no doubt that socioeconomic development, in its broadest sense, can bring about a dramatic reduction in the TB burden. The precise impact of different socioeconomic development scenarios and specific efforts to tackle various proximate TB risk factors is beyond the scope of this analysis. This is however a high-priority area for future research. The following broad research areas require further attention:

- basic epidemiological research to further establish association and causality of TB risk factors, including interactions between the risk factors;
- refined and country-specific analyses of population attributable fractions of different risk factors, accounting for interaction and heterogeneity across countries;
- multilevel analysis to explain causal pathways linking low socioeconomic status with higher risk of TB;
- analysis of factors determining variations in TB burden and historical change in TB burden across countries and across geographical areas within countries;
- modelling of impact on future TB burden of different scenarios for socioeconomic change and change in risk factor exposure in populations.

Such research would help to improve our understanding of the possible future paths of the TB epidemic, the relative importance of different interventions that address social determinants and proximate risk factors and how they can complement curative interventions. However, some tentative additional entry-points for preventive intervention aimed to address social deter-

minants and risk factors can be identified. These are discussed in section 12.4.

12.4 Interventions: possible new entry-points

This section focuses on possible additional interventions, beyond those already included in the Stop TB Strategy (see above). Figure 12.5 highlights possible entry-points for interventions.

Preventing TB through addressing downstream risk factors

The analysis of the population attributable fraction for selected risk factors presented above indicates that reduced prevalence of HIV, malnutrition, smoking, diabetes, alcohol abuse and indoor air pollution would all have important implications for TB control, but the relative importance of the different risk factors varies across regions and countries. Ideally, a careful analysis should be carried out on a country-by-country basis to identify the most important risk factors to address. The relevant and possible contribution by TB programmes at national level need to be explored in the light of: (a) analysis of the population attributable fraction of the different risk factors in the country; (b) effectiveness and cost-effectiveness of the available interventions to reduce them; (c) the possible complementary role that national TB programmes can play in supporting other programmes and the general health system; and (d) the capacity of, and competing demands on, national TB programmes.

Possible intervention entry-points for alcohol abuse, malnutrition and smoking are covered in other chapters of this volume (see Chapters 2, 4 and 11 respectively). No preventive intervention to address these risk factors would be the sole, or even primary, responsibility of national TB programmes, the role of which would be to collect information and analyse the importance of different risk factors, to establish or improve collaborative interventions with other public health programmes as required and to analyse how the programme can contribute in practice to the implementation of such interventions. Public health programmes must rely on a well-functioning health system, in particular primary health care. Contribution to health systems strengthening, already on the agenda for national TB programmes (*19, 59*), can therefore indirectly help address these TB risk factors. Further integration of TB programme implementation with public health programmes addressing the various TB risk factors, under the umbrella of comprehensive primary health, may further strengthen both the health system and TB control.

National TB programmes can make a direct contribution to the implementation of certain programmatic components, and to some extent this is already happening. The Stop TB Strategy component on TB/HIV collaborative activities already incorporates a strong element of improved diagnosis, treatment and care for people with HIV/AIDS, and it opens up for stronger involvement of national TB programmes in primary HIV prevention. Some programmes provide nutritional support to patients (*58*), others are involved in initiatives to tackle alcohol abuse (*149*). Smoking cessation as a component of national TB programmes is currently being piloted as part of the Practical Approach to Lung Health (PAL) initiative (*150*). Guidelines for improved management of diabetes and alcohol abuse among TB patients may also be required. Ongoing efforts focus on people who have already developed active TB disease. Further engagement in primary prevention would be required for a significant impact on the TB burden. This would entail support also to actions aimed at addressing these risk factors and their social determinants in the general population.

Guidelines for collaborative strategies between public health programmes should be developed jointly between Stop TB and other programmes along the lines of what has already been done concerning TB and HIV collaborative activities (*151*) and concerning TB and tobacco control (*152*). Guidelines on programmatic collaboration need to go beyond guidelines for clinical management of individuals with comorbidity, and also consider population-based preventive actions and regulatory approaches.

Currently, the Stop TB Strategy recommends active screening of TB among all people with HIV. This may be expanded to include systematic TB screening among vulnerable populations in high TB burden settings and people who are exposed to specific risk factors, such as malnutrition, smoking, diabetes and drug and alcohol abuse. The Stop TB Strategy recommends prophylactic treatment of demonstrated or assumed latent TB infection for people with HIV (after active TB disease has been excluded), and also for children under the age of 5 who have had close contact with a person with infectious TB. In countries where sufficient resources are available the indication for treatment of latent infection is often much broader than this. Future global preventive strategies may include broadening of the indication for treatment of latent infection to include all people at high risk for progression from infection to disease. However, considerable research will be required to demonstrate the effectiveness, feasibility, cost-effectiveness and public health impact of such approaches before they could be recommended as part of national TB control strategies.

Addressing upstream social determinants

As the work of the Knowledge Network on Priority Public Health Conditions has shown, the conditions that constitute TB risk factors share many social determinants that are also relevant to other priority public health conditions (see Chapter 14). Addressing these determinants will contribute to the control of many public health problems simultaneously. The more upstream the entry-point for intervention, the more widespread the effect. Economic development and poverty reduction would be essential elements. However, there is no simple relationship between economic growth and TB decline, nor between poverty reduction and TB decline. Some of the risk factors for TB, such as smoking, diabetes and alcohol abuse, are likely to become more prevalent in settings that are experiencing rapid economic growth. This seems to be particularly likely where reductions in absolute poverty are coupled with sustained inequity, continued lack of basic education, lack of strong public health policies and legislation, and sociocultural changes favouring unhealthy behavioural patterns. Therefore, in order for economic growth to effectively contribute to TB control, it needs to be combined with appropriate social and public health policies. Here, the countries that currently have a high TB burden may learn from those countries that experienced such a dramatic reduction in TB burden during the 20th century.

The Commission on Social Determinants of Health has developed frameworks for action to address a wide range of upstream social determinants, including various aspects of globalization, urbanization, health systems, social exclusion, employment conditions and gender equity (*137, 138, 153*). TB programmes and technical partners supporting them need not reinvent the wheel by developing frameworks for action in these areas, but should rather collect relevant information, analyse it and provide additional intellectual ammunition to back up these frameworks, and help implement them as is appropriate and feasible. Public health experts are in a good position to provide policy-makers with the evidence of links between health and social change (*86, 154*). International technical agencies, including WHO, need to play an active part in both producing the evidence base for which social determinants are most important, and then devising advocacy strategies highlighting the need to address them. Such advocacy needs to target international and national players outside the health sector, such as trade organizations, development banks, government, and nongovernmental development agencies.

Political commitment – the first element of DOTS and the new Stop TB Strategy – should not only concern commitment from governments to invest in and support TB diagnosis and treatment programmes, but also commitment to address the upstream drivers of the TB epidemic. Advocacy for such political commitment is more effective when done jointly across public health conditions that share common upstream social determinants.

Moreover, TB programmes should be actively involved in any national initiative to fight poverty and improve living conditions, such as the development of poverty reduction strategy papers and similar processes. A practical programmatic aspect of such involvement is to ensure that the TB programme fosters equity in access and financial protection for the poor. National TB programmes may also be actively involved in local poverty reduction initiatives, such as microcredit schemes, vocational training and other forms of social support for TB patients and their families. This, together with the positive health impact of good TB treatment and the resulting effects on the productivity of the workforce directly, would contribute to equitable economic development.

The ultimate responsibility to address the upstream social determinants that drive TB epidemics rests with several stakeholders, both governmental and non-governmental. The responsibility goes well beyond the traditional realm of national TB programmes and well beyond the boundaries of ministries of health. For example, ministries of finance, education, social welfare, trade, labour and environment have important roles to play. In addition, civil society and the private corporate sector need to contribute.

12.5 Monitoring and evaluation

As discussed in the introduction to this chapter, the current TB control strategy already pays attention to the need to reach the poor and vulnerable with effective curative interventions. There is a well-established system of monitoring TB control implementation and key programmatic outcomes such as case detection and treatment success rate. However, there are no established indicators, targets or measurement strategies to monitor the progress towards achieving "universal access to high-quality diagnosis and patient-centred treatment". Specifically, there is no routine monitoring to determine who is actually being reached by national TB programme interventions, and this is rarely done even as part of research initiatives (*155*). Methods to measure the effectiveness of pro-poor strategies are currently being developed by the TB and Poverty subgroup of the Stop TB Partnership. A possible approach is to determine the socioeconomic profile of TB patients reached by national TB programmes through a

survey of newly registered patients. Ideally, this should be compared with the socioeconomic profile of people with TB in the community, as identified through a TB prevalence survey. Approaches for measuring socioeconomic status in a TB prevalence survey have been included in the recently published guidelines on how to conduct TB prevalence surveys (*156*).

Building a stronger preventive dimension into the general TB control strategy will require additional indicators. This would include monitoring of prevalence of risk factor exposure among the general population and among people diagnosed with TB. One way to do this may be through regular TB prevalence surveys, and this is currently being advocated as one of several means to monitor progress towards the TB-related Millennium Development Goal targets. Instruments to measure prevalence of HIV, smoking, malnutrition, diabetes, indoor air pollution, alcohol abuse and crowding have also been included in TB prevalence survey guidelines (*156*).

Process indicators for new preventive actions would need to be developed, including indicators of programmatic collaboration similar to those already developed for TB and HIV collaborative activities (*151*). Measuring progress towards addressing upstream determinants outside the health system has to be done as part of a monitoring package across public health conditions. Process indicators to monitor for national TB programmes may include indicators of national actions that aim to analyse the impact of TB determinants at national level, and develop advocacy strategies for how to address the most relevant determinants that lie outside the health system.

Abundant routinely collected TB surveillance data exist at national and subnational level that could be used for such analysis (*68, 69*). However, there is no strong tradition of analysing these data with a view to understanding variation and time trends of the TB burden in relation to change in risk factor prevalence and in aggregate socioeconomic indicators. Such analysis could greatly contribute to the future understanding of the underlying forces driving TB epidemics in countries.

12.6 Possible sources of resistance to change

The most important risk in expanding the framework of TB control to include broad aspects of prevention and social determinants is that it may draw attention away from what is currently the core task of national TB programmes: ensuring delivery of quality TB diagnosis and treatment.

One of the success factors behind rapid scale-up of quality TB programmes over the past 15 years has been a broad consensus across technical agencies on a limited set of strategic elements for ensuring effective implementation of curative TB services. During this time, TB control rarely suffered disruptive debates over the value of prevention versus curative approaches. Massive efforts have been put in place to ensure that patients in many countries now have access to a reliable supply of drugs, well-trained health care staff and well-functioning diagnostic services. Intensified efforts will be required to ensure universal access to such services for all TB patients, especially in the poorest countries, which struggle with weak health systems and severe human resource crises.

The new Stop TB Strategy, which builds on the DOTS strategy, puts a heavy demand on national TB programmes in terms of additional essential TB control activities to be performed. Adding even more responsibilities for preventive interventions and contribution to initiatives to address social determinants to the portfolio of national TB programmes risks diverting attention and limited resources away from where they are urgently needed. This risk is unfortunately largest where TB burden is highest, which is also where the health systems are weakest and where social determinants of TB take their highest toll.

A related potential side-effect is that countries may use the importance of social determinants and prevention as an argument for not scaling up curative services. It can be deleterious for national TB programmes and for TB control when health ministers argue that improved nutritional status and living conditions are the only "real long-term solutions" for TB control, and thus reduce support for quality curative services. Such a position could translate into millions of lives lost, those lives that only curative services can save in the short to medium term.

In order to mobilize support from overstretched national TB programmes and to avoid some of the potentially disruptive consequences discussed above, it is essential to reinforce two important points. First, the current curative approach needs to be further strengthened. In order to alleviate suffering and control TB it is essential that people with TB are diagnosed as quickly as possible, and receive evidence-based treatment. National TB programmes in most countries need to step up actions to ensure improved equity in access to quality curative services. For this, both strengthening of the general health system and additional funding for TB-specific interventions are required. Second, the responsibility for taking additional preventive actions does not fall on national TB programmes alone. As discussed above, other partners within and outside the health sector need to be engaged. Biomedical causes

require biomedical interventions, behavioural causes require behavioural interventions and social causes require social interventions. National TB programmes are not well suited to tackling the latter two, and should not tackle any of them alone. The responsibility to address the upstream social determinants rests mainly outside the health system. The role of the national TB programme and technical partners should mainly be to contribute to the understanding of the underlying driving forces of the TB epidemic, and to more strongly advocate the need to address them.

12.7 Next steps

This analysis was done at a time during which a new global strategy for TB control had just started to be scaled up in countries (*24*). Countries are still busy optimizing several new areas of work under this strategy, and are struggling to mobilize resources and personnel for the additional tasks. The need to broaden the scope of TB control even further, as discussed in this chapter, will have important implications for planning and implementation of national TB programmes in the future. A distinct agenda for action has not been presented, as this should be developed with the involvement of all concerned TB control partners. The debate informing this work should be guided by one basic principle: that effective TB control cannot be achieved through *either* excellent diagnostic and curative TB services alone *or* primary prevention by tackling risk factors and social determinants alone. Both will be needed, and the work to find the right package of actions and the appropriate role division for the respective tasks will have to be done mainly at a country level, in relation to the status of the TB epidemic and the strength of the national TB programme and the general health care system.

Some tentative additional entry-points for interventions have been presented, and a possible role division in taking them forward has been discussed. The next task for partners involved in TB control at global and national level is to develop the required practical steps towards concrete action, while taking the analysis of social determinants for TB forward and adapting it to country contexts. Bearing in mind the cross-cutting nature of the risk factors and determinants, it will be essential that this is done in close collaboration with other disease control programmes under the framework of health systems strengthening and comprehensive primary health care, as well as with relevant stakeholders working towards poverty reduction and equitable social and economic development.

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Violence and unintentional injury: equity and social determinants

13

Helen Roberts and David Meddings[1]

Contents

Figures

1 The authors would like to acknowledge Danny Dorling, John Pritchard, Ian Roberts, Anneliese Spinks, Leif Svanstrom, Margaret Whitehead, and the Cochrane Injuries Review Group, The Cochrane Public Health Review Group and the Cochrane Equity Methods Group.

13.1 Summary

Injuries account for just under 10% of global mortality, constituting a major and growing public health problem, with worldwide injury-related deaths projected to increase by 28% by 2030. Over 5.7 million people lost their lives due to injury in 2004, and in addition to these, acts of war cause harm to millions more.

Injuries are a major contributor to inequities[2] in health. Intentional and unintentional injuries are unevenly distributed between rich and poor nations, and within nations between rich and poor individuals. Inequities relating to gender, age and ethnicity are also evident, and these vary according to injury cause and setting, with young men frequently overrepresented in some kinds of road traffic and intentional injury, and women and children more heavily represented in domestic injury, whether intentional or unintentional.

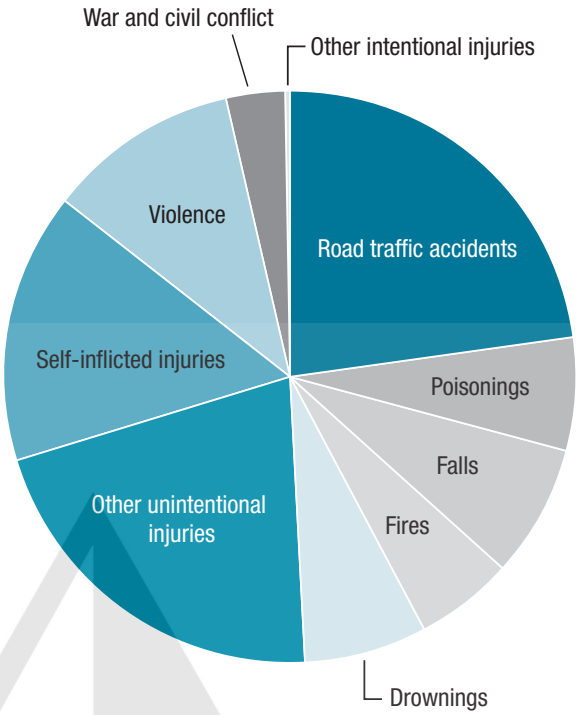
For interventions on injury to make a significant difference both to inequities and to the global toll of death and disability they need to act on upstream measures, addressing transport policies, including those relating to vehicle use and speed; housing policies, with the aim of turning the idea of the home as a safe haven into a reality; and alcohol policies, giving due regard to the supply end of the problem as well as problem drinkers. Putting the emphasis, as is often currently the case, on behavioural interventions directed towards individuals, and in wealthier nations, secondary and tertiary care of the injured, will further widen inequities.

At present, much of the evidence base for injury reduction comes from high-income settings. There is a pressing need to enhance the evidence base for both evidence of effect and evidence of effective implementation in low- and middle-income settings, and, in wealthier settings, to ensure that upstream interventions take account of the needs of the most disadvantaged populations. As in other areas discussed in this volume, the importance of lay expertise and knowledge is vital in addressing injury.

One implication of the approach described here, with an emphasis on upstream measures, is that injury prevention provides a powerful way of illustrating the health impacts of intervening on social determinants. Intervening in this way can and frequently does yield cross-cutting benefits for a range of health and other outcomes. The wide inequities in health in this area, although a depressing example of the need for an approach that encompasses social justice, also shows more positively that things do not need to be the way they are.

2 There are different views on the use of language. The authors of this chapter had originally inclined to the use of "inequalities" in health, but, in the interests of consistency, have adopted the terms used elsewhere in this volume.

FIGURE 13.1 Distribution of global injury mortality by cause



Source: World Health Organization (*1*).

13.2 Introduction

Background

Injuries account for just under 10% of global mortality, constituting a major and growing global public health problem. Over 5.7 million people lost their lives due to injury in 2004 – equivalent figures for HIV, tuberculosis and malaria were 2.0 million, 1.5 million and just under 0.9 million respectively (*1*). Seven of the 15 leading causes of death for people between the ages of 15 and 29 years are injury related (*1*). In addition to these deaths, injuries resulting from traffic collisions, drowning, poisoning, falls, burns, violent assault, self-inflicted violence or acts of war cause harm to millions more (*2*). Global injury-related deaths are projected to increase by approximately 28% by 2030 (*1*). Figure 13.1 breaks down the global injury burden by mechanism, showing the large parts played by road traffic injuries and violence (*3*).

In this chapter some of the ways in which inequities impact on causes and consequences of injury are outlined, and some effective or promising strategies to reduce injury and violence by acting on social determinants are set out. Finally, data requirements to monitor

and evaluate the described strategies and interventions are explored.

Sources and limitations of evidence

The evidence in this chapter derives largely from peer-reviewed scientific literature, especially systematic reviews, as well as reports from governments and international agencies. Particular reference has been made to the work of the Cochrane Injuries Group (*4*), in which a significant proportion of reviews deal with prevention; the emerging work of the Cochrane Health Equity Field and Campbell Equity Methods Group (*5*); and the work of the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) in London (*6*). Other sources of knowledge (*7–9*) included the experience of those exposed to risk of injury in disadvantaged areas. No one scientific method was considered to be higher up the evidential ladder in terms of contributing to an understanding of the issue (*10*), and studies using a range of methodologies were drawn on.

While much of the evidence base on social determinants of injury and interventions is produced in high-income settings (*11–13*), injury disproportionately impacts low- and middle-income countries, where implementation may be too costly or insufficiently context relevant.

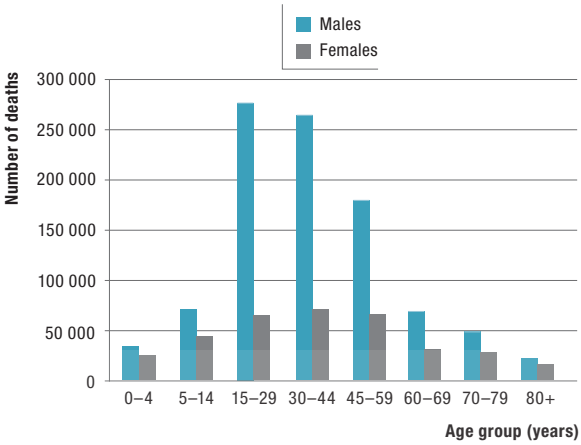
This chapter focuses on social determinants of injury in a general sense, and identifies entry-points by which causal pathways linking social determinants and injury may be interrupted. Illustrative examples are given using three determinants of injury: alcohol; housing and neighbourhoods; and vehicles and roads.

Inequities and the determinants of injury

Violence and unintentional injury are a significant locus of inequity (*14, 15*). In terms of economic inequities, both intentional and unintentional injuries are unevenly distributed between rich and poor nations, and within nations between rich and poor individuals. Even in a relatively wealthy setting such as the United Kingdom, a child from the lowest social class is 16 times more likely to die in a house fire than one from a wealthy family (*16, 17*).

In many cases, other inequities also come into play, including differences relating to gender, age and ethnicity, and differences in access to and costs of treatment that impact on morbidity and mortality (*15*).

FIGURE 13.2 Road traffic deaths worldwide by sex and age group, 2004



Source: World Health Organization (*1*).

Figure 13.2 demonstrates differences by age and sex in road traffic deaths worldwide (*1*). These graphically illustrate the impact on younger adult men, with implications for societal economic impact due to the aggregate effect of productive life years lost. While a distribution affecting younger adult men is a relatively consistent feature of many fatal injury outcomes, women are overrepresented in a variety of non-fatal injury outcomes, including intimate partner violence and sexual violence.

Around 90% of global road traffic deaths are in low- and middle-income countries (*15*). The poor get hurt more often than the rich, as they are more likely to be exposed to the risks posed by vehicles when they are walking or cycling. When they are inside rather than outside vehicles, they are less likely to be in well-maintained machines. By 2020, deaths from road accidents are expected to continue to fall in many richer nations (often at the price of a reduction in the freedom of children to occupy public space) but to rise in poorer ones (*18*). The differentials in progress in reducing road traffic fatality rates between high-income countries and low- and middle-income countries echo steep inequity gradients elsewhere.

On the one hand, inequities in health in terms of social factors serve as a reminder of the social injustices that mean that length and quality of life are subject to powerful determinants. On the other, they show that things do not have to be the way that they are (*19*). If it is possible for the best-off to be at lower risk of exposure to accidental and non-accidental injury, then there are lessons there for all.

13.3 Analysis: social determinants of injury

Research evidence on reducing the determinants of injury

While research evidence is the factor most consistently used in this chapter, it must be borne in mind that research evidence is only one of many influences on policy or practice strategies to reduce injury. Reference has also been made to other influences, such as tradition, values and expertise, including lay expertise (*20*). Moreover, others have drawn attention to the importance of underlying theories regarding inequities as causes of public health problems and the ways in which a given intervention might bring about improvement (*21–23*).

In a report of this kind, there is a trade-off between strong research evidence from trials, qualitative work and systematic reviews, and potentially promising, but less robust, single primary studies. Data are presented here from two sources – systematic reviews and individual studies. The primary studies have been selected either because they directly address the top three levels of the analytical framework guiding this volume or because they are informed by these.

The Cochrane Injuries Group is one of the better-populated review groups in terms of a focus on determinants, and efforts to look at the problem beyond the confines of wealthier nations. Nevertheless, in line with the predominant focus on injury rather than the antecedents to injury, a relatively small number of reviews address the determinants of injury beyond behaviour. Among other review groups, the EPPI-Centre (*6*) in London uses a broad range of study types, including user views in research syntheses; the Campbell Collaboration (*24*), a sister collaboration to Cochrane, provides evidence for decisions about the effects of interventions in the social, behavioural and educational arenas; and the newly established Cochrane Public Health Review Group (*25*) and Cochrane Health Equity Field (*26*) have growing contributions to make to tackling inequities through a focus on determinants.

Reviews and individual studies relevant to alcohol and injury

In a review of ways of working with problem drinkers (*27*), the authors point out that injuries (both intentional and unintentional) are one of the most important ways in which excess alcohol use can result in harm. The evidence from the studies they identify suggests that behavioural change interventions with problem drinkers are effective in reducing both injuries and the events that lead to injury (such as falls, motor vehicle crashes and suicide attempts).

Another review (*28*) points out that while many interventions to reduce alcohol-related injuries have a demand-side focus and aim to reduce individuals' consumption of alcohol, supply-side interventions, altering the environment and context within which alcohol is supplied, are also required. The review examines the evidence for the effectiveness of interventions implemented in the alcohol server setting for reducing injuries. The studies cover a range of interventions involving server training, health promotion initiatives, a drink-driving service, a policy intervention and interventions that target the server setting environment, concluding that there is no reliable evidence that interventions in the alcohol server setting are effective in preventing injuries.

A review on a passive intervention – an alcohol ignition interlock (*29*) – describes convicted drink-drivers being given the choice of a standard punishment or the fitting of an alcohol ignition interlock to their car for a fixed period. To operate a vehicle equipped with an interlock, the driver must first give a breath specimen. If the breath alcohol concentration is too high, the vehicle will not start. The authors conclude that while the interlock seems to reduce reoffending as long as it is still fitted to the vehicle, there is no long-term benefit after it has been removed. The low percentage of offenders who choose to have an interlock fitted makes it difficult to reach firm conclusions about the effectiveness of this as an intervention.

Moving from systematic reviews to primary studies, a multilevel intervention in Cali, Colombia, which restricted bar opening hours and limited access to firearms, reported a significant reduction in firearm-related homicide (*30*). The restrictions on bar closing hours and on carrying a firearm were enforced by authorities who targeted the poorer districts of the city, where most homicides had taken place. Another study evaluated the effect of a 02:00 (as opposed to a 05:00) closure of bars in the city of Juárez, Mexico (*31*). Prior to this partial ban on alcohol sales, the city was a favoured destination for young adults crossing the United States–Mexico border to take advantage of a lower drinking age (18 as opposed to 21), and lower-priced alcohol. The study found an 89% reduction in young drinkers crossing the border after 03:00. Finally, a recent meta-analysis found that while emergency department interventions for alcohol problems did not reduce subsequent alcohol consumption, they were associated with approximately half the odds of experiencing an alcohol-related injury (*32*). However, an overall rise in violence in the city at present is a sobering turn. It seems unlikely to be related to displacement activity, but the rise of violence in Juárez is a reminder

that complex social issues require comprehensive social interventions, and there is no single magic bullet that will affect all outcomes definitively.

The reviews and individual studies above relate to both alcohol and transport, but with alcohol as the primary presenting problem. Pathways identified are individual behavioural (potentially strengthening individuals); contextual (potentially strengthening communities and targeting availability); and a passive measure (interlocking).

Reviews and individual studies relevant to housing and neighbourhoods and injury

A Cochrane review (*33*) found that home safety education provided most commonly as a one-to-one, face-to-face intervention, in a clinical setting or at home, especially with the provision of safety equipment, is effective in increasing a range of safety practices. There was no consistent evidence that home safety education, with or without the provision of safety equipment, was less effective in those at greater risk of injury, but the effect of home safety education appeared to diminish with time, with greater effects for most outcomes over a short (three months or less) time period. There was a lack of evidence regarding the impact of these improved safety practices on child injury rates.

In a review of community-based interventions to reduce burns and scalds in children (*34*), only one study showed a significant decrease in paediatric burn and scald injury in the intervention community compared with the controls. The authors suggest that an evidence-based suite of interventions be combined to create programme guidelines suitable for implementation in communities throughout the world. They point out that there remains a gap between "what we know works" and "how to make it work" in a real-world setting.

A review of modifications to the home environment (*35*) was similarly cautious, finding insufficient evidence to determine the effects of interventions to modify home hazards.

Interventions to promote functioning smoke alarms to reduce injury were reviewed in 2001 (*36*), with less than positive findings. As the authors point out, many children aged 0–16 are killed or injured by house fires each year, with a steep social class gradient. Fires detected with smoke alarms are associated with lower death rates. This review found that interventions to promote smoke alarms have at most only modest beneficial effects on smoke alarm ownership and function, fires and fire-related injuries.

A review of pool fencing (*37*) is more positive, concluding that pool fencing that adequately prevents children reaching a pool unsupervised can prevent about three quarters of all child drowning in pools. The death of a child is always a tragedy, but with a focus on inequities and addressing social determinants, the fencing off of water is unlikely to be an effective intervention in low- and middle-income countries.

Also positive in its conclusions is a review of population-based interventions to prevent falls in the elderly (*38*), suggesting a relative reduction in fall-related injuries ranging from 6% to 33%, providing support for a population-based approach.

Rather more cautious is a review of the World Health Organization (WHO) Safe Communities approach (*39*) to population-based injury reduction. The emphasis of the Safe Communities approach is on collaboration, partnership and community capacity-building to reduce the incidence of injury and promote injury-reducing behaviours. Approximately 150 communities throughout the world have been designated as "Safe Communities", in countries as diverse as China, Czech Republic, South Africa and Sweden. Programmes target high-risk groups or environments and promote safety for vulnerable groups. They range from bicycle helmet promotion in Sweden to antiviolence programmes in South Africa, traffic safety initiatives in the Republic of Korea and indigenous community injury prevention programmes in New Zealand. The review authors identify that only 21 of the Safe Communities have been the subject of controlled injury outcome evaluations. These communities are from two geographical regions: the European countries of Austria, Sweden and Norway and the Pacific nations of Australia and New Zealand, both of which have relative economic wealth, higher health standards and lower injury rates than many other parts of the world. Although positive injury rate reductions were reported for some communities, the results varied substantially and overall do not provide a clear answer to the question of whether the adoption of the Safe Communities model leads to a significant reduction in injury. Limited information is available about how the programmes were implemented, their impact on injury risk factors and their sustainability. There were also substantial methodological limitations associated with most of the included evaluations. No evaluations were available from other parts of the world, particularly those with lower economic and health standards.

Absence of evidence does not, of course, denote evidence of absence of positive health effects. The collaborative spirit and attention to low- and middle-income countries of the Safe Communities approach, and an understanding of the wider benefits to health that attention of the kind engendered through being

part of a worldwide community of interest may bring, are important factors.

Shifting focus from the attributes of households and communities to the quality of the nurturing environment for children, a number of early childhood interventions appear to be effective when targeting populations in lower socioeconomic neighbourhoods. A review of a range of early childhood interventions primarily based on home visitation or home visitation combined with parental education, typically within the first 5 years of life, considered a subset of the programmes targeted at high-risk households, where risk equated to markers such as a household with an income below the poverty line (*40*). Overall the findings were positive from the 20 programmes with evaluation designs that were considered strong, and the benefits tended to be more pronounced in programmes that focused specifically on disadvantaged populations. Benefits were measured over a wide variety of domains (cognition and academic achievement, behavioural and emotional competencies, educational attainment, child maltreatment, health, delinquency, use of social welfare programmes and labour market insertion). The broad array of domains studied in which benefits accrue shows that the impact of such programmes extends into other domains of health, where benefits were observed in early, middle and late childhood and through to adulthood.

Another review looked at early childhood interventions and tenant-based rental voucher programmes designed to allow poorer families to move to better housing and neighbourhoods (*41*). On the basis of a range of positive outcomes, results supported early childhood development programmes for children aged 3–5 at risk because of poverty, and supported rental voucher programmes on the basis of improved household safety and reduced risk of victimization due to violence and exposure to violence. Long-term effects (after 15 years) of home visitation have found the intervention particularly effective for low-income, unmarried mothers, with a wide range of negative outcomes reduced for mother and child, including child abuse and neglect, and criminal behaviour (*42*).

The reviews above relate to housing, households and neighbourhoods as determinants. Pathways identified tend to be at the individual behavioural level (strengthening individuals); socioeconomic contextual level (strengthening communities and improving the quality of the household environment); and physical environment and infrastructure levels (smoke alarms).

Reviews and individual studies relevant to the prevention of road traffic injury

The Cochrane database is relatively well populated in this area. It is important that readers with an interest in this aspect of injuries consult the database for updates on the findings below (*43*).

A review of bicycle helmet legislation (*44*) concludes that this appears to be effective in increasing helmet use and decreasing head injury rates. A review of non-legislative interventions to encourage the wearing of cycle helmets (*45*) is similarly positive, finding that while the results varied, overall, after a campaign, children were more likely to wear helmets. The reviewers could not identify the best way of reaching poorer children, and the studies they reviewed did not look at the impact of campaigns on injury rates, or assess whether the promotion campaigns had negative effects. A review of the part played by helmets in preventing facial and head injury in cyclists (*46*) provides the robust conclusion that wearing a helmet reduces the risk of head or brain injury by approximately two thirds. Feedback from critics of these reviews demonstrates the complexity of this area (*46*).

A review of trials and observational data from a variety of settings, including some low- and middle-income countries, concludes that helmet use by motorcyclists reduces the risk of head injury by around 72% (*47*). The risk of death is also reduced and the review supports the view that helmet use should be actively encouraged worldwide.

A review of reflective clothing concludes that visibility aids have the potential to enable drivers to detect pedestrians and cyclists earlier (*48*) but that the effect on pedestrian and cyclist injury remains unknown.

A review largely applicable to (and based on studies from) wealthier nations looks at the effectiveness of interventions to promote the use of booster seats in 4–8-year-olds (*49*), concluding that all interventions investigated were found to increase the use of booster seats. Specifically relevant to equity issues, the distribution of free booster seats combined with education on their use had a marked beneficial effect, as did incentives (for example booster seat discount coupons or gift certificates) combined with education.

Turning to drivers, a review of whether graduated driver licensing reduces crash rates among novice drivers by gradually introducing them to higher-risk driving situations found that relatively little research had been done to see whether this actually works (*50*). The review found 13 studies that had evaluated various types of programmes, all of which reported positive

findings, with reductions for all types of crashes among all teenage drivers. However, the size of the reductions varied and, from the evidence available, it is not possible to say which aspects of programmes have the biggest effect. A more conclusive review looks at driver education (*51*). As the authors point out, drivers' errors often contribute to traffic crashes and driver education is often used in the belief that this makes drivers safer. Driver education for licensed drivers can be remedial programmes for those with poor driving records, or advanced courses for drivers generally. They can be offered by correspondence, in groups or with individualized training. The review of trials found strong evidence that no type of driver education for licensed drivers leads to a reduction in traffic crashes or injuries.

Also in the area of driver education is a review of school-based education for drivers aimed at the prevention of traffic crashes (*52*), an example of a review where a well-meaning intervention appears to have the reverse of the desired effect. The authors conclude that driver education in schools leads to early licensing, but there is no evidence that it reduces road crash involvement, and it may lead to a modest but important increase in the proportion of teenagers involved in traffic crashes.

A review with very positive findings explores the use of cameras at road junctions (*53*). As the authors report, a common place for road traffic accidents is at junctions (intersections) controlled by traffic signals. Red-light cameras are now widely used to identify drivers that jump (or "run") red lights, who can then be prosecuted. This review looked for studies of their effectiveness in reducing the number of times that drivers drive through red lights and the number of crashes. Five studies in Australia, Singapore and the United States all found that use of red-light cameras cut the number of crashes in which there were injuries. In the best conducted of these, the reduction was nearly 30%. A similarly positive trend in a review of engineering measures relates to the use of speed enforcement devices (*54*) to prevent traffic injuries. The authors found that although there were methodological limitations to the studies reviewed, the consistency of reported reductions in speed and crash outcomes across all studies suggest that speed enforcement devices are a promising intervention for reducing the number of road traffic injuries and deaths.

A review of educational interventions (*55*) (mostly in children) found that pedestrian safety education can improve children's road safety knowledge and their observed road-crossing behaviour. However, whether these changes to knowledge or behaviour can be linked to a reduction in pedestrian deaths and injuries is unknown.

A number of individual studies have documented prevention of road traffic injury or improved access to established safety measures through interventions that have explicitly targeted or taken into account the socioeconomic context. In many low-income countries children are routinely transported on motorized two-wheelers, and studies have shown that factory workers need to work 11 times as long as counterparts from high-income countries to purchase motorcycle helmets. In Viet Nam a nongovernmental organization distributes tropical climate-suited motorcycle helmets free of charge to school-age children (*56*).

Child restraint systems are very effective in preventing injury if correctly installed and used. A number of studies have shown that uptake of these interventions may be increased in populations where use is low through free distribution, loan schemes or subsidized rental schemes. In addition to the Cochrane review, a variety of studies have demonstrated such measures to have a marked beneficial effect on the uptake and use of appropriate restraint systems for children and to be highly cost effective (*57, 58*).

Finally, incorporating safety features into road design has been shown to be effective and has addressed the improvement of road networks in poorer environments. Ghana has road fatality rates some 30 to 40 times higher than industrialized countries and excessive speed has been shown to be a key contributory factor. Inexpensive speed bumps in pedestrian crash hot spots in towns lying alongside the main Accra–Kumasi highway have been associated with a 35% reduction in road traffic crashes, a 55% reduction in fatalities and a 76% reduction in serious injury, showing the feasibility of addressing differential exposure to risk through speed control interventions (*59*).

13.4 Discussion: pathways between determinants and injuries

This section uses the examples of alcohol, housing and neighbourhoods, and roads and vehicles to chart some pathways between social determinants and injury, and identify areas where interventions along these pathways might be effective. The same set of circumstances – a speeding car or a dropped match, for instance – may lead to no injury, minor injury, serious injury or death. In many cases, these outcomes will themselves be related to the determinants of inequities and poor outcomes in other spheres. Poverty, poor housing, poor education and poor standards of, or access to, health care determine exposure to risk, and in the case of health care, may also determine the outcome once an injury occurs. Furthermore, determinants for

injury have an impact on other outcomes, and the framework and interventions advanced here are relevant for other areas of work of the WHO Commission on Social Determinants of Health. Other knowledge networks of the Commission, including those on early development, urban settings and challenging inequities through health systems, will also have an impact on injuries and violence (*60*).

It has long been established that the determinants of injuries and violent deaths are multifactorial (*61*), though by the time any single death is investigated, there will often be a single explanation – "speeding", "drunken driver", "crossing the road without care". These explanations, focusing as they do on only one element of the causal pathway, can result in inadequate "solutions" (*62*), including educational interventions that may attempt to educate the public in general, and children in particular, to use the road in the "right" kind of way. As a participant from a low-income community in a high-income country put it in a study of safety as a social value: "It's like teaching your child to swim in a pool full of alligators" (*9*).

The following sections take a range of determinants – alcohol, housing and neighbourhoods, and roads and vehicles – in order to chart, albeit only in part, some of the pathways between these determinants and injury, and these and other determinants. The decision to focus on alcohol, housing and neighbourhoods, and roads and vehicles has been made for reasons of conceptual clarity and illustration. They are drawn on as illustrative examples that yield information about the nature of pathways between them and the outcomes of interest, and offer insights into potential entry-points for intervention.

Alcohol

Alcohol is more commonly perceived as a consumer choice than as a determinant of public health problems. It is because of the shaping of social and cultural attitudes about alcohol intake that it is appropriate to consider alcohol as a social determinant. Indeed, other work in this volume looks specifically at the causal pathways linking alcohol to a variety of health outcomes and other consequences (see Chapter 2).

Alcohol is implicated in injury in low-, middle- and high-income countries and plays an important part in a wide range of intentional and unintentional injuries. A recent WHO report (*63*), for instance, suggests that of the large number of deaths associated with alcohol globally, 32.0% are from unintentional injuries, and 13.7% are from intentional injuries.

Injury outcomes related to alcohol use

Road traffic injury is perhaps the most evident injury outcome that has a strong and consistent association with alcohol intake. After a certain level of blood alcohol concentration, crash involvement for drivers increases significantly (*15*). Drivers with elevated blood alcohol levels place themselves at risk and place non-motorized (and therefore more vulnerable) road users at even greater risk.

Availability and use of alcohol has been shown to be an important factor in precipitating a range of violent acts, including youth violence, perpetration of intimate partner violence (usually by men), sexual violence and suicide (*14*).

Injury-related alcohol use and relationships with other social determinants

Destructive patterns of alcohol intake have been well documented and the health effects of this at the population level have been suggested as a potential contributor to observed declines in life expectancy among men in the case of the Russian Federation (*64*).

Taking the health outcome of interest, and relating the available data to the framework being used throughout this volume, injury-related alcohol use shows strong differential health outcomes within both wealthy and poorer countries, including those where alcohol is discouraged. The WHO study referred to above (*63*) found that those presenting to emergency departments with alcohol-related injury were more likely to be young (with a peak in the teenage and young adult years), more likely to be male and more likely to be of low to medium socioeconomic status. Any social determinant-informed approach to addressing the destructive use of alcohol in relation to injury risk needs to take account of this striking sex differential. A 2002 WHO report on gender and road traffic injuries (*65*) reviewed the available data and reported that:

- Data consistently show that men are more likely than women to be driving or walking on the road under the influence of alcohol.
- Studies from Kenya and the United States report that male drivers were far more likely than females to have been drinking prior to a motor vehicle accident.
- In the United States, alcohol use is implicated in approximately one third of all fatal crashes involving teenagers, and the risks are greatest among young males.
- A national survey of young people in Canada reports that of those who reported drinking at parties, males were 3.5 times more likely to drive after drinking.

- In Sweden, more than twice as many male as female pedestrian fatalities during 1977–1995 tested positive for blood alcohol.
- In a 1996 hospital-based study in Cape Town, South Africa, male pedestrians injured were twice as likely to be positive for blood alcohol as females, and had significantly higher mean blood alcohol levels than females.

The report also found that the problem of alcohol-related injuries is particularly alarming in many low- and middle-income countries, where alcohol consumption is increasing, injury rates are extremely high, and appropriate public health policies have not yet been implemented. In these countries ready access to appropriate medical care is less likely to be available than in wealthier nations. This means that differential consequences of injury as a result of excessive alcohol use are inevitably greater amongst those with poor access to health care.

Pathways

The differential distribution of health outcomes described above provides some insight into relevant pathways. Lower socioeconomic context and position is correlated with risk. Furthermore, the strong gender differences suggest different vulnerabilities to factors such as peer pressure regarding alcohol intake and high-risk behaviour during young adulthood.

Setting on one side its adverse non-injury health effects, alcohol use may lead to no injury, minor injury, serious injury or death. The risk of causing, or being involved in, an injury-producing event while under the influence of drink is heightened, but by no means inevitable, which is one of the factors that may reduce the effectiveness of interventions that focus on individuals rather than determinants.

Whilst it is the biological effects of alcohol that are of proximal importance to a driver being unable to brake quickly enough to avoid colliding with a pedestrian, and these same effects have been shown to play a role in sexual violence (*66*), it makes sense from a public health perspective to focus on the pathways that *precede* alcohol intake and are amenable to social intervention and policy-making.

Steps along those pathways where an intervention may interrupt the chain from determinant to injury include cultural attitudes towards alcohol use; access to alcohol; enforcement of sanctions for infringements for under-age drinking (or in some countries, any drinking); measures to prevent drinking while in charge of a vehicle; and being drunk in public. These potential intervention points can be mapped to any of the top three levels of the framework guiding this volume.

When devising interventions it is important to bear in mind that in this public health area, as in many others, an historical perspective suggests that interventions with strong face validity (such as prohibition) may themselves carry adverse outcomes.

Housing and neighbourhoods

Housing's potential as a *protective* factor in health is clear; however, the home is also a common location for both intentional and unintentional injury. Housing is a concrete manifestation of socioeconomic status, which has an important part to play in the development of explanations of the social production of health inequities (*67*). Moreover, factors related to housing tenure and neighbourhood effects are of fundamental importance (*68*).

The decision to examine both housing and neighbourhoods in this chapter is relevant as some injury outcomes relate directly to the quality of the housing itself, whereas others relate to the wider community. With regard to the first of these, poor design, poor building regulations and poor maintenance are all implicated in injury. Overcrowding within households relates to injury in some cultures, while regional differences in habitations, such as flat roofs in hot countries, deficient heating systems in cold countries and habitations unable to withstand natural disasters are also factors in injury.

The scope of factors falling within housing and neighbourhoods as determinants is wide, and would include property boundaries and disputes over these, overcrowding and road congestion, uncontrolled noise levels, formal or informal inhabitation of unsafe land areas such as steep slopes or flood risk areas, unsafe access to social structures such as schools or markets, and absent or deficient infrastructure such as public sewerage, street lighting and regular police patrolling. All of these have been associated with both intentional and unintentional injury and underline the fundamental importance of the human habitat as a determinant of health and safety.

Types of injury that may be implicated

A very broad range of injury and violence outcomes relate to housing and neighbourhoods. Common injuries in the home are falls and injury or death from fire, scalds and smoke. The home, conventionally seen as a place of safety, may be unsafe in relation to interpersonal violence, including partner violence and child and elder abuse. In the wider context of the neighbourhood the range of factors referred to above has been shown to be associated with road traffic injury, injuries related to natural disasters such as flooding, earthquakes

and major weather events, and a variety of forms of interpersonal violence including youth violence, sexual violence and violence in institutional settings.

Pathways and relationship between housing and neighbourhood-related injuries and inequity

Exposure to risks emanating directly from housing is, of course, increased in those who spend the greatest time in the home, amongst whom will be the very old (*38, 69*) and the very young (*70*), the unemployed, the sick or disabled and those tasked with cooking and keeping the house warm. Injury deaths in poor housing in relation to fire have been well documented (*71–74*). So while poorly maintained, poorly heated and poorly constructed housing are drivers for injury-producing events, these risks are not borne equally. The most socially disadvantaged members of society are more likely to reside in such marginal housing.

Referring more broadly to the neighbourhoods in which housing is situated, the settings variously referred to as informal settlements, shanty towns, slums, favelas and barrios have become synonymous with social exclusion and threat. The nature of the threat may change from setting to setting. A boy celebrating his 15th birthday in the Cape Town, South Africa, settlement of Nyanga has a greater than 1 in 20 chance of being shot dead by the age of 35 (*75*). In the Banshbari slum of Dhaka, Bangladesh, politically and economically marginalized residents report not going out after nightfall due to security fears and the targeting of women for abduction, rape and trafficking (*76*). In still other settings the threat may come from major arterial, high-speed traffic routes cutting such areas off from the rest of the urban area, or bisecting entire neighbourhoods.

In some countries, housing tenure (whether a house is rented or owned) is correlated with injury, although of course the relationships between poverty, housing and health are complex (*77*). There is some evidence that in wealthier nations, older people in institutional care have an excess risk of falls leading to fractures (which may also, of course, be a consequence of the factors that bring them into residential care) (*78*). Housing inequities are also related to injury rehabilitation, with housing maladapted to those disabled in an accident further disabling them in terms of day-to-day living. Poor (or no) fire services increase the risk to those living in poverty.

In summary, there are a number of pathways between housing and neighbourhoods and injury and violence outcomes. These relate both to the inherent safety of building structures, safety devices and activities taking place within housing, such as cooking and heating, as well as to the broader qualities of the neighbourhood within which housing is situated. Interruption to these pathways depends on awareness and understanding of their interconnections with health, effective regulation, sound planning and adequate space, and the occupational health of domestic labour, including the ways in which meals are created. Relating the scope of these factors to the analytical framework guiding this volume, housing and neighbourhoods mediate influences on injury risk through all three top levels (with unsafe or substandard housing being a marker for socioeconomic position, by virtue of unsafe environments constituting a direct and differential exposure for risk of injury, and through those living within unsafe settlements constituting population groups that are differentially more vulnerable to injury risk).

Roads and vehicles

Poor road design has long been identified as a determinant of road traffic injury and death (*15*). However, attention to design (improved road surfaces or better sightlines, for instance) may have the consequence of increased injury risk as a result of higher speed. Much the same observation can be made in relation to vehicles, with within-vehicle modifications having the potential to improve the attractiveness of the vehicle to consumers, or the safety of those who travel inside the vehicle, while potentially reducing the safety of other road users. For example, a study commissioned by the Department for Transport, United Kingdom, reported that accident records showed that two to three fatalities, and about 40 serious injuries, at a cost of some £6 million a year, were caused by bull bars (large, ostensibly protective, metal grilles on the front of vehicles) (*79*). Whilst risk compensation theories remain controversial, observational studies confirm increased speed in powerful vehicles, and increased proximity between motor vehicles and cyclists wearing helmets.

Types of injury that may be implicated

The injuries and deaths related to roads and vehicles are largely road traffic injuries – a health outcome that is inequitably distributed globally.

Pathways and relationship between roads and vehicle-related injuries and inequity

The relationship between socioeconomic inequities and injury on the roads has been frequently described and can be observed in both wealthier and poorer nations, though roughly 90% of the global burden of road traffic injury deaths occur in low- and middle-income countries (*15*). Within these settings non-motorized transport tends to predominate, while

for the world's poor people walking is the main mode of transport (*80, 81*). The young and the old are at particular risk, and those who live or work close to busy roads are exposed to greater danger than those who have gardens, grounds or land to play on.

There is an increased risk to males of road traffic injuries. Those outside motorized vehicles are at greater risk than those inside them – indeed, this dimension of injury risk is a perfect illustration of both differential exposure and differential vulnerability. For those who own or drive vehicles, safer vehicles tend to be those that are more expensive (though these vehicles are also the ones more capable of high speeds). Thus vehicle ownership and safety of vehicles owned as a marker for socioeconomic position is yet another aspect of the manner in which this determinant influences injury risk. Among those who drive for a living in countries where regulation is poor, long hours and the need to earn a living wage may contribute to unsafe driving as a result of fatigue.

The pathways between this group of determinants and injury include the separation of roads and traffic from pedestrians, safe vehicle maintenance and regulation, and some of the consequences of globalization and the movement of goods across large distances by road.

Interrelationships between determinants, inequities and injury

There are a number of important interrelationships between the determinants touched on here. Some examples below highlight the potential for synergistic effects between the determinants and underline the potential value of public health interventions that target the social determinants driving health outcomes.

Alcohol and housing. The consequences of their own or others' alcohol use is exacerbated for those who live in poor housing, who themselves are more likely to be poor, and more likely to be smokers. Falling asleep while smoking, leaving cooking devices unattended or knocking over heating implements while under the effect of alcohol have all been implicated in fire injury. Falls under the influence of alcohol are more likely in poorly maintained housing.

Housing and road traffic injuries. Poor housing is less likely to be well separated from traffic, and poor people are less likely to live in housing or settlements away from busy or fast roads. In wealthier nations, traffic-calming initiatives tend to be seen more frequently in wealthier areas.

Alcohol and road traffic injuries. The effects of alcohol on road injury have been well documented, with an excess of driving deaths and injuries following drinking.

These brief examples are discussed further in the next section, where possible interventions are considered.

13.5 Interventions and upstream strategies to reduce injury by affecting the determinants

The ideal position in a chapter of this kind would be to provide a menu of three or four "best buys" able to act on upstream determinants to reduce injuries, but while knowledge of ineffective or harmful interventions is increasing, there is still a good deal to be known about the most effective and cost-effective courses of action and how to implement them successfully.

There is no magic bullet, or pump handle to remove, since the issues considered in this chapter involve cross-cutting responsibilities and, in some cases, powerful vested interests. This does not mean that *in*action is the answer, but that there may be different priorities and possibilities in different local and national contexts.

This section takes the research evidence on determinants analysed in section 13.3, and the pathways between determinants identified in section 13.4, to suggest broad strategies and areas of intervention that might be applied in tackling injury related to alcohol; housing and neighbourhoods; and vehicles and roads.

In all three cases, the evidence points in a similar direction. For interventions on injury to make a significant difference both to inequities and to the global toll of death and disability they need to act on upstream measures, addressing transport policies, including those relating to vehicle use and speed; housing policies, with the aim of turning the idea of the home as a safe haven into a reality; and alcohol policies, giving due regard to the supply end of the problem as well as problem drinkers. Putting the emphasis, as is often currently the case, on behavioural interventions directed towards individuals, and, in wealthier nations, secondary and tertiary care of the injured, will further widen inequities.

At present, much of the evidence base for injury reduction comes from high-income settings. There is a pressing need to enhance the evidence base for both evidence of effect and evidence of effective implementation in low- and middle-income settings, and, in wealthier settings, to ensure that upstream interventions take account of the needs of the most disadvantaged populations. As in other areas discussed in this volume,

FIGURE 13.3 Worldwide spending on public health

Territory size shows the proportion of worldwide spending on public health services that is spent there. This spending is measured in purchasing power parity.

Source: SASI Group and Newman (*86*).

the importance of lay expertise and knowledge is vital in addressing injury, as is local knowledge and know-how on context. Drawing on high-quality reviews where possible, and the use of strong quantitative and qualitative methodologies in primary studies, are vital.

Further research is required to identify potential "low-hanging fruit" – those interventions that can be most easily and effectively implemented, such as safer stoves for low- and middle-income settings, or policies to enforce hot water temperature regulation in those settings. There is also a need in the short term for policy-makers and practitioners to act on the identification of risks by those living in poor housing; and, in the longer term, for land use policies to include housing initiatives.

13.6 Implications: measurement

To start with the positive, as the United Kingdom Statistics Commission has pointed out (*82*), there have been many examples of statistical evidence radically changing the way things are done. Florence Nightingale's application of disease statistics reduced mortality in those wounded during the Crimean War, and Richard Doll's research in the 1950s made the link between smoking and lung cancer. More recently the *Stern review on the economics of climate change* (*83*) has drawn on statistical evidence. Less positively, a case study from the International Development Research Centre (*84*) on crunching the numbers points out that many countries in the developing world have an inadequate or no system for registering vital information. For example, of the 57 countries that make up the WHO Africa and South-East Asia regions only eight have usable vital events data, and only one has complete coverage of death. It is believed that, within the poor countries of the globe, there are 1 billion people whose births and deaths are never registered – no official or government agency ever acknowledges that these people exist. For this reason, the 2008 study on violence-related mortality in Iraq published in the *New England Journal of Medicine* (*85*) is a testimony (albeit a depressing one) to what can be done to collect data in even the most unpromising conditions.

Data collection deficiencies are part of a broader context of insufficient funding for public health. The inequitable distribution of resources for public health services is made clear in Figure 13.3 (*86*).

As in other areas of health inequities, we are stronger on description that records injuries and their sequelae than we are on describing the antecedents of an injury, measuring the ways in which determinants are

addressed and the extent to which these measures are effective. In those parts of the world where data collection systems are poor, there is an understandable tendency to suggest that the data systems be improved. However, even in those (largely wealthier) nations where data collection is less poor, data on the determinants of injury remain largely inadequate, and data collection (which itself incurs a high cost) is frequently impenetrable, and underused or poorly used.

Just as health care increasingly needs to be addressed in terms of cost–benefit analysis, so too does data collection. Where a suggestion is made that new data be collected there needs to be a strategy in place to use them, and a strategy for allocating resources to the process. If data are simply collected because they are there, or because they always have been collected, or because they might be useful, then more stringent criteria need to be developed and tested against other uses of the same data collection resource.

Data collection is itself socially constructed, and in some cases highly contested. Consideration needs to be given to what kinds of data are likely to have an impact on the social determinants discussed here. The macroeconomic determinants of injury are not evident at the site of injury and are not captured by injury surveillance systems (*87*). Ironically, some measures that may narrow social exclusion (for instance wider availability of cheap cars) will increase injury. While walking is the main mode of transport for the world's poor people, such populations often experience the harms of energy-intensive transport (*81*). Moreover, much investment in major road projects does not meet the transport needs of poor people, especially women whose trips are local and off-road (*81*). Bogotá (Colombia) and Curitiba (Brazil) are perhaps the two most notable examples of developing-nation cities that have shown innovation with low-cost alternatives to private motorization. Both of these cities have achieved success with high-quality bus systems and a complementary package of supporting measures, including infrastructure for non-motorized transport and car restriction measures (*80*). Measuring whether this progress is maintained or undermined will be important.

That said, there are areas where good data have helped to support cultural change. As well as the examples at the head of this section, at a time when drinking and driving was more widely tolerated than is currently the case in the United Kingdom, the fact that drinking only rarely directly led to injury and death in any individual case made the offer of "one for the road" commonplace amongst convivial hosts. Given that those who are drunk and in charge of a vehicle were unlikely to be perceived as (let alone perceive themselves as) criminals, data have enabled the association between alcohol, impairment while drink-driving, and injury and death to become apparent.

One of the peculiarities of data collection on injury is that even in countries where relatively good data are collected, there is a greater emphasis on the sequelae than on the antecedents of injury – a result in part of the relatively good data collection systems in the health sector, where, either for administrative (billing) reasons or for reasons related to treatment, what is important is the injury and how it is dealt with, rather than the causes. Where injury is considered a largely individual problem, to be tackled through behavioural or educational interventions, these sorts of data may be considered adequate. They are entirely inadequate, however, for tacking determinants.

While policies to tackle injury are developed nationally, much of what needs to be known in order to effectively tackle the determinants is derived locally. Gaps in the data are therefore now identified, with a recommendation that these be considered at national and local level by those tasked with reducing the toll from injury deaths.

The areas where there are particular data or evidence gaps on the determinants of injury include:

- how best to collect and, more particularly, use to good effect data that illustrate the equity gap in the incidence or morbidity, mortality, candidacy for risk and access to effective treatment, or better, prevention;
- how best to draw on lay expertise on local determinants and risks (and responses to these);
- how best to identify and monitor dangerous places, and social and economic structures;
- what the appropriate economic models are for looking at the cost-effectiveness of simple public health interventions. At present, while modelling is well developed in clinical areas, particularly for pharmaceutical interventions, both methods and outcomes need further work in public health economics. There is a clear need for a register (*88*) so that knowledge, including economic evaluations on public health interventions, can be shared.

Not all of these measurements or data need to be collected by statisticians, epidemiologists or administrators. Where tackling determinants is done through regulation, using official statistics to collect data is important – both to reinforce the need for action and to enforce action where appropriate. But as many studies have shown, the lay public, including children, are well able both to identify dangers in their own communities and to suggest responses to those dangers. Keeping local logs of such lay knowledge is not only of interest to the historians of the future, showing (not for the first time) that ordinary citizens may identify problems long

before they reach the public policy agenda; more positively, it may also be a means of improving health at a local level, through the kinds of collaborations supported through Safe Communities, and in a way that tests different kinds of interventions.

Further work on measurement, relating to the overall work of the Commission on Social Determinants of Health, can be found in the final report of the Measurement and Evidence Knowledge Network (*89*), and for those conducting reviews addressing the determinants of health with equity as a focus, the checklist of the new Cochrane Health Equity Field is likely to prove an increasingly useful tool (*90*).

13.7 Conclusion

This chapter has summarized systematic review evidence supplemented by primary studies that speak to injury control interventions addressing the determinants of alcohol, housing and neighbourhoods, and roads and vehicles. Instances have been identified where the nature of the implementation or the intervention itself is explicitly targeted along the lines of socioeconomic context and position, differential exposures or differential vulnerabilities.

One thing that emerges from this is the fundamental importance of an upstream social determinants approach to the prevention of injury. Unlike many other health outcomes that might also benefit from a social determinants approach, there are no pills, no vaccines and no clinical manoeuvres that reduce rates of injury. Virtually all of the progress in preventing injury has come from acting directly on the social environment or on patterns of exposure to risk that correlate closely with factors such as socioeconomic context and position.

While the evidence presented here shows that addressing social determinants can reduce injury, much of the evidence base comes from high-income settings. There is a pressing need to enhance the evidence base on effective social determinant-based interventions that are either administered in low- and middle-income settings or are explicitly targeted at the most disadvantaged populations.

In conclusion, this chapter has described associations between determinants and injury. One implication of addressing these determinants in order to avert injury outcomes is that, as most injury prevention practice needs to rely in one way or another on affecting social determinants, injury prevention provides an excellent area to clearly illustrate the health impacts of intervening on social determinants. Another compelling implication is that intervening on these determinants can and frequently does yield cross-cutting benefits for a range of other health outcomes. Finally, due to their prevalence and strong correlation with social class gradients, injuries provide a key health outcome to be monitored as a reflection of the effectiveness of social determinant approaches.

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promoting health, providing care

Synergy for equity 14

Erik Blas and Anand Sivasankara Kurup

Contents

Figures

Tables

This chapter will explore the common ground and potential synergies across different public health conditions and take these forward as the basis for proposing practical action. Evidence and proof of association and causality are presented for each individual public health condition (Chapters 2 to 13) and are not repeated here.

The chapter will start with an analysis of the different patterns of social gradients in the health of populations that have emerged from the analyses of the individual conditions. Next, the social determinants that most frequently occur in the pathways of the examined public health conditions will be identified. Then proposals on what public health programmes, individually and collectively, could do to change the situation will be discussed. This will be followed by consideration of implementation in the light of the lessons learned from the country case studies and proposals for programmatic monitoring. Finally, the implications of taking the recommended social determinant approach will be discussed.

14.1 Levels and patterns of social gradients

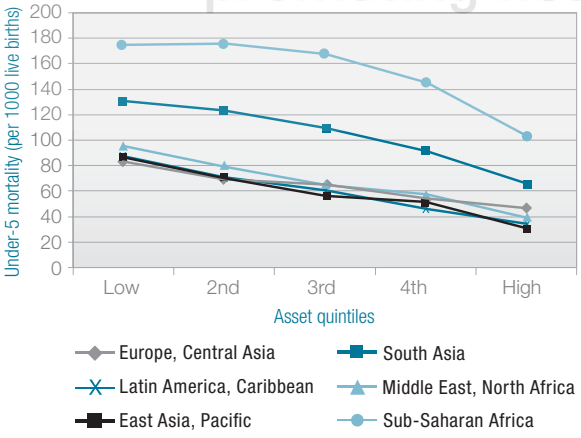
For all the health conditions analysed, available data show clear social gradients within populations. However, the steepness and the shape of the gradients vary not only with a condition, but also for the same condition across populations and time.

For example, variations exist in the marked social gradients in under-5 mortality that are found in all geographical regions (Figure 14.1). Two regions, sub-Saharan Africa and South Asia, have much higher under-5 mortality rates than other regions. With the exception of the highest quintile in South Asia, all quintiles of these two regions have higher under-5 mortality rates than the lowest quintile of any of the other regions. The other four regions have remarkably similar overall levels and gradients despite different levels of economic development. While mortality in those four regions is lower, the gradients across asset quintiles persist. This could indicate that under-5 mortality decreases with economic development only to a particular threshold level, and that inequity persists independently of the general level of economic development and is shaped by other factors.

More complex patterns appear at lower levels of aggregation, for example at national or subnational levels. The same condition can display different patterns of social gradients in different contexts and societies, depending on such factors as religious principles, values and cultural norms (Chapter 2). Further, the pattern can change over time, for example with economic development (Chapter 5). Axes of social stratification are strongly influenced by global, national and regional political and economic trends and by existing institutions and legal systems, and the relative explanatory power of differing socioeconomic markers varies between cultures (Chapter 7). Six main patterns of social gradients in health were identified in the analyses of the priority public health conditions. These are summarized below and examples of each pattern are given in Table 14.1, along with links to the relevant chapters.

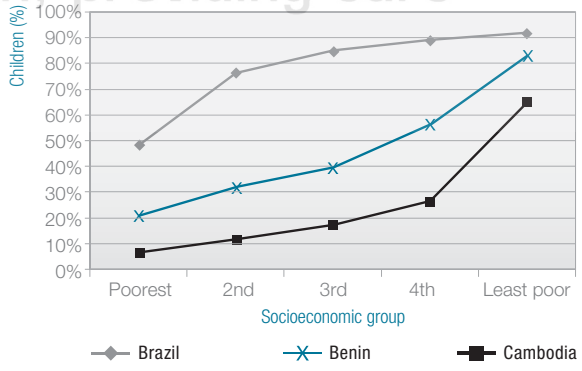
- Linear gradients occur for major social determinants such as wealth and education for all the conditions analysed. For example, Benin shows an almost linear gradient for percentage of under-5 children receiving six or more child survival interventions, by socioeconomic group (Figure 14.2).

FIGURE 14.1 Social gradients in under-5 mortality rate by asset quintile and region (low- and middle-income countries for which related DHS data are available)



Source: Data from Gwatkin et al. (*1*) (see Chapter 4).

FIGURE 14.2 Percentage of under-5 children receiving six or more child survival interventions, by socioeconomic group and country



Source: Extracted from Victora et al. (*4*) (see also Chapter 4).

- Bottom-end inequity is illustrated by the case of Brazil in Figure 14.2, where the difference between the highest four quintiles is relatively small, while for the poorest there is a significant drop. The contrast with Benin shows that even for the same condition gradients may show different patterns.
- Top-end inequity occurs where only the top strata of the social spectrum receive a service at any reasonable level, as in the case of Cambodia in Figure 14.2, which displays an inverse situation compared to Brazil.
- Changing direction of gradients can occur, for example, when changes in the level of economic development have an impact on which population subgroups are most vulnerable to certain noncommunicable diseases (Chapters 3, 5, 9, 13).
- Dichotomous gradients result when, irrespective of other social determinants, there are significant and discrete inequities between groups. This applies

TABLE 14.1 Main patterns of social gradients in health with brief examples and references to relevant chapters for more detail

Main inequity patterns	Examples	Relevant chapters
Linear	**Alcohol** problems tend to be associated with diminishing socioeconomic status, assuming a constant amount of alcohol consumed	2
	Injury outcomes are highly correlated with lower socioeconomic status	13
	With the possible exception of overweight, indicators of **nutrition and morbidity** outcomes are considerably worse among poor than among better-off children	4
	Differential exposures to risk factors for **mental disorders** are frequently inversely associated with social position	7
	Monotonic inverse relationship occurs between wealth, education and **tooth loss** in developed countries	9
	Sharp social gradients for total **fertility** across wealth quintiles occur in many countries	10
	The risk of **tuberculosis** is much higher among people from low socioeconomic groups in both rich and poor countries	12
Bottom-end	In Brazil and Nicaragua a significantly smaller percentage of children in the lowest wealth quintile receive six or more **child survival** interventions than in the other quintiles	4
Top-end	In Cambodia, less than 20% of children in the lowest four wealth quintiles receive six or more **child survival** interventions against 60% in the highest	4
Changing direction	Economic development changes the pattern of **noncommunicable** diseases that were once hallmarks of affluence to conditions of poverty	2, 3, 5, 13
	The relationship between mothers' educational achievement and children's **dental health** is more complicated in some developing countries	9
Dichotomous	In some cultures women consume virtually no **alcohol** at all	2
	Male:female **tuberculosis** notification ratio in most countries is 2:1	12
	Tobacco smoking and ethnicity shows dichotomous pattern	11
Clustering (amplifying effect)	Cumulative effects on **alcohol and food-related conditions** result from poverty, lack of education, demographic change, and agricultural, commercial and industrial transition, combined with insufficient food safety systems	2, 6
	Vulnerable groups with respect to **mental disorders and injury** may be characterized by individual features such as female or male sex and age, or by shared attributes or experiences such as common ethnicity or migration	7, 13
	Injury outcomes are increased in populations with a clustering of social determinants, including socioeconomic context and position, poorly built housing and neighbourhoods, and unsafe road networks	2, 13
	100% of low-income countries are affected by at least five **neglected tropical diseases**	8
	There is a marked clustering of **tuberculosis** risk factors among the urban poor	12

particularly in the case of gender, but also occurs for ethnicity (Chapter 11) (*2*) and legal status (*3*).
- Clustering describes a situation where simultaneous multiple social determinants amplify differentials in a manner that can exceed the sum of the effect of the individual determinants. For example, for some mental disorders it has been found that two factors working simultaneously increase the risk fourfold and four factors increase it tenfold (Chapter 7). Thus, for certain disadvantaged population groups, a significantly increased vulnerability can result from a combination of factors, including powerlessness, neglect and poverty; lack of education; demographic change; agricultural, commercial and industrial transition; and inadequate food safety systems (Chapters 2, 6, 7, 8, 12, 13).

The pattern of the social gradient will naturally influence in a major way the appropriate design and choice of interventions in each situation. For example, universal intervention approaches could be considered in the case of linear gradients and top-end inequity, while targeted approaches might be more appropriate for addressing bottom-end, clustering and dichotomous inequities. However, the reality is a somewhat more complex web of different determinants interplaying to produce inequitable distribution of health within populations. Practical actions to correct inequities in health might therefore include:
- working, based on the analyses of the individual conditions (Chapters 2 to 13), through the major pathways of differentials, level-by-level of the priority public health conditions analytical framework, using "reverse engineering" to isolate the main social determinants at play, find out what keeps the situation from changing (resistance to change), and identify promising entry-points for intervention;
- proposing possible interventions and identifying key movers that can drive the interventions at each entry-point;
- defining the key concrete actions that public health programmes can undertake to implement the proposed interventions.

14.2 Social determinants at play

A large number of determinants on the pathways for each condition have been identified in Chapters 2 to 13. However, grouping the determinants according to the frequency with which they occur in the analyses reveals that there are a limited number of major determinants at each level of the priority public health conditions analytical framework that shape several of the conditions and thereby overall population health. These are summarized in Table 14.2. For more details, including links to the chapters in which they were identified, see Annex 14.A to this chapter.

The concept underpinning the priority public health conditions analytical framework and its pathways is that hierarchical links occur between determinants, so that changes at a higher level, for example at the level of socioeconomic context and position, will have an influence at one or more of the lower levels, for example exposure, vulnerability, health care outcomes or consequences (given that the complexity of the hierarchy allows no simple linkages).

The analysis of entry-points considers where, on the pathways of the most frequently mentioned determinants, effective action can potentially be deployed. First, the most frequent determinants will briefly be described, then potential side-effects of change and possible sources of resistance to change will be discussed before suggesting entry-points. The most promising entry-points identified will then form the basis for proposing interventions that can be implemented through public health programmes. The aim is not to be comprehensive but to identify and pursue a limited number of entry-points that have the most potential to enable concrete action that can have an impact across many public health conditions. More specific proposals are made in the relevant chapters of this volume.

14.3 From promising entry-points to proposals for action

The priority public health conditions will not become more equitable without effective interventions on core social determinants outside the health system, even in the widest definition of this system. While health care services to a large extent are dealing with the symptoms of health problems determined elsewhere, public health programmes have the privilege and the duty to analyse and address not only how health services are provided but also how and why ill-health and inequitable distribution of health occur in the population. This goes far beyond providing medical interventions and is much more comprehensive than reaching certain vulnerable groups. Taking a social determinant and equity approach to public health means acting at all the five levels of the priority public health conditions analytical framework. Clearly, public health programmes cannot be responsible for all the required interventions. However, these programmes can play critical roles in engaging partners and activating the key movers. The following subsections will sketch out possible interventions in response to promising entry-points, identify the key movers and discuss the actions that public health programmes, individually or collectively, could undertake.

TABLE 14.2 Social determinants occurring on the pathways of six or more of the 13 conditions examined in Chapters 2 to 13

Level of the priority public health conditions framework	Major social determinants at play *(Numbers in brackets indicate the number of conditions in whose pathways the determinant has been identified)*
Socioeconomic context and position *Society*	Globalization and urbanization [7]
	Social status and inequality [9]
	Gender [10]
	Minority situation and social exclusion [8]
	Rapid demographic change, including ageing population [9]
Differential exposure *Social and physical environment*	Social norms [9]
	Community settings and infrastructures [9]
	Unhealthy and harmful consumables [8]
	Non-regulated markets and outlets [6]
	Advertisement and television exposure [6]
Differential vulnerability *Population group*	Poverty and unemployment [8]
	Hard-to-reach populations [7]
	Health care-seeking and low access to health care [7]
	Low education and knowledge [8]
	Tobacco use and substance abuse [8]
	Family and community dysfunction [6]
	Food insecurity and malnutrition [6]
Differential health care outcomes *Individual*	Poor-quality and discriminatory treatment and care services [10]
	Limited patient interaction and adherence [9]
Differential consequences *Individual*	Social, educational, employment and financial consequences [9]
	Social exclusion and stigma [7]
	Exclusion from insurance [7]

Socioeconomic context and position

Five determinants at this level are common to the majority of the analysed conditions, namely globalization and urbanization; social status and inequality; gender; minority situation and social exclusion; and rapid demographic change, including ageing population.

The world is in the midst of an unprecedented process of modernization and globalization, characterized by the integration of global markets and economies. Low- and middle-income countries are particularly affected by economic fluctuations and growing inequalities, though new opportunities are offered, for example by information technology (*5*). Massive population movements are taking place from rural to urban areas and between countries, with urbanization itself becoming a social determinant (*6*). While economic growth can facilitate improvement in average population health, it can also widen the gap between the most and the least advantaged.

Gender, income or wealth, and education are frequently used stratifiers applied to the measurement of inequities. While they are relatively simple to measure, they only form the surface of a complex web of interlinked factors, most of which are much more difficult to quantify, including laws and rights, dependencies, relationships and feelings, and access to power (*7, 8*).

Demographic change, in particular ageing populations, affects the nature of population health, for example as regards diseases and conditions (especially noncommunicable) that are associated with longevity, and the distribution of resources and power in societies.

Making changes at this level of the framework means making changes to the basis of how economies and societies are organized and function. History has shown

TABLE 14.3 Entry-points, interventions and movers at the socioeconomic context and position level

Promising entry-points	Possible interventions	Key movers
Define, institutionalize, protect and enforce rights; and empower to exercise	Strengthen good and responsible national and international governance Improve legislation, policy and enforcement, including with regard to basic human rights and reproductive rights Put in place universal education of girls	Parliament Legislative bodies Education sector Development agencies and banks Civil society
Redistribute and regulate power and resources within and between countries	Implement progressive taxes with redistribution and tax-financed public services Carry out cash transfers Ensure that trade agreements encourage fair and socially responsible trade, and that production and regulatory infrastructures promote public health	Finance, planning, social welfare departments Trading organizations and partners
Capitalize on positive and counteract negative effects of modernization and global integration	Enhance and develop healthy urban planning Create international and national basis for regulation of availability and marketing of products Encourage international knowledge sharing, solidarity and transfer of good practices	Planning departments Local government Legislative and regulatory bodies Civil society Industry and commerce Health sector

several examples of positive health equity effects, for example in the area of distribution of power and resources in relation to the labour market (*6, 9*). Change at this level would touch upon some of the very fundamentals of society, including power structure, political and philosophical values and perspectives, and the role of the state and religion, and is likely to trigger resistance from any group who will lose or perceive itself to lose power and control.

Table 14.3 shows promising entry-points, interventions and key movers at the socioeconomic context and position level.

Interventions at this level will potentially have profound effects on determinants further downstream. Most of the interventions at this level are not the responsibility of single agencies and health does not necessarily have a firm customary seat at the table. Moreover, action is usually in the hands of a limited number of professional disciplines, for example economists and lawyers, who may or may not appreciate the equity dimension of public health interventions. Several avenues are available for public health actors, individually and collectively, to redress this situation. The formal route could be through the national ministry of health or the World Health Organization (WHO) in order to obtain representation nationally or internationally at the table, for example in economic and trade forums, from where the interests of public health can be defended and influence exercised (*5, 10*). Informal approaches might include working with the media, civil society and individual champions to shape the public debate and influence how laws, policies and agreements are formulated.

Very few public health programmes have been successful in steering public debate, though specific diseases are frequently prominent in the media, where the focus tends to be on sensationalization of issues rather than the real causes of ill-health. However, this may bring vital health issues to the attention of parliamentarians, financers, planners and legislators, and skilful use of the media is essential in shaping the political agenda (*11*).

Three actions public health programmes could take to effect change:

- Provide setting-specific, timely and relevant evidence at global, national and subnational levels on the relationship between determinants and outcomes (magnitude and distribution);
- Undertake, individually and jointly, nationally and internationally, health impact assessments, research and analyses; provide examples of good practices; and review and propose options before and during policy development processes;
- Support advocacy and action groups to engage in public debate and convince politicians, regulators and legislators, including within the health sector, to address the social determinants of health and incorporate health equity issues into economic and social strategies and plans.

TABLE 14.4 Entry-points, interventions and movers at the differential exposure level

Promising entry-points	Possible interventions	Key movers
Social institutions: norm-setters and keepers	Carry out community education and sensitization programmes to address gender norms, alcohol marketing and availability, attitudes towards violence Implement school attendance and health programmes, including physical activity and nutrition Encourage peer-focused interventions using role models	Police, media, educationalists, community groups Education sector Health sector
Community infrastructure development (roads, transport, water, sanitation, waste management, electricity)	Improve infrastructure design to encourage physical activity, heighten safety and security, and serve the needs of vulnerable groups Improve housing, living and working conditions, water and sanitation, venues for physical activity	Planning and development, transport departments Water sector Community groups Nongovernmental organizations Health sector
Availability of products for consumption, including diversity, security, safety and marketing	Enforce government regulation, including tobacco advertising, sponsorship and promotion bans, food production and handling safety standards Introduce watchdog and voluntary agreements with industry, counteradvertising Tax unhealthy foods, alcohol and tobacco and provide incentives for healthy food and products availability	Financial, agriculture, industry, retail sectors Communication and media Education sector Consumer groups Health sector

Differential exposure

Five main groups of determinants are shared by most of the analysed conditions: social norms; community settings and infrastructures; unhealthy and harmful consumables; non-regulated markets and outlets; and advertisement and television exposure. Social norms include the range of beliefs, practices and expectations to which groups and individuals are exposed and by which they are influenced, exclusion from which can give rise to stigmatization and marginalization. Community settings and infrastructures include the safety of environments, rates of employment and crime, availability of clean water and sanitation, and functionality of social services. The influence of social norms and community settings and infrastructures combined with non-regulated markets and advertisement can make certain groups more exposed to unhealthy or unsafe food and harmful consumables such as alcohol and tobacco. Also, poor urban communities are frequently more exposed to and less capable of coping with the effects of disasters (*6*).

Care needs to be taken to ensure that interventions in these areas do not have unintentional negative side-effects. Regulation and control of the food supply chain might push small and local producers out of the market, affecting sustainability and diversity (Chapter 6). Increasing taxes, for example to regulate consumption of alcohol and tobacco, may have negative economic effects on individuals or encourage substitute consumption (Chapter 2). Improving community structures might increase the cost of living and the attractiveness of an area, pushing out the weaker inhabitants (Chapter 13).

Dealing with differential exposure often means taking on the power holders in society, those vested interests that will offer strong resistance to any attempt to change the status quo. For example, interventions to influence the availability and accessibility of certain products face commercial interests, along the whole range from small-scale businesses to multinational corporations.

Table 14.4 shows promising entry-points, interventions and key movers at the differential exposure level.

There are examples of public health programmes that include consideration of differential exposure; however, usually the role is indirect. Other non-health programmes are not normally aware of the health implications of their activities and the lost health development opportunities. The three key entry-points to address differential exposure therefore call for very different interventions.

First, the social norms to which populations, groups and individuals are exposed are often deeply rooted in cultures and circumstances. To modify such norms will require action from multiple actors and multilevel strategies at the levels of context, position, exposure and vulnerability (*8*). Public health programmes can

individually and in particular collectively play a pivotal role in identifying which social norms are supportive of and which have detrimental effects on population health.

The second entry-point is much more tangible as it addresses the physical environment in which people are born, live, work and die. The analysis of the individual conditions shows that the key factors are shared and interrelated, so interventions in this area could have a positive effect on many conditions.

The third group of interventions relates to availability of products for consumption with good or bad effects on population health. While they link directly to the modernization and global integration group of interventions at the context level, interventions at this level would focus more directly on exposure to and availability of individual products.

Three actions public health programmes could take to effect change:

- Provide a lead role in generating evidence and identifying and advocating appropriate interventions to address social norms;
- Work with and support civil society groups and public opinion makers to focus debate and action at the three entry-points; influence the health ministry to shift more of its attention upstream to policies and what produces good or ill health in the population;
- Encourage direct and active participation by individual or collective public health programmes in such areas as community education, regulation, infrastructure planning and design, taxation and advertising.

Differential vulnerability

Six or more conditions share seven broad determinants at the vulnerability level: poverty and unemployment; hard-to-reach populations; health care-seeking and low access to health care; low education and knowledge; tobacco use and substance abuse; family and community dysfunction; and food insecurity and malnutrition. Poverty, lack of education and knowledge, and unemployment heighten the vulnerability of families and individuals by affecting their ability to afford and consume healthy food, to inhabit neighbourhoods safe from violence, and to access health services and products. Some population groups are hard to reach or have difficulty in accessing services due to the combined effect of several determinants, such as minority status, gender, poor community and communication structures or social dysfunction. Barriers in access to services can result from the way that health and social systems and services are designed and financed (*11*). Finally, over half of the conditions have tobacco use, alcohol and substance abuse on their pathways, adding to the differential vulnerability.

There are possibly fewer risks of large-scale side-effects at this level because of the often more limited scope of interventions and its position lower down the hierarchy. However, targeted cash transfers might be counterproductive for social cohesion and productivity (*7*). Further, pulling individuals out of poverty, for example through setting up small enterprises, might increase exposure to unhealthy products and create new hierarchies and inequities if poverty alleviation means redistributing already meagre community resources. Finally, focusing on certain aspects of vulnerability may divert attention from addressing the determinants at the exposure, context and position levels.

There are multiple sources of resistance to change at the vulnerability level, due to ignorance, complacency or active pressure from peers, family members, communities and others who benefit from maintaining the status quo. There might also be resistance from health and other professionals who may have a narrow perception of public health or have no incentive to adopt new approaches.

Table 14.5 shows promising entry-points, interventions and key movers at the differential vulnerability level.

This level is not new territory for many public health programmes. However, there is still considerable room for expansion of both direct intervention and collaboration with other programmes to seek out and intervene in favour of the most vulnerable groups. The involvement of health programmes at this level goes far beyond providing evidence and advocacy. The analyses of the individual conditions show the amplifying effect of clustering of disadvantages, supporting collective interventions that address the overall situation of population groups, with early implementation in disadvantaged areas and with disadvantaged populations.

At the first entry-point, a series of interventions could aim to empower vulnerable population groups to undertake self-development to reduce the clustering effect and escape the concentration of poverty in certain areas. The success and sustainability of such interventions would be assisted by prior or simultaneous interventions at the context, position and exposure levels. The next entry-point requires interventions to improve access to health and social services, and to promote use of healthy or beneficial products. The final entry-point focuses on how public health programmes and services are delivered to vulnerable populations. The clustering of disadvantages and the prevalence of co-conditions calls for a concerted effort to reach such populations.

TABLE 14.5 Entry-points, interventions and movers at the differential vulnerability level

Promising entry-points	Possible interventions	Key movers
Empower: offer social, structural and economic opportunities, educate	Reduce and deconcentrate poverty and address access to and control over wealth at the family level, in particular for women Implement home visitation programmes for high-risk children and parental training programmes Improve population access, targeting and relevance of promotional and preventive measures, and provide means to empower vulnerable groups to take responsibility and act	Community development organizations Education sector Communication and media Religious leaders Health sector
Compensate: target, subsidize	Promote interventions that combine poverty reduction with increased utilization of health and educational services, for example conditional cash transfers, vouchers Provide free or subsidized healthy food Provide social insurance so that providers do not suffer losses due to fee exemptions etc.	Social welfare department Health sector
Public health reach-out: use of health services, co-conditions, health products, licit stimulants	Improve individual case detection, targeting vulnerable groups such as slum dwellers, the homeless, migrants, drug abusers, prisoners and people living with HIV Increase coverage and integration of services, organize quality services close to and appropriate to disadvantaged population groups and diversify delivery channels Capitalize on interlinkages with other conditions in addressing common root causes, for example tobacco use, alcohol, indoor air pollution, malnutrition	Health sector, government and private business

Three actions public health programmes could take to effect change:

- Individually and collectively take the lead to identify vulnerable populations and groups and the specific causes of differential vulnerability; work with other sectors to address the social determinants causing differential vulnerability;
- Work with communities to ensure that health delivery systems are in line with cultural and social contexts and to sensitize vulnerable populations to the health benefits of programme activities;
- Take the lead in working with health service providers and other programmes to extend coverage and reduce the barriers preventing vulnerable populations from accessing health services (preventive, curative and rehabilitative).

Differential health care outcomes

Once an individual who needs care and treatment has entered the health care system, there are two groups of determinants that can cause differential outcomes: first, poor quality and discriminatory treatment and care services, including such factors as personal bias and ability to pay; and second, limited patient interaction and adherence, reducing the capability of individuals to use and benefit from treatment and care. In summary, health systems and services themselves can be social determinants of inequity (*11*).

Special attention to or dedicated services for people who are less able to use standard services may have unintended side-effects, for example further stigmatization. If costs of extra time and exemptions are to be borne by the provider, new barriers to use could be created. Dedicated services can easily become underfunded and less attractive to professionals, resulting in a downward spiral of service quality. Insensitive questioning of vulnerable individuals could deepen the social, educational or ethnic gaps that often exist between patient and provider, leading to patients becoming unwilling to seek treatment.

There are several potential sources of resistance to change among patients, professionals and the public. Patients might acquiesce to the current status quo, expecting the health professionals to know best. The social hierarchy of power and class relations may be reinforced by the personal bias of some health workers against certain population groups. The way the individual provider is paid and the system financed and monitored may also be a hindrance to change, for example if a provider loses income through spending more time catering to the needs of patients who have difficulty utilizing the services. Finally, the media and the public often have strong views on how health care services should operate, and these are not always

TABLE 14.6 Entry-points, interventions and movers at the differential health care outcomes level

Promising entry-points	Possible interventions	Key movers
Medical and administrative procedures (patient adherence)	Simplify, package and standardize procedures Organize group-based education and support sessions Provide individual system coaching	Health facilities Patient groups Media Private business
Provider behaviours and practices (provider compliance)	Educate and sensitize providers to comply with ethical norms, non-discriminatory practices and institutional policies Make health systems accountable to citizens, communicate and enforce patients' rights, ease complaint procedures, include social determinants in clinical audits Within the public and private health sector ensure incentives, for example fees, bonuses, compensations and enhanced career paths, to encourage work with the disadvantaged and increase equity in outcome	Health facilities Health regulatory and financing bodies Media Patient groups Professional associations Health training institutions
Compensate (target, dedicate)	Provide dedicated health services for particular groups, for example migrants and minority populations	Health facilities Social welfare departments Media

commensurate with the needs of disadvantaged population groups and individuals.

Table 14.6 shows promising entry-points, interventions and key movers at the differential health care outcomes level.

Public health programmes are at times directly responsible for providing treatment and care services, though in most cases they are not. The focus of programmes is usually on providing treatment and care guidelines and training, though they may include provision of equipment and supplies and monitoring outputs. Most often, the intramural health care services are provided by health institutions and units responsible for a wide range of clinical services, and ruled by their own procedures and dynamics.

The first entry-point addresses patient adherence, including ability to effectively use services, and calls for two types of interventions: first, medical and administrative procedures can be simplified and adjusted so that they become easier for vulnerable populations to use; and second, group or individual support can be provided to guide users through procedures and encourage adherence to follow-up treatment. The second entry-point addresses provider compliance and discourages attitudes and practices that are not conducive to ensuring equitable outcomes. Interventions would need to work on several fronts simultaneously and become part of the normal routines of the health system, and would include addressing the professions from college to clinic, enforcing the rights of patients for decent treatment regardless of their background and situation, and modifying the way health system incentive structures operate so that they work in support of and not against improving equity in health care outcomes. The final entry-point involves provision of dedicated health services designed for the needs of defined populations that have insurmountable difficulties in accessing and using regular services.

Three actions public health programmes could take to effect change:

- Take the lead to identify the sources and causes of differential health care outcomes for treatment and care within health care services;
- Act in partnership to review and influence priority-setting and service provision, financing and organization within the health care system and revive primary health care;
- Work with the media, public opinion-makers and action groups to create awareness of and demand for equitable health care.

Differential consequences

This is the level of the priority public health conditions analytical framework where the cumulative effect of the above four levels manifest in differential consequences. Three major groups of consequences were identified for the majority of conditions: social, educational, employment and financial consequences; social exclusion and stigma; and exclusion from insurance. All of these consequences disproportionately affect those who are already disadvantaged and in turn become

TABLE 14.7 Entry-points, interventions and movers at the differential consequences level

Key entry-points	Possible interventions	Key movers
Coping: compensate and empower (social welfare, rehabilitation, etc.)	Improve ability to gain income, for example through vocational training, microcredit, social welfare Provide psychosocial support, including promotion of social networks for people affected by certain health conditions Provide social safety net and educational and vocational opportunities for affected family members, with particular focus on children	Social welfare department Education sector Private business Health sector Patient and community groups
Defining, institutionalizing and protecting rights	Educate the public through campaigns to reduce stigmatization and discrimination Take regulatory measures to address differential consequences of health conditions, including stigma, discrimination, access and loss of insurance coverage	Social welfare department Legislative bodies Media Private business Insurers Patient groups Civil society Health sector
Social and physical access (transport, institutions, workplaces, etc.)	Introduce worker-friendly policies, environments and practices to reduce differential consequences Increase access and affordability for people with specific health conditions Improve referral services not just for health care services but also for social welfare, education, etc.	Labour organizations Private business Education, transport sectors Social welfare department Patient groups Health sector

additional social determinants, feeding into a vicious cycle affecting position, exposure, vulnerability and outcome. In addition to the financial consequences of ill-health, this may have implications for an individual's ability to work, receive education and participate in social activities (*9*). Several diseases and their consequences are causes of further stigmatization and social exclusion. Having been ill, even if cured, often means higher insurance premiums, loss of coverage or plain exclusion, increasing future vulnerability. Finally, there are also consequences for the families of those affected, with disadvantages often passed on to the next generation (*10*).

Focusing on consequences could have the side-effect of exposing flaws in the health system, which may result in inappropriate political reaction, for example addressing the symptoms rather than the system causing the differential consequences. Also, while individuals could and should benefit from support and action to ameliorate the consequences and break the vicious cycle, in communities where most have too little, supporting individuals might have negative effects on social cohesion (*7*).

Allocating resources to deal with differential consequences means moving resources from elsewhere or pushing the burden onto other parts of the social or private systems, thereby triggering resistance to change. Some will also argue that as long as the system keeps producing inequities compensating individuals might not be the most efficient use of scarce resources, or that such action is not the role of the State. Nor will it be an easy task to regulate insurance companies so that they cannot exclude individuals or raise premiums due to health conditions, with subsequent loss of profit.

Table 14.7 shows promising entry-points, interventions and key movers at the differential consequences level.

Few public health programmes are engaged with the differential consequences, perhaps because they fall within the interface between programmes, health care services and other sectors, with solutions left within the hands of special disability programmes or charity organizations, or in most cases with the individuals and families suffering from the consequences of ill-health, who have to find their own solutions and ways through the system.

The three entry-points at this level relate to compensation and empowerment, rights, and social and physical access. Interventions related to compensation and empowerment could include enhancing ability to engage in income-generating activities, provision of social welfare and participation in peer support

networks. The focus should not exclusively be on individuals but also on how their immediate dependents are affected by the consequences of the health care outcome. The rights entry-point would work from two angles: public environment, attitudes and behaviours; and regulation and legislation. Finally, the access entry-point would require interventions to improve physical access to workplaces and public transport, and to reduce social and financial barriers blocking access to education and other services.

Three actions public health programmes could take to effect change:

- Individually and collectively take the lead in analysing and identifying differential consequences of the public health conditions and resulting needs;
- Develop or strengthen standard referral and follow-up procedures in health and across social systems;
- Collectively work with patient groups and other partners, including nongovernmental organizations, the media, industry and insurance companies, to facilitate appropriate responses.

14.4 Lessons for implementation

Many lessons were learned from the 13 case studies commissioned by the Priority Public Health Conditions Knowledge Network on implementing social determinant approaches in real-life situations. The key findings can be grouped under seven headings: values, leadership, intersectoral collaboration, scaling up, communication, risks, and external agencies. For full details see the individual studies, which are published separately.

Values

Reducing inequities in population health may mean sustaining a programme that is at variance with certain values and beliefs among influential groups in a society, possibly requiring a buffer between the programme and the government. This could mean implementation through nongovernmental organizations and the private sector, and wise management of strategic and funding alliances. A three-pronged approach involving government, nongovernmental organization and donor has been skilfully and successfully pursued for the Menstrual Regulation Programme in Bangladesh for more than three decades (*12*). Differences in values should be given full attention in the process of scaling up any policy programme that attempts to redress inequities within populations. The concept of equity in health must be understood and accepted among a critical mass of political and civil service leaders in order for programmes to have a chance of surviving long enough to have an impact (*3*).

Leadership

Sometimes the right combination of opportunities makes it possible to launch a programme, as was the case for the Menstrual Regulation Programme in Bangladesh despite opposition from some quarters. In the 1970s, the combination of a secular government of the newly independent country, international concern at population growth, a newly trained cadre of influential medical doctors and an international donor willing to provide support offered the opportunity to launch a programme to grant abortion to women who had been raped during the liberation war (*12*).

In the absence of such windows of opportunity, it is difficult but possible to initiate and run programmes to reduce inequities in health. Once launched, survival depends not only on delivering good results but also on institutionalizing the approaches and gains. Dealing with social determinants and equity falls at the multi-interface of politics, bureaucracy and civil society and needs to be led accordingly (*13*). The responsibility for mobilizing and linking these interests needs to come from and be formally anchored within the ministry of health. The impetus and support can come from outside, but there must be no doubt where the responsibility and leadership lie (*14*).

Absence of clear leadership to articulate and defend the vision and to get stakeholders on board can be detrimental. When programmes are rolled out and more interested parties become involved, different agendas might intermix with and confuse the equity agenda. This happened in the Nigeria Reach Every Ward Project, which originally set out to provide preferential support to those wards falling behind in immunization coverage. During the process of implementation the concept was changed to Reaching Every Child, a change that allowed the stronger local government areas and wards a disproportionate share of the resources, so the gap between the best and the weakest performers widened instead of narrowed (*15*).

A combination of visionary technical leadership and accountability to the highest political level, including routine follow-up beyond the individual sectors and administrative units and identification of those who do not meet the targets, proved a successful recipe to implementing a social determinant approach to reviving primary health care in Indonesia (*16*). Leadership need not come by chance but can be nurtured and developed over time, both within disadvantaged population groups and through formation of strategic

alliances with outsiders who are willing to lend some of their leadership capacity to the case. This was productively achieved in the Manitoba First Nations Suicide Prevention Programme in Canada (*2*).

Intersectoral collaboration

Implementing a social determinant approach to improving the health of the population starts with realizing that health is the outcome of all sector (not just health) programmes. Focusing on outcomes related to a single condition is unlikely to attract sustained political and multisectoral commitment, as shown in a nutrition and equity programme in Iran (*17*). Rather, the emphasis should be on a range of conditions and indicators of success beyond health, as was pursued in Indonesia (*16*).

Different sectors may have different interests. For example, for the education sector the purpose of food rations in schools is not nutritional, but rather to attract families to schools. However, while interests may differ, successful intersectoral collaboration for social determinants of health depends on identifying and defining a common core and ensuring that individual interests are not counter to collective, including health, interests (*18*).

Different sectors often have different management cultures and different views on criteria for success, as was experienced in South Africa in a collaboration between a microfinance and a HIV programme. For the microfinance partner, sustainability meant that the scheme was self-financed, with full cost recovery; for the HIV programme, sustainability meant ensuring a continued flow of external resources to allow change in social norms to take root. At the centre of this conflict is the issue of whether public health is a public good, driven by concern for the population as a whole, or a private good, driven by market forces and self-interest. Leaders need to be visibly and practically present, in particular when organizational values, success criteria and practices are not fully compatible. However, even in such situations there are potential synergies and partners can learn from each other concerning approaches and practices (*19*).

Scaling up

An important element in scaling up social determinant programmes from pilot to wider application is to work on transferring ownership. Lessons learned from China, Iran and South Africa suggest that a project mode of implementation requires substantial modifications to go to scale. Pilot implementation should be divided into two phases: first, test if the intervention delivers the required outcome; and second, test if the implementation approach is feasible at scale, beyond intensive project inputs (*3, 17, 19*). Fully comprehensive approaches may require substantial changes to go to scale, even if they work in an initial pilot setting, as shown in the Millennium Village Project in Kenya. A supportive environment would include adjustment by national governments of their development policies to ensure equitable distribution of financial and human resources; fulfilment by the richer countries of their promise to contribute 0.7% of their gross national product to Official Development Assistance; equipping local governments with the knowledge and tools required to deliver results in a multisectoral fashion; and application of indicators, based for example on the Millennium Development Goals, to enable accountability for equity-based results at population level (*20*).

Communication

In addition to the various activities related to proposing and implementing policy options, it is equally important to provide the public, politicians and senior civil servants with relevant information, including on the magnitude of the inequity problem, why it needs to be rectified and how it can be rectified. The move in China to reduce inequity in pregnancy outcomes started in the media and was then picked up by researchers who documented the size and causes of the problem, before the health sector stepped in with proposed solutions. In the process of implementation, keeping the politicians, senior officials, media and the public informed was a critical element (*3*). In Peru, while scaling up a community-led primary health care approach, information for government officials and health workers was essential for their understanding of the concepts and adoption of new attitudes regarding the roles and responsibilities of community members in the co-management of public services (*21*).

In managing information flows, care has to be taken to apply an equity lens in both analysis and presentation. Otherwise, evidence might be skewed to serve vested interests, as was experienced in the antimalarial insecticide-treated bednet programme in the United Republic of Tanzania (*22*). Performance monitoring and incentives should apply to outcome rather than process measures to ensure inclusion of equity considerations (*3*).

Risks

Short-term gains can be made by short-cutting, for example by hiding or ignoring potential conflicts of interests instead of addressing them. However, such conflicts can haunt a project and eventually terminate it when it is most vulnerable, as occurred with the Tawana

Pakistan Project. The project had been very successful at the local level in empowering village women to take action to improve school attendance and the nutritional status of girls, but encountered resistance within the civil service system, which was not used to having government resources controlled by village women. The programme was eventually terminated despite documented achievements and available resources. The result may have been different if the expected resistance had been managed from the start (*13*). Continuing a programme at variance with strong societal values through an opportunistic and delicate balancing between different stakeholders may work well for a long time, as is the case with the Menstrual Regulation Programme in Bangladesh. However, renewal can become difficult, for example when new technologies become available, when the fundamentals of the health system change or when donors move to sector funding (*12*).

Addressing inequity at the lower levels of the priority public health conditions analytical framework, as was the case with the migrant delivery centres in Shanghai, is a stopgap measure that might contribute to the maintenance of the status quo. It removes some of the most visible symptoms of the problem from the public eye but does not address the root causes, which will remain as the stopgap measures begin to falter (*3*). Quick fixes to public health problems are unlikely to be effective in the longer term, particularly those that promise to resolve inequity problems by applying pro-poor downstream solutions. Some approaches might even be incompatible and, in the extreme, mutually destructive, as in the case of social marketing versus free distribution of insecticide-treated bednets (*22*).

As pointed out earlier, the role of a leader can be critical in preparing for, launching and implementing social determinant approaches. However, there are also risks involved in becoming dependent on one or a few leaders, for example when a community development programme becomes too closely linked to a particular political agenda (*16*). For the innovative community-based nutrition programme in Pakistan, a government minister led the process and ensured government funding but was then removed and was thus unable to oversee implementation (*13*).

External agencies

Outside agencies can play important roles in policy research, advocacy and technical assistance. In situations where the government is subject to pressure from interest groups this support becomes even more important, as was experienced in both the Bangladesh and Peru cases. However, external agencies are rarely value neutral. For example, when major donors during the period 1997–2002 injected new resources and life into the community co-managed primary health care system in Peru, the perspective also changed from communitarian, with the community at the centre, to utilitarian, with the focus on efficiency (*21*). In Bangladesh the main donor shifted values from in the beginning being supportive of abortion to being against, and withdrew funding with significant impact on the programme (*12*). The shifting between different approaches to bednet distribution in the United Republic of Tanzania was largely the result of different donor perspectives rather than evidence of effectiveness (*22*).

The suicide prevention programme in Canada found that funders often preferred visible instant action and were less interested in supporting the long-term strategies required to do something about the social determinants of suicide among the First Nations population (*2*). Others have found it relatively easy to find external funding for the pilot, small-scale phase, but in the longer term and at larger scale only governments remain (*17, 20*). Projects on social determinants need to have vertical short-term strategies to show results and raise awareness as well as horizontal long-term approaches, linked with capacity-building, to address the underlying determinants and support sustained impact (*14*). If donors are not prepared for this they can choose to stay away from engaging – governments do not have that luxury.

14.5 Measuring

Outside a limited number of developed countries, there are remarkably few data available that systematically link outcomes for public health conditions with social characteristics of populations. Even large-scale prevalence surveys do not routinely collect information on the social background of those surveyed. Notable exceptions include Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS) and the Global Health Survey. Also, service data rarely provide information on the social background of patients, not to mention those who are not able to access the services due exactly to social determinants. Further, there is hardly any systematic information available on the differential services received and consequences experienced by those who manage to access the services.

For most of the conditions analysed, evidence has had to be patched together from a variety of sources. While the overall picture and trends are clear in that there are social gradients for all conditions with respect to common stratifiers such as wealth and education, in reality, as outlined in section 14.2 above, the situation is often very complex and dynamic.

In order to improve the evidence base for policy-making, it is necessary that:

- population survey designs are amended to capture a wider range of social determinants, cover more conditions and provide information on those that do not access health services;
- service data collection procedures and formats are designed to link social determinants, including context, position, exposure and vulnerability, with health care outcomes and consequences;
- data are collected, processed and presented to show gradients rather than just ratios, for example between the richest and the poorest;
- a combination of statistical and narrative methods is used to present evidence to inform policy, given that not all data on associations between social determinants and population health lend themselves well to statistical analysis;
- resources are set aside to undertake multidisciplinary epidemiological, social and service research to cover data gaps and look for answers to "why" and "how" in addition to the usual "what" and "how much" questions;
- mathematical models take into account social gradients and the fact that the effects of interventions might not be equally distributed within populations.

A number of concerns were raised and proposals made by the individual priority public health conditions programme nodes with respect to measurements and evidence. The concerns concentrated on four main issues:

A. **Aggregation of data.** Because of the many different determinants at play, often at the same time, differentials and variances tend to get lost in aggregation so that, for example, national and international data are inconclusive or of limited use to guide practical action and intervention.
B. **Capturing local data.** The focal nature of some conditions or the small populations involved pose a challenge of small numbers where routine information systems are not geared for capturing the data or where the numbers are insufficient to provide a statistical basis for analysis.
C. **Side-effects.** Intervening at the level of social determinants may have unforeseen adverse side-effects, some of which might show up outside the immediate sphere of interest of the intervening public health programme or the health sector as a whole.
D. **Timely identification of trends.** Often, trends are only noticed by the health system when they are firmly manifested as growing numbers in the clinics, and years of potentially effective counteraction might be missed.

A number of proposals were brought forward by the individual priority public health conditions programme nodes to address these issues.

Monitoring clustering of adverse determinants

The neglected tropical diseases are characterized by their focality, and there is a consequent risk that the pockets of high burden of disease may disappear within statistical averages at higher aggregate levels, for example national or provincial. It is a precondition for control of neglected tropical diseases that innovative surveillance systems be established, including the necessary cross-disciplinary expertise, encompassing not only biomedical and biological, but also climatological, demographic, economic and anthropological know-how. The aim would be to identify vulnerable populations, not only retrospectively based on traditional epidemiological data, but also proactively, identifying existing or potential disease hot spots (for example due to migrating populations, climatic phenomena, poverty, female literacy or infant mortality rates), through use of basic indices. This approach could both serve as a means of directing curative or preventive interventions to the neglected tropical disease hot spots and reduce inequity in health for the most disadvantaged populations (Chapter 8).

This idea could be generalized, for example by looking for clustering of determinants that are on the pathways of several public health conditions. Approaches could range from sophisticated satellite-aided geographic information systems at national level to simple verbal intelligence and mapping at district, village and community levels. This does not necessarily imply collection of new data – considerable benefit could derive from assembling existing data from different sources, and analysing and presenting them in new ways, enabling intersectoral responses. The approach could potentially address issues A, B and D above.

Comprehensive social and physical environment monitoring

The International Diabetes Federation produces the *Diabetes atlas* every three years, in which it pulls together summary statistics of diabetes prevalence and complications from across the world. This work could potentially be extended in two directions: to provide this information within countries and perhaps regarding population subgroups; and also to include information on upstream determinants of diabetes and diabetes inequalities, such as walkability of urban centres, distribution of food outlets, distribution of health care for diabetes relative to need – in summary, monitoring the obesogenic environment. Some of these data may already be available but not yet organized or brought together, while for many low-income countries additional data collection may be required (Chapter 5).

The idea could be further expanded to map and monitor trends in the way we live, eat, drink, smoke, work and move, with consequent relevance for several public health conditions. This information could help guide, focus and monitor interventions at all levels of the framework. While it is true that it might be difficult to maintain the databases, this is truer at higher than lower aggregate levels. For example, at city and in particular at neighbourhood level, web-based data capturing systems could continuously analyse data and make the results available to policy-makers and the public. The approach could potentially address issues A, B and D above.

Community logs

Not all data need to be collected by statisticians, epidemiologists or administrators. Where tackling determinants is done through regulation, using official statistics to collect data is important – both to reinforce the need for action and to enforce action where appropriate. But as many studies have shown, ordinary people are well able to identify dangers in their own communities and to suggest responses to those dangers. Keeping local logs of such lay knowledge may be a means of improving health at a local level through collaboration with communities and testing different kinds of interventions (Chapter 13).

The idea could be further developed to include the common social determinants and entry-points identified by the majority of public health conditions, while being left open to also include recording of additional determinants deemed relevant to a particular community. Thus, it would draw to a local level the suggestions made above and thereby overcome some of the problems related to equity perspectives disappearing in aggregation. Such logs could play a vital role in empowering communities by putting them in control of the information, including data on lack of access, inappropriate behaviours of providers or inequitable results of treatment, that official information systems have difficulty providing. This approach could address issues A, B, C and D above.

Monitoring of adverse side-effects of interventions

There are huge gaps in the data needed to manage and monitor the possible side-effects of interventions, because this objective requires measurement of outcomes other than those in the main interest area. For example, initiatives such as polio eradication campaigns have been accused of detracting attention from child survival, but unless evaluations of these programmes also include measurement of child survival indicators, no evidence on this possible side-effect will be available (Chapter 4).

The issue of monitoring possible side-effects requires greater attention and sophistication. For interventions targeting determinants at the three upper levels of the priority public health conditions analytical framework, side-effects potentially become more distant in space and time, more severe and more difficult to predict and reverse. Some risks of adverse side-effects can be foreseen and therefore monitored. In other instances interventions in one sector might produce side-effects in another sector before showing up as negative effects on population health. To capture this latter category would require scanning large amounts of data with unknown linkages to each other. Possibly, something could be learned from how credit card companies and counterterrorist agencies scan for unusual events or changing patterns or trends in large data flows. This approach could address issues C and D above.

Choice of indicators

Skilled birth attendants will reduce maternal mortality only if they are adequately trained and supported by facilities where major obstetric complications can be managed, such as hospitals. The utility of the percentage of births attended by skilled birth attendants as an indicator therefore depends on there being an association between a country providing more skilled birth attendants and better access to hospital facilities. It seems likely that this is broadly the case. However, because increasing the percentage of births attended by skilled birth attendants is a Millennium Development Goal, countries may feel pressured to demonstrate progress towards this goal, and this may threaten the links between the number of skilled birth attendants and the quality of service (Chapter 10).

This example describes a situation where the indicator can become more important than the outcome, underscoring the need for a carefully defined palette of process and outcome indicators, rather than relying on a single indicator or a few indicators. Choice of indicators becomes more complex when addressing social determinants across different sectors, but if properly managed can facilitate broader involvement and ownership while achieving the intended complex social and health results (*16*).

Effective data collection, analysis and presentation for social determinants of and equity in health could almost be viewed as a new discipline. It combines and analyses data from different sources, many of them not directly health related, and, above all, presents the results in ways that are understandable and useful to the audience. This audience will be wider than the usual health

audience, including sectoral managers, politicians and the general public. The latter will include the journalist and the person next door, as well as the person in the neighbourhood that you did not know existed or you have never dared visit.

A major challenge will be to move the social determinants and equity debate from the philosophical and theoretical to the practical application and managerial sphere. The ideas and proposals brought forward in this chapter will only have value if they are taken on board by public health programmes. In the following section the implications for programmes in general and WHO in particular will be discussed.

14.6 Implications

The implications for condition-specific national and international public health programmes of taking up a social determinants approach as described in the previous chapters are numerous and potentially very significant. There is still hesitation among some control programmes to move beyond administering known or incrementally improved health technologies, for several reasons: the biological rather than social approach to which most senior staff in programmes are accustomed; the increasingly prominent position of health on the political agenda and in the media, encouraging short-term solutions rather than a longer-term vision that takes into account the fundamental functioning of social and health systems; and the related consequence that money is allocated with a view to generating immediate measurable effects, often on a limited range of narrowly defined indicators. Internationally, the past decade has seen a remarkable growth in the number and size of single-purpose, health commodity-focused initiatives established outside but heavily influencing the thinking and direction of WHO programmes.

While this no doubt has a positive effect on the suffering of a large number of individuals, the effect on population health is more questionable. How health is distributed within a population is foremost a matter of fairness in economic and social development policy. Several public health programmes, as documented in the preceding chapters, are increasingly realizing that to halt growing global epidemics of communicable and noncommunicable diseases or to achieve and sustain global health targets, technologies alone will not do. Some programmes, notably in the areas of tobacco and injury, are already successfully demonstrating that it is possible for health sector-based programmes to address upstream determinants and to effectively work with other sectors. Many of the interventions that these programmes are implementing could also be applied for several of the control programmes that are reluctant to move outside their comfort zones. Others, such as the Stop TB programme, are well into a paradigm transition, integrating social determinant approaches with biomedical approaches.

The individual public health programme

Instead of mainly dealing with the outcomes and consequences of social determinants through preventive and curative interventions, programmes will have to look upstream to diversify and expand the range of interventions to influence the social determinants before they manifest in differential vulnerabilities and health care outcomes. In addition to a focus on individuals and specific subgroups, greater attention needs to be given to whole populations. This means that programmes, while maintaining their biomedical aspects, need to be expanded to embrace a broader social, economic and developmental agenda, which implies shifting some resources from doing "repair work" to reducing the health problem at its source. In the long run, a combination of technologies and social determinant approaches might prove best in combating many current health problems as well as others that may emerge. Specific actions that individual public health programmes could pursue in taking a social determinant approach include:

- **Information systems.** Programmes should review, revise or develop information systems to provide insight into condition-specific distribution of health in populations, with a focus at the national and local level to facilitate practical application of the outputs of such systems.
- **Capacity-building.** Country programme capacity needs to be strengthened to enable analysis of the equity gradient, patterns and pathways for each specific condition and country context, and to enable application of interventions and approaches that are most appropriate to their specific situations.
- **Intervention packages.** A range of intervention packages relevant to each condition and different shapes and patterns of social gradients needs to be developed and tested.
- **Advocacy.** All public health programmes need to advocate inclusion of social determinant approaches in their own work and in broader social, political and economic debates.

Collaboration between programmes

Important social determinants are common to a wide range of health conditions, from how individuals from disadvantaged populations are dealt with and treated by health services to contextual factors related to governance and modernization. There is currently enormous untapped potential for collaboration and

joint action between programmes. In some cases, for example in service provision and outreach, direct integration may be the solution; in other cases it may be more advantageous to use the power or arguments of some programmes to allow them to take the lead while other programmes join in with additional evidence and arguments.

Some obvious collaborative actions include:

- Identify **social determinants that are shared** along the pathways of the individual conditions and common entry-points for action, reviewing and adjusting to each country context;
- Incorporate into the **general health information systems** (routine reporting, surveillance, surveys, etc.) the information pertinent to those social determinants that appear on the pathways of multiple public health conditions;
- Recognize that collective rather than individual action has a greater chance of influencing how **health care services** in general are provided and **health systems** are designed and function;
- Develop and implement common tailor-made intervention packages targeting the circumstances and needs of **endemic and particular population groups** vulnerable to a range of conditions; change the mode of action to transcend individual disease-specific programmes in order to reduce prevalence of co-conditions and common risk factors or sources of vulnerability;
- Identify, nurture and support **leaders and champions** for public health programmes, both from within the health sector and, for wider outreach, from civil society, political life, the media and other sectors;
- Put into action the **special social responsibility** of large public health programmes, already attracting attention from media, politicians and donors, to speak out on the importance of addressing upstream social determinants to improve the health of the population in a significant and lasting way.

It might be tempting to spin off programmatic activities related to social determinants into dedicated social determinant programmes or organizational units, for example in ministries of health. However, these would inevitably lack power, funding and focus. Social determinants are everybody's business and impact and sustainability will hinge on the active and continued participation of all the condition-specific public health programmes. The role of dedicated social determinant programmes or units should be that of a convener and catalyst, facilitating analysis and articulation.

Relationship of public health programmes to other sectors

Health matters to all and public health programmes exist because they are deemed to address important population health issues. Dedicated disease control programmes have a special appeal to the public and politicians because they deal with real people rather than systems, people who are sick, die and suffer. However, with that also comes a duty to identify and communicate why people get sick and die and why some groups in the population are more vulnerable than others. Health programmes have a social responsibility to identify possible entry-points and interventions and propose frameworks for monitoring the situation. They should provide evidence of the relationship between socioeconomic status and health, advocate social and economic change, and address resistance to change, for example due to ideology, vested interests or costs, thereby providing leadership in dealing with the social determinants of and inequities in health. Relevant actions may include (taking the general analysis presented in section 14.3 as guidance, adapted to individual country settings):

- Analyse the critical pathways and identify the four to six **most promising entry-points** that call for interventions by sectors other than the health sector, with specific emphasis on the three upper levels of the priority public health conditions analytical framework;
- Make and present the case – **digest and popularize** the evidence base for social determinants of health and inequity in health, demonstrate the need for and benefits of social interventions to prevent increased or reduce current prevalence of the range of specific conditions, and propose concrete actions and targets;
- Work simultaneously from the bottom and the top through **social participation and vertical integration**, involving national as well as local government, and high-level civil servants as well as grass-roots organizations, given that successful realization will require close collaboration with other sectors of the government and creation of popular pressure;
- Adopt **collaborative sectoral indicators** so that, while overall population health is the goal, other sectors see value in programme activities;
- Sensitize and **build capacity among sectoral planners** and those involved in international financial and development assistance so they better understand how health is produced and what are the linkages between political, social and economic development, inequity and health.

Public health programmes should identify and convince to act those who hold the keys to the relevant entry-points. This may be done directly, for example

sector-to-sector, or indirectly, for example by encouraging and supporting civil society organizations and proactively using the media. It is important to understand that positive changes in the upstream social determinants of health require systematic and sustained effort and dedication over a very long time period, and dedicated leaders and champions to move the process forward.

Implications for WHO

The work of the Priority Public Health Conditions Knowledge Network, involving the different participating programmes and in many cases for the first time bringing them to the same table, has demonstrated that there is both the need and potential for collaboration and joint action on social determinants. The World Health Assembly is a unique forum to address issues of global health and the Director-General of WHO has access to the highest levels of government and of international economic, social and developmental forums. Internally within WHO there are also actions that could be undertaken, and the Medium-Term Strategic Plan 2008–2013 identifies four strategic objectives broadly dedicated to determinants of health (*23*).

In May 2009 the World Health Assembly, recalling the principles of "Health for All", reaffirmed the importance of addressing the wider determinants of health. Through resolution WHA62.14 the Assembly called upon the international community and Member States to take action and through political commitment develop and implement policies and strategies for public health with a focus on health inequities. The resolution specifically requested WHO to make social determinants a guiding principle and the reduction of health inequities an objective of all areas of the Organization's work, especially for the priority public health programmes (*24*).

Complex social issues require comprehensive interventions, and addressing social determinants of health in public health programmes needs to be one of the key aspects of a comprehensive solution to global public health challenges. This requires WHO to redefine the interventions and strategies to mainstream social determinants of health and health equity in public health programmes, and to strengthen the capacities of programmes and of Member States to take action in the critical areas of social determinants of health and health equity. While the delivery of interventions for high-mortality diseases clearly saves lives, WHO needs to put its weight behind the longer haul and to engage in the difficult political and social processes that this entails. Otherwise, there is a danger that short-sighted approaches become embedded in public health programme thinking, beliefs and attitudes, leading to resistance and reluctance within governments and among partners and financing agencies to pursue new approaches, despite the fact that the failure to control major public health problems, for example in Africa, has not been due to absence of tools (diagnostics, drugs, vaccines) but due to a wide range of social determinants whose origins can be traced in history and which are defined in the priority public health conditions analytical framework.

There is also a need to institutionalize joint action of public health programmes on social determinants, starting from within WHO and expanding to countries. This could be done with minimal additional resources, for example in pathfinder countries where WHO programmes are already supporting work on specific public health conditions and where these programmes, the WHO country office, the government and other health development partners are prepared to engage to move the boundaries of public health programming. Moreover, as health outcomes are mostly created outside the health sector, as demonstrated throughout this volume, WHO has a key role to play in proactively aligning and harmonizing its work with its various partners in the development sector. Such collaborative work would fit well with the ideas regarding renewal of primary health care expressed in the *World Health Report 2008* (*25*), adding to cohesion among programmes and expansion beyond provision of individual health care services. A practical starting-point would be to ensure that all pre-service and in-service training for programme staff equipped them with skills and tools to identify promising entry-points, possible interventions and key movers at each of the five levels of the priority public health conditions analytical framework for all the priority public health conditions relevant to the context, regardless of which programme pays them.

14.7 Conclusion

This chapter has focused on what condition-specific public health programmes can and should do, rather than on what others should do. It is clear that there are managerial and organizational issues that need to be tackled in order to effectively adopt social determinant approaches in programming. The following conclusions can be drawn:

- **Strengthening the competence base.** The competence base of programmes in relation to social determinants needs to be strengthened. In the short term this can be done through changing the incentive structure of programmes, including with regard to how results are measured and valued. Cross-cutting issues tend to become lost when management is based on a results-based framework and collaboration across programmes and parts of programmes tends to be underappreciated. In the longer run,

schools of public health, medicine and nursing must be oriented towards producing the right competencies.

- **Restructuring for social determinants.** Few health programmes and organizations are currently structured, informed and tooled to support social determinant approaches to population health, limiting the potential for internal cross-programme collaborative work. Greater attention needs to be paid to cross-sectoral policy-making and political processes, within government and in the public arena.
- **Communication and dialogue.** Much of the communication of programmes is focused on resource mobilization rather than on challenging and generating the public policy dialogue on the complex social, economic and political change processes required to improve population health.
- **Appropriate time horizons.** Programmes need to work with more than one time horizon. In the short and medium term they need to apply available tools and improve services to compensate for inequities. However, short- and medium-term achievements are fragile. For lasting solutions work with other sectors to influence the social determinants of health at their roots is indispensable. It is clear that such work has a much longer time horizon than the work normally pursued by most public health programmes.
- **Evidence-based action.** If donors and programmes look back to the past six decades of national and international public health programming, they will find a road littered with approaches that once appeared promising but did not deliver the expected results. In hindsight many of the solutions pursued and later abandoned could have been foreseen not to lead to the expected results had they been more comprehensively evidenced. This is not to say that risks should not be taken – new and innovative approaches should be encouraged but should be supported by improved information systems, implementation research and evaluative research to document the impact on the health of populations and not merely on disease prevalence.
- **Cost implications.** Cost increases from taking a social determinant approach will be marginal for the majority of public health programmes as most of the direct intervention costs will be borne by others. For health care service delivery, taking a social determinant approach and improving equity of access and use may at a first sight appear to imply a significant cost increase. However, equity is not a matter of level of resources but of how resources are distributed and on whose account the costs show up – all programmes, services and societies can afford to be more equitable. While some sectors of society might see short-term gains from ignoring the population health effect of their actions, the long-term costs will eventually become apparent, not only in the health sector but also in the social, political and economic sectors. National governments and planners, and international bodies, must take a comprehensive social view when allocating and steering the flow of resources, costs and benefits.

All the theoretical evidence to convince all sceptics that a social determinant approach is a right and necessary way forward to improving population health will never be available. However, the chapters of this volume provide enough pieces to the puzzle to send a clear and consistent message that the health of and distribution of health in populations is socially determined regardless of the condition in question. Insight has also been provided into lessons learned in the field from programmes that have tried to implement various forms of social determinant interventions. Concrete ideas have also been offered on what could be done and it is to be hoped that together with the evidence provided by the other knowledge networks of the Commission on Social Determinants of Health this will encourage governments, donors and nongovernmental organizations to dare to come forward to work together. Changes can ensue through working on actual large-scale projects, and starting such work through already existing programmes that deal with important public health conditions provides a sound and pragmatic way forward.

Annex 14.A Social determinants occurring on the pathways of the priority public health conditions analytical framework

Level of framework	Social determinant(s) at play[a]	Relevant chapters/conditions
Socioeconomic context and position ***Society*** Interventions target laws, systems, relations between sectors and countries that form the fabric of society	**Context**	
	Globalization (trade, import and export, production)	2, 11
	Urbanization, rural or urban residence	2, 5, 6, 8, 11, 12, 13
	Poor governance, political instability, lack of proper policies	6, 9, 12, 13
	Position	
	Gender	2, 3, 5, 6, 7, 8, 9, 10, 11, 13
	Rapid demographic changes	3, 6, 11, 12, 13
	Age	3, 5, 7, 9, 10, 11, 13
	Social status, economic, social or political inequality	2, 3, 4, 5, 7, 8, 10, 11, 13
	Ethnicity, minority situation, race	5, 6, 7, 11, 12
	Social exclusion	2, 4, 7, 8, 12
Differential exposure ***Social and physical environment*** Interventions target organizations, institutions, enterprises	Social norms, cultural beliefs and practices, lifestyles (including age at marriage, start of sexual activity, maternal age)	2, 5, 6, 7, 8, 10, 11, 12, 13
	Social stigma and discrimination	2, 7, 12
	Slum formation, crowding, clustering, deprivation	2, 3, 4, 6, 8, 9, 12, 13
	Poorly developed infrastructures	4, 8, 13
	Water and sanitation	4, 6, 8, 9
	Poor living and working environment	2, 3, 6, 9, 12, 13
	Waste disposal	6, 8
	Food of poor nutritional value	4, 5, 6, 7, 9
	Availability, safety and use of alcohol	2, 11, 13
	Natural disasters, wars, conflicts	4, 7, 8, 13
	Non-regulated markets and outlets	2, 5, 6, 11
	Production and preparation of food	4, 5, 6
	Non-compliance or resistance by industry and agriculture	2, 6, 9
	Lack of compliance by commercial food handlers	6
	Contaminated food and alcohol sources, street vending	2, 6
	Marketing, advertisement	2, 4, 6, 11
	Television exposure	2, 4, 7, 11, 13
	Environment, including exposure to disease vectors	4, 6, 8, 12
	Toxic exposures	6, 7
	Inadequate or unsafe health services	3, 4, 10, 12, 13
	Indoor pollution	3, 4, 12
	Unsafe housing	8, 13
	Mechanization of work	3, 5
	Availability of lethal means	13

Level of framework	Social determinant(s) at play[a]	Relevant chapters/conditions
Differential vulnerability ***Population group*** Interventions target populations	Hard-to-reach populations	2, 4, 5, 7, 9, 10, 12
	Poverty	2, 3, 4, 6, 8, 9, 10, 12
	Unemployment	2, 3
	Low access to health care	4, 10, 12
	Low health-seeking behaviour	3, 4, 5, 7, 9, 10, 12
	Low (parental) literacy, education, knowledge	2, 3, 4, 5, 6, 7, 10, 12
	Tobacco smoking	3, 5, 7, 9, 12
	(Parental) alcohol and substance use and abuse	2, 4, 7, 12, 13
	Low access to contraceptives	10
	Low access to insecticide-treated mosquito nets	4
	Low access to micronutrients, including iron and iodine	3, 4, 7
	Low access to oral health products, including fluorides	9
	Food insecurity, malnutrition	3, 4, 5, 6, 7, 12
	Early childhood experiences, including abuse	2, 7, 9, 10, 13
	Sexual violence	2, 10, 13
	Parental mental health	7
	Lack of social capital, dysfunctional family or community links	4, 7, 10, 13
	Low status of women	4, 7, 9, 10, 13
	HIV	2, 4, 7, 12
	Migration, work mobility	6, 8, 10
	Diabetes	3, 4, 12
	Genetics, family history	3, 5, 7
	Birth complications	4, 7
	Domestic practices	6, 13
	Maternal stress during pregnancy	4, 7
	Psychological risk factors, job stress	3, 7
	Physical inactivity	3, 5
	Obesity	3, 5
	Family size, birth order	7, 10
Differential health care outcomes ***Individual*** Interventions target the individual person	Low qualification of health staff	2, 3, 4, 5, 7, 10, 13
	Inadequate or weak health services	2, 4, 5, 7, 8, 9, 10, 12, 13
	Discriminatory services	2, 7, 10, 12
	Limited patient interaction, low social class	3, 4, 5, 10, 12
	Adherence to treatment	2, 3, 4, 5, 7, 8, 12
	Use of tobacco cessation services	11
	Use of treatment and care, antiretroviral services	12

Level of framework	Social determinant(s) at play[a]	Relevant chapters/conditions
Differential consequences	Education and employment	3, 4, 5, 10, 12
Individual	Absenteeism from school	12
Interventions target the individual person and family	Social and financial consequences	2, 3, 5, 7, 11, 12, 13
	Social exclusion, stigma	2, 4, 5, 7, 8, 10, 12
	Exclusion from insurance	2, 3, 4, 5, 7, 10, 12

a. This refers to the social determinant(s) identified for each public health condition (Chapters 2 to 13) at each level of the priority public health conditions analytical framework.

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Closing the gap in a generation: Health equity through action on the social determinants of health

Social justice is a matter of life and death. It affects the way people live, their consequent chance of illness, and their risk of premature death. We watch in wonder as life expectancy and good health continue to increase in parts of the world and in alarm as they fail to improve in others.

The full report is available from:
http://www.who.int/social_determinants/thecommission/finalreport/en/index.html

This book was commissioned by the Department of Ethics, Equity, Trade and Human Rights as part of the work undertaken by the Priority Public Health Conditions Knowledge Network of the Commission on Social Determinants of Health, in collaboration with 16 of the major public health programmes of WHO: alcohol-related disorders, cardiovascular diseases, child health, diabetes, food safety, HIV/AIDS, maternal health, malaria, mental health, neglected tropical diseases, nutrition, oral health, sexual and reproductive health, tobacco and health, tuberculosis, and violence and injuries. In addition to this, through collaboration with the Special Programme of Research, Development and Research Training in Human Reproduction, the Special Programme for Research and Training in Tropical Diseases, and the Alliance for Health Policy and Systems Research, 13 case studies were commissioned to examine the implementation challenges in addressing social determinants of health in low-and middle-income settings. The Priority Public Health Conditions Knowledge Network has analysed the impact of social determinants on specific health conditions, identified possible entry-points, and explored possible interventions to improve health equity by addressing social determinants of health.

For more information on the work of WHO on social determinants of health, please visit http://www.who.int/social_determinants/en/

978 92 4 156397 0