Disease Control Priorities in Developing Countries
SECOND EDITION
Dedication

This book is dedicated to Bill and Melinda Gates, whose vision, leadership, and financing over the past decade have catalyzed global support for transforming the lives of the world’s poor through inexpensive but powerful health interventions.
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The 1993 publication of the now classic book, Disease Control Priorities in Developing Countries, by Oxford University Press and of its companion document, the World Development Report 1993: Investing in Health, published by the World Bank that same year, constitute a landmark in the public health literature. For the first time, decision makers and public health practitioners had a comprehensive review of the cost-effectiveness of available interventions to address the most common health problems in the developing world. They were also provided with the useful metric known as disability-adjusted life years to calculate the burden of disease and the cost-effectiveness of interventions more accurately than in the past.

As was the case with the first edition, this second edition of Disease Control Priorities in Developing Countries will serve an array of audiences. One primary audience consists of people working in the health sector, ranging from those who are responsible for making evidence-based decisions to those who practice medicine and public health under often suboptimal field conditions. A second audience consists of people working in finance and planning ministries, who will benefit from the solid recommendations for improving the health of populations through sound resource reallocation and cost-effective practices.

PURPOSE

The purpose of this book is to provide information about what works—specifically, the cost-effectiveness of health interventions in a variety of settings. Such information should influence the redesign of programs and the reallocation of resources, thereby helping to achieve the ultimate goal of reducing morbidity and mortality.

FUNDAMENTAL POLICY CONSIDERATIONS

Although economic and budgetary constraints are clearly important considerations, money is not the only limitation. Additional factors fundamental to improving outcomes are the particular circumstances in each country, as well as the individual institutional capacities to deliver goods and services and to implement policies and processes.

Context-specific strategies and responses are essential, because application of the Disease Control Priorities Project’s findings will vary according to each country’s circumstances: one size does not fit all. Understanding that most health interventions require a minimum level of institutional capacity to deliver goods and services is equally important, and such capacity may have to be built up before money or physical inputs can yield any benefits. Accordingly, goals and priorities should be established and tailored to each country’s context.

TRANSITION IN HEALTH

Every developing region is facing a transition in its epidemiological profile from an environment with high fertility rates and high mortality from preventable causes to one in which a combination of lower fertility rates and changing lifestyles has led to aging populations and epidemics of tobacco addiction, obesity, cardiovascular disease, cancers, diabetes, and other chronic ailments. The 20th century will be remembered for, among other things, witnessing the largest universal increase in life expectancy in history. While life expectancy is highest in the richest countries, the upward trend is apparent in almost every society. Moreover, in the past 50 years, variations in this health indicator across and within countries have decreased. This convergence of improved life expectancy and reduced variations, which has occurred even in the presence of widening income gaps in many regions, can be explained solely by the impact of knowledge expansion and direct public health interventions.

The increase in life expectancy worldwide will, however, soon reach a plateau, and a retraction has occurred in many countries. HIV/AIDS and civil unrest in Africa, vaccine-preventable diseases and alcoholism in Eastern Europe, and obesity in the United States have reduced—or will soon do so—the years of life their populations can expect.
SCALING UP EFFECTIVE INTERVENTIONS

The late Jim Grant, former executive director of the United Nations Children’s Fund, was one of the first leaders with a vision for setting specific health goals and priorities within a time frame and on a global scale. He recognized the need to raise awareness of the dramatic disparities in children’s health and to mobilize political will accordingly. His missionary zeal for universal child immunization and for organizing the first summit of world leaders for children’s health and rights in 1990 permitted the scaling up of interventions of proven efficacy. The Millennium Development Goals are a natural consequence of that vision and an extremely useful instrument for maintaining both focus and social pressure. Achieving these ambitious goals will require not only the universal implementation of effective interventions that are currently available, but also the development of new interventions.

NEED FOR ONGOING RESEARCH

Today, most vaccines, medical devices, diagnostic tools, and drugs have been subjected to careful investigation in the laboratory, at the bedside, and in the field. However, not enough investment has gone into research to increase well-being and development globally. We need more epidemiological and health systems research to improve the efficiency of available interventions, technological research to reduce their costs, and biomedical research to develop new tools for dealing with as yet unsolved and emerging health problems.

OPPORTUNITIES AND CHALLENGES OF GLOBALIZATION

One of the greatest opportunities and challenges for international public health is globalization. We live in an era when the explosion of trade, travel, and communications is spreading new cultural influences and lifestyles faster than ever before, and the division between domestic and international health problems is becoming increasingly obsolete. At the same time, globalisation also permits the spread of risks, pathogens, and other threats. The ever-increasing movement of people everywhere increases the potential for epidemics. Travelers, refugees, and displaced people are more vulnerable to infectious diseases, and their movement contributes to spreading pathogens into new areas. Overall, however, the positive consequences outweigh the negative ones, and cautious optimism about this irreversible trend is justified. Certainly, one of the most valuable contributions of globalization is the rapid accrual and spread of knowledge about useful tools for controlling disease and ways to implement those tools on a large scale.

In recent years, the huge advances in information technology have greatly boosted the globalization of knowledge. Ideally, this should become a tide that lifts all boats to yield global benefits. The challenge is to harness the information technology revolution to foster the growth of economies. One step in the right direction is the open access movement, which promotes and permits free and immediate access to research results and other components of knowledge transfer.

SPENDING MORE AND SPENDING BETTER

It is indeed a paradox to observe that even though the money spent on health worldwide has reached 10 percent of overall global income, that amount is both insufficient and poorly allocated. The World Health Organization’s Commission on Macroeconomics and Health and several other global initiatives make a persuasive plea for a larger investment in health. At the same time, this book is dedicated to making the case for better spending—that is, deriving more health benefits from every dollar spent. The aim should be to reduce inequalities in health investment between and within countries: a 100-fold difference between the rich and the poor in money spent on health services still persists in many places. Despite a lack of clarity about what constitutes the optimum balance of health spending, a larger share should go to prevention. This book looks at several prevention options and clinical interventions that are not being fully implemented.

SELECTING INTERVENTIONS

This book persuasively makes the case that both clinical and public health interventions depend on the capacity of a given country’s health system to deliver, noting that some interventions are more demanding than others in terms of infrastructure and human resources. Therefore, both the costs and the likelihood of success of the more complex interventions are a function of the health capacity in place. In addition, decisions about which interventions should be given priority will depend on assessments of the local burden of disease, local health infrastructure, and other social factors as well as on cost-effectiveness analyses. The following chapters identify the health system capacity needed for scaling up a given intervention. Even middle-income countries with relatively better health infrastructure often pursue sophisticated approaches to medical care that result in fewer health gains per amount of money invested. Every country, regardless of level of development, could benefit from the recommendations presented here.

DIAGONAL APPROACH

The medical literature has long debated which approach to delivering health interventions is more effective: vertical programs or horizontal programs. Vertical programs refer to
focused, proactive, disease-specific interventions on a massive scale, whereas horizontal programs refer to more integrated, demand-driven, resource-sharing health services. This is a false dilemma, because both need to coexist in what could be called a diagonal approach—that is, the proactive, supply-driven provision of a set of highly cost-effective interventions on a large scale that bridges health clinics and homes. This approach often starts vertically (polio vaccination, for instance) but moves toward an increasing number of interventions (for example, oral rehydration, other vaccines, residual spraying and bednets for malaria control, micronutrient supplementation, and supervised tuberculosis treatment), making full use of field health workers and existing infrastructure. This could well be the equivalent of a public health polypill.

MULTIDISCIPLINARY ORIENTATION

What makes this book unique, in addition to its comprehensive scope, is its truly multidisciplinary approach to disease control, which merges the best of the medical and economic sciences. Every recommendation has been carefully researched and documented. Evidence-based approaches must be the foundation for allocating scarce resources. The poor cannot afford anything but the most efficient methods for organizing and implementing health care. This book is a fundamental component for fostering equitable outcomes in health and development. It will inspire all those who seek the highly complex but attainable goal of universal good health for all members of the global community.

FACILITATING PROGRESS

We all share global responsibility: governments and international agencies, public and private sectors, and society and individuals all have specific tasks. We must all strive toward more equitable distribution of the benefits of new knowledge to reduce health and development gaps between rich and poor, between countries, and within countries. The second edition of Disease Control Priorities in Developing Countries is a new step in precisely the right direction. If we succeed in conveying the main lessons and messages of this book, public health in developing countries will progress farther and faster.

Jaime Sepúlveda, Director, National Institutes of Health of Mexico, Mexico City, Mexico
Chair, Advisory Committee to the Editors
In the late 1980s, the World Bank initiated a review of priorities for the control of specific diseases and used this information as input for comparative cost-effectiveness estimates of interventions addressing most conditions important in developing countries. The purpose of the comparative cost-effectiveness work was to inform decision making within the health sectors of highly resource-constrained low- and middle-income countries. This process resulted in the 1993 publication of the first edition of Disease Control Priorities in Developing Countries (DCP1) (Jamison and others 1993). That volume’s preface stated its purpose as follows:

Between 1950 and 1990, life expectancy in developing countries increased from forty to sixty-three years with a concomitant rise in the incidence of the noncommunicable diseases of adults and the elderly. Yet there remains a huge unfinished agenda for dealing with undernutrition and the communicable childhood diseases. These trends lead to increasingly diverse and complicated epidemiological profiles in developing countries. At the same time, new epidemic diseases like AIDS are emerging; and the health of the poor during economic crisis is a source of growing concern. These developments have intensified the need for better information on the effectiveness and cost of health interventions. To assist countries to define essential health service packages, this book provides information on disease control interventions for the commonest diseases and injuries in developing countries.

To this end, DCP1 aimed to provide systematic guidance on the selection of interventions to achieve rapid health improvements in an environment of highly constrained public sector budgets through the use of cost-effectiveness analysis.

DCP1 provided limited discussion of investments in health system development. Other major efforts undertaken at the World Bank at about the same time, including the World Development Report 1993: Investing in Health, used the findings of DCP1 and dealt more explicitly with the financial and health systems aspects of implementation (Feachem and others 1992; World Bank 1993). Closely related efforts in collaboration with the World Health Organization led to the first global and regional estimates of numbers of deaths by age, sex, and cause and of the burden (including the disability burden) from more than 100 specific diseases and conditions (Murray, Lopez, and Jamison 1994; World Bank 1993).

This second edition of Disease Control Priorities in Developing Countries (DCP2) seeks to update and improve guidance on the “what to do” questions in DCP1 and to address the institutional, organizational, financial, and research capacities essential for health systems to deliver the right interventions. DCP2 is the principal product of the Disease Control Priorities Project, an alliance of organizations designed to review, generate, and disseminate information on how to improve population health in developing countries. In addition to DCP2, the project produced numerous background papers, an extensive range of interactive consultations held around the world, and several additional major publications. The other major publications are as follows:

- Global Burden of Disease and Risk Factors (Lopez and others 2006), undertaken in collaboration with the World Health Organization
- Millions Saved: Proven Successes in Global Health (Levine and the What Works Working Group 2004), undertaken in collaboration with the Center for Global Development
- “The Intolerable Burden of Malaria: II. What’s New, What’s Needed” (Breman, Alilio, and Mills 2004), undertaken in collaboration with the Multilateral Initiative on Malaria
- Priorities in Health (Jamison and others 2006), a brief and nontechnical companion to this volume.

Each product of the Disease Control Priorities Project marries economic approaches with those of epidemiology, public health, and clinical medicine.

While general lessons emerge from the Disease Control Priorities Project, they result from careful consideration of individual cases. The diversity of health conditions necessitates specificity of analysis. Arrow clearly stated the need for
technical analyses to underpin health economics: “Another lesson of medical economics is the importance of recognizing the specific character of the disease under consideration. The policy challenges that arise in treating malaria are simply very different from those attached to other major infectious scourges (Arrow, Panosian, and Gelband 2004, xi–xii).” Chapters in this volume address this need for specificity, yet use cost-effectiveness analysis in a way that makes findings on the relative attractiveness of interventions comparable.

DCP2 goes beyond DCP1 in a number of important ways as follows:

• While virtually all chapters of DCP1 were structured around clusters of conditions, DCP2 provides integrative chapters—for example, on school health systems, surgery, and integrated management of childhood illness—that draw together the implementation-related responses to a number of conditions. These and other chapters reflect DCP2’s inclusion of implementation and system issues.

• DCP2 includes explicit discussions of research and product development opportunities.

• Although DCP1 dealt with policy mechanisms to change behavior (or the environment), DCP2 attempts to do so in a more systematic way. In particular, a number of chapters assess in depth the public sector instruments for influencing behavior change that were described briefly in DCP1: information, education, and communication; laws and regulations; taxes and subsidies; engineering design, such as speed bumps; and facility location and characteristics.

• Different interventions place different levels of demand on a country’s health system capacity. DCP2 builds on earlier work (Gericke and others 2005) in attempting, in some chapters, to identify which interventions require relatively less system capacity for scaling up and which require more.

• Although DCP1 briefly discussed the nonhealth outcomes of interventions, DCP2 does so in a more systematic way, including looking at the consequences of interventions (and intervention financing) for reducing financial risks at the household level. Other important nonhealth outcomes include, for example, the time-saving value of having piped water close to the home, the increased labor productivity of healthy workers, and the amenity value of clean air.

• An important element of DCP1 was its assumption that to inform broad policy, major changes from the status quo need to be considered, not just marginal ones. For cost-effectiveness analysis, any major change needs to be informed by burden of disease assessments in a way not required for judging the attractiveness of marginal change, because the size of the burden affects total costs and the feasibility of extending the intervention to all who would benefit. This is particularly true when considering research and development priorities, but also applies to control priorities. In this regard, DCP2 continues in the spirit of DCP1 in assessing cost-effectiveness analyses of major changes, but it does so more systematically for each of the six regional groupings of low- and middle-income countries used throughout this volume (see map 1, inside the front cover).

What was becoming clear in 1990 is clearer today: focusing health system attention on delivering efficacious and often relatively inexpensive health interventions can lead to dramatic reductions in mortality and disability at modest cost. A valuable dimension of globalization has been the diffusion of knowledge about what these interventions are and how to deliver them. The pace of this diffusion into a country determines the pace of health improvement in that country much more than its level of income. Our purpose is to help speed this diffusion of life-saving knowledge.

The Editors

REFERENCES


Editors

Dean T. Jamison is a professor of health economics in the School of Medicine at the University of California, San Francisco (UCSF), and an affiliate of UCSF Global Health Sciences. Dr. Jamison concurrently serves as an adjunct professor in both the Peking University Guanghua School of Management and in the University of Queensland School of Population Health.

Before joining UCSF, Dr. Jamison was on the faculty of the University of California, Los Angeles, and also spent many years at the World Bank, where he was a senior economist in the research department; division chief for education policy; and division chief for population, health, and nutrition. In 1992–93, he temporarily rejoined the World Bank to serve as director of the World Development Report Office and as lead author for the Bank’s World Development Report 1993: Investing in Health.

His publications are in the areas of economic theory, public health, and education. Dr. Jamison studied at Stanford (B.A., philosophy; M.S., engineering sciences) and at Harvard (Ph.D., economics, under K. J. Arrow). In 1994, he was elected to membership in the Institute of Medicine of the U.S. National Academy of Sciences.

Joel G. Breman, M.D., D.T.P.H., is senior scientific adviser, Fogarty International Center of the National Institutes of Health, and co-managing editor of the Disease Control Priorities Project. He was educated at the University of California, Los Angeles; the Keck School of Medicine, the University of Southern California; and the London School of Hygiene and Tropical Medicine. Dr. Breman trained in medicine at the University of Southern California–Los Angeles County Medical Center; in infectious diseases at the Boston City Hospital, Harvard Medical School; and in epidemiology at the U.S. Centers for Disease Control and Prevention.

Dr. Breman worked in Guinea on smallpox eradication (1967–69); in Burkina Faso at the Organization for Coordination and Cooperation in the Control of the Major Endemic Diseases (1972–76); and at the World Health Organization, Geneva (1977–80), where he was responsible for orthopoxvirus research and the certification of smallpox eradication. In 1976, in the Democratic Republic of Congo (formerly Zaire), Dr. Breman investigated the first outbreak of Ebola hemorrhagic fever.

Following the confirmation of smallpox eradication in 1980, Dr. Breman returned to the U.S. Centers for Disease Control, where he began work on the epidemiology and control of malaria. Dr. Breman joined the Fogarty International Center in 1995 and has been director of the International Training and Research Program in Emerging Infectious Diseases and senior scientific adviser. He has been a member of many advisory groups, including serving as chair of the World Health Organization’s Technical Advisory Group on Human Monkeypox and as a member of the World Health Organization’s International Commission for the Certification of Dracunculiasis (guinea worm) Eradication. Dr. Breman has written more than 100 publications on infectious diseases and research capacity strengthening in developing countries. He was guest editor of two supplements to the American Journal of Tropical Medicine and Hygiene: “The Intolerable Burden of Malaria: A New Look at the Numbers” (2001) and “The Intolerable Burden of Malaria: What’s New, What’s Needed” (2004).

Anthony R. Measham is co-managing editor of the Disease Control Priorities Project at the Fogarty International Center of the National Institutes of Health; deputy director of the Communicating Health Priorities Project at the Population Reference Bureau, Washington, DC; and a member of the Working Group of the Global Alliance for Vaccines and Immunization on behalf of the World Bank.

Born in the United Kingdom, Dr. Measham practiced family medicine in Dartmouth, Nova Scotia, before devoting the remainder of his career to date to international health. He spent 15 years living in developing countries on behalf of the Population Council (Colombia), the Ford Foundation (Bangladesh), and the World Bank (India). Early in his international health career (1975–77), he was deputy director of the Center for Population and Family Health at Columbia University, New York. He then served for 17 years on the staff

Dr. Measham has spent most of his career providing technical assistance, carrying out research and analysis, and helping to develop projects in more than 20 developing countries, primarily in the areas of maternal and child health, family planning, and nutrition. He was an editor of the first edition of *Disease Control Priorities in Developing Countries* and has authored approximately 60 monographs, book chapters, and journal articles.

Dr. Measham graduated in medicine from Dalhousie University, Halifax, Nova Scotia. He received a master of science and a doctorate in public health from the University of North Carolina in Chapel Hill and is a diplomate of the American Board of Preventive Medicine and Public Health. His honors include being elected to the Alpha Omega Alpha Honor Medical Society; being appointed as special professor of International Health, University of Nottingham Medical School, Nottingham, United Kingdom; and being named Dalhousie University Medical Alumnus of the Year in 2000–1.

**George Alleyne, M.D., F.R.C.P., F.A.C.P. (Hon.), D.Sc. (Hon.),** is director emeritus of the Pan American Health Organization, where he served as director from 1995 to 2003. Dr. Alleyne is a native of Barbados and graduated from the University of the West Indies in medicine in 1957. He completed his postgraduate training in internal medicine in the United Kingdom and did further postgraduate work in that country and in the United States. He entered academic medicine at the University of the West Indies in 1962, and his career included research in the Tropical Metabolism Research Unit for his doctorate in medicine. He was appointed professor of medicine at the University of the West Indies in 1972, and four years later he became chair of the Department of Medicine. He is an emeritus professor of the University of the West Indies. Dr. Alleyne joined the Pan American Health Organization in 1981, in 1983 he was appointed director of the Area of Health Programs, and in 1990 he was appointed assistant director.

Dr. Alleyne's scientific publications have dealt with his research in renal physiology and biochemistry and various aspects of clinical medicine. During his term as director of the Pan American Health Organization, he dealt with and published on issues such as equity in health, health and development, and international cooperation in health. He has also addressed several aspects of health in the Caribbean and the problems the area faces. He is a member of the Institute of Medicine and chancellor of the University of the West Indies.

Dr. Alleyne has received numerous awards in recognition of his work, including prestigious decorations and national honors from many countries of the Americas. In 1990, he was made Knight Bachelor by Her Majesty Queen Elizabeth II for his services to medicine. In 2001, he was awarded the Order of the Caribbean Community, the highest honor that can be conferred on a Caribbean national.


Dr. Claeson coauthored the call for action by the Bellagio study group on child survival in 2003, *Knowledge into Action for Child Survival*, and the World Bank's 2005 report on *The Millennium Development Goals for Health: Rising to the Challenges*. She was a member of the What Works Working group hosted by the Center for Global Development that resulted in the report *Millions Saved: Proven Successes in Global Health* (2005). Dr. Claeson coauthored the health chapter of the *Poverty Reduction Strategy* source book, promoting a life-cycle approach to maternal and child health and nutrition. As a coordinator of the public health thematic group (1998–2002), she led the development of the strategy note *Public Health and World Bank Operations* and promoted multisectoral approaches to child health within the World Bank and in Bank-supported country operations, analytical work, and lending.

Prior to joining the World Bank, Dr. Claeson worked with the World Health Organization from 1987 until 1995, in later years as program manager for the Global Program for the Control of Diarrheal Diseases. She has several years of field experience working in developing countries; in clinical practice at the rural district level in Bangladesh, Bhutan, and Tanzania; in national program management of immunization and diarrheal disease control programs in Ethiopia; and in health sector development projects in middle- and low-income countries.

**David B. Evans,** Ph.D., is an economist by training. Between 1980 and 1990, he was an academic, first in economics departments and then in a medical school, during which time he undertook consultancies for the World Bank, the World Health Organization, and governments. From 1990 until 1998, he sponsored and conducted research into social and economic aspects of tropical diseases and their control in the United Nations Children's Fund, United Nations Development Programme, World Bank, and World Health Organization Special Programme on Research and Training in Tropical Diseases. He subsequently became director of the Global Programme on Evidence for Health Policy and then the Department of Health Systems Financing of the World Health Organization, where he is now responsible for a range of activities relating to the development of appropriate health
financing strategies and policies. These activities include the World Health Organization's CHOICE project, which has assessed and reported the costs and effectiveness of more than 700 health interventions, the costs of scaling up interventions, the levels of health expenditures and accounts, and the extent of financial catastrophe and impoverishment caused by out-of-pocket payments for health and which has assessed the impact of different ways to raise funds for health, pool them, and use them to provide or purchase services and interventions. He has published widely in these areas.

Prabhat Jha is Canada research chair of health and development at the University of Toronto. He is also the founding director of the Centre for Global Health Research, St. Michael's Hospital; associate professor in the Department of Public Health Sciences, University of Toronto; research scholar at the McLaughlin Centre for Molecular Medicine; and professeur extraordinaire at the Université de Lausanne, Switzerland.

Dr. Jha is lead author of *Curbing the Epidemic: Governments and the Economics of Tobacco Control* and coeditor of *Tobacco Control in Developing Countries*. Both are among the most influential books on tobacco control. He is the principal investigator of a prospective study of 1 million deaths in India, researching mortality from smoking, alcohol use, fertility patterns, indoor air pollution, and other risk factors among 2.3 million homes and 15 million people. This work is currently the world's largest prospective study of health. He also conducts studies of HIV transmission in various countries, focusing on documenting the risk factors for the spread of HIV and interventions to prevent the spread of the HIV/AIDS epidemic. His studies have received more than $5 million in peer-reviewed grants.

Dr. Jha has published widely on tobacco, HIV/AIDS, and health of the global poor. His awards include a Gold medal from the Poland Health Promotion Foundation (2000), the Top 40 Canadians under Age 40 Award (2004), and the Ontario Premier’s Research Excellence Award (2004). Dr. Jha was a research scholar at the University of Toronto and McMaster University in Canada. He holds an M.D. from the University of Manitoba and a D. Phil. in epidemiology and public health from Oxford University, where he studied as a Rhodes Scholar at Magdalen College.

Anne Mills, Ph.D., is professor of health economics and policy at the London School of Hygiene and Tropical Medicine. She has more than 20 years of experience in research pertaining to health economics in developing countries and has published widely in the fields of health economics and health planning, including books on the role of government in health in developing countries, health planning in the United Kingdom, decentralization, health economics research in developing countries, and the public-private mix. Her most recent research interests have been in the organization and financing of health systems, including the evaluation of contractual relationships between the public and private sectors and the application of economic evaluation techniques to improve the efficiency of disease control programs.

Dr. Mills has had extensive involvement in supporting the health economics research activities of the World Health Organization's Tropical Disease Research Programme. She founded, and is head of, the Health Economics and Financing Programme, which has become one of the world’s leading groups in developing and applying theories and techniques of health economics to increase knowledge on how best to improve the equity and efficiency of developing countries’ health systems. She has acted as adviser to a number of multilateral and bilateral agencies—notably, the United Kingdom Department for International Development and the World Health Organization. She guided the creation of the Alliance for Health Policy and Systems Research and chairs its board. Most recently, she has been a member of the Commission for Macroeconomics and Health and cochair of its working group on improving the health outcomes of the poor.

Philip Musgrove is deputy editor—global health for *Health Affairs*, which is published by Project HOPE in Bethesda, Maryland. He worked for the World Bank (1990–2002), including two years on secondment to the World Health Organization (1999–2001), retiring as a principal economist. He was previously an adviser in health economics at the Pan American Health Organization (1982–90) and a research associate at the Brookings Institution and at Resources for the Future (1964–81).

Dr. Musgrove is an adjunct professor at the School of Advanced International Studies, Johns Hopkins University, and has taught at George Washington University, American University, and the University of Florida. He holds degrees from Haverford College (B.A., 1962, summa cum laude); Princeton University (M.P.A., 1964); and Massachusetts Institute of Technology (Ph.D., 1974).

Dr. Musgrove has worked on health reform projects in Argentina, Brazil, Chile, and Colombia and has dealt with a variety of issues in health economics, financing, equity, and nutrition. His publications include more than 50 articles in economics and health journals and chapters in 20 books.
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The Disease Control Priorities Project is a joint enterprise of the Fogarty International Center of the National Institutes of Health, the World Health Organization, the World Bank, and the Population Reference Bureau.

The Fogarty International Center is the international component of the U.S. National Institutes of Health. It addresses global health challenges through innovative and collaborative research and training programs and supports and advances the mission of the U.S. National Institutes of Health through international partnerships.

The World Health Organization is the specialized agency for health of the United Nations. Its objective, as set out in its constitution, is the attainment by all peoples of the highest possible level of health, with health defined as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

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The World Bank Group is one of the world’s largest sources of development assistance. The Bank, which provides US$18 billion to US$22 billion each year in loans to its client countries, provided US$1.27 billion for health, nutrition, and population in 2004. The World Bank is working in more than 100 developing economies, bringing a mix of analytical work, policy dialogue, and lending to improve living standards—including health and education—and reduce poverty.

The Population Reference Bureau informs people around the world about health, population, and the environment and empowers them to use that information to advance the well-being of current and future generations. For 75 years, the bureau has analyzed complex data and research results to provide objective and timely information in a format easily understood by advocates, journalists, and decision makers; has conducted workshops around the world to give key audiences the tools they need to understand and communicate effectively about relevant issues; and has worked to ensure that policy makers in developing countries base policy decisions on sound evidence.
Preparation of this volume required efforts over four years by many institutions and almost 1,000 individuals: chapter coauthors, advisory committee members, peer reviewers, copy editors, and research and staff assistants. We have many contributions to acknowledge. We particularly thank our chapter authors, who worked extremely hard through a long and exacting process of writing, review, and revision. We also owe much gratitude to the institutional sponsors of this effort:

- The Fogarty International Center (FIC) of the U.S. National Institutes of Health. The FIC supported both the senior editor and one of the co-managing editors of this project, as well as support staff. Gerald Keusch, former director of the FIC, initiated and facilitated this effort, and FIC’s acting director, Sharon Hrynkow, continued to provide support and counsel.
- The World Bank. Successive directors of the World Bank’s Health, Nutrition, and Population Department, Christopher Lovelace and Jacques Baudouy, provided support, guidance, and critical reactions and facilitated the involvement of Bank staff as coauthors and reviewers.
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In undertaking the work leading to this volume, we benefited from the close engagement of three institutions that helped organize and host consultations and arranged for background analyses to be undertaken. These institutions were the London School of Hygiene and Tropical Medicine (Anne Mills), the University of Toronto’s Center for Global Health (Prabhat Jha), and Resources for the Future (Ramanan Laxminarayan). The Center for Global Development (Ruth Levine) collaborated with the chapter authors in an effort to identify proven successes in global health, the results of which were used both in this book and in a separate publication. We are grateful to each of these institutions and individuals.

We were particularly fortunate to have the strong collaboration of the Inter-Academies Medical Panel (IAMP), an association of the medical academies or medical divisions of the scientific academies of 44 countries. David Challoner and Guy de Thé cochaired the Steering Committee of the IAMP and invested much time and effort into facilitating the collaboration. In particular, the IAMP helped establish the productive Advisory Committee to the Editors, chaired by Jaime Sepulveda, on which many members of the IAMP Steering Committee served. The IAMP’s second global meeting hosted the launch of this volume in Beijing in April 2006, and the IAMP also sponsored the peer review process for all the chapters. We are most grateful to David Challoner and Guy de Thé, as well as to Jaime Sepulveda and other members of the Advisory Committee to the Editors. The U.S. member of the IAMP, the Institute of Medicine of the National Academy of Sciences, played a critical role in facilitating all aspects of the IAMP’s collaboration. Patrick Kelley, Patricia Cuff, Dianne Stare, Stacey Knobler, and Leslie Baer at the Institute of Medicine and Mohamed Hassan and Muthoni Fanin at the IAMP managed this effort and provided critical, substantive inputs.

The Office of the Publisher at the World Bank provided outstanding assistance, enthusiastic advice, and support during every phase of production of this volume and helped coordinate publicity and initial distribution. We particularly wish to thank Dirk H. Koehler, the publisher; Carlos Rossel; Mary Fisk; Santiago Pombo-Bejarano; Nancy Lammers; Randi Park; Valentina Kalk; Alice Faintich; Joanne Ainsworth; Enid Zafran; Deepa Menon; and Janice Tuten for their timely, high-quality professionalism.

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With this volume now in the dissemination phase, the Population Reference Bureau is charged to communicate its findings in formats likely to be of use to a range of audiences. We greatly value the work of the bureau's William P. Butz, president, and Nancy Yinger, director of international programs, in rapidly initiating this effort.

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- Instituto Nacional de Salud Pública, Advisory Committee to the Editors meeting, Cuernavaca, Mexico (June 2002)
- Institut Pasteur, Advisory Committee to the Editors meeting, Paris, France (March and December 2004)
- Johns Hopkins Bloomberg School of Public Health, consultation on maternal and child health, Annapolis, Maryland (May 2002)
- Johns Hopkins Paul H. Nitze School of Advanced International Studies, consultation on elimination and eradication of disease, and vaccinations, Washington, DC (October 2004)
- Merck & Company Inc., consultation on research and product development priorities, Whitehouse Station, New Jersey (September 2004)
- Multilateral Initiative on Malaria, consultations on the burden of malaria:
  - National Institute of Medical Research, Arusha, Tanzania (November 2002)
  - University of Yaoundé, Cameroon (November 2005)
  - National Cancer Institute, National Institutes of Health, consultation on cancer prevention, treatment, and pain control, Bethesda, Maryland (June 2003)
  - Université de Lausanne, consultation on cardiovascular disease, Lausanne, Switzerland (March 2002)
  - University of California, Berkeley, consultation on learning and developmental disorders, Berkeley, California (August 2003)
  - University of California, San Francisco, consultation on surgery, San Francisco, California (July 2003)
  - University of Queensland, School of Population Health, authors’ meeting on psychiatric disorders, neurology, and alcohol and other substance abuse, Brisbane, Australia (August 2003)
  - University of Washington, consultation on sexually transmitted infections, Seattle, Washington (July 2003)
  - University of the Witwatersrand, consultations on health systems and on capacity strengthening and management reform, Johannesburg, South Africa (July 2004)
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The Editors
Abbreviations and Acronyms

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<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
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<td>ACE</td>
<td>angiotensin-converting enzyme</td>
</tr>
<tr>
<td>ACER</td>
<td>average cost-effectiveness ratio</td>
</tr>
<tr>
<td>ACT</td>
<td>artemisinin combination therapy</td>
</tr>
<tr>
<td>AD</td>
<td>Alzheimer’s disease</td>
</tr>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>ADHD</td>
<td>attention deficit and hyperactivity disorder</td>
</tr>
<tr>
<td>AED</td>
<td>antiepileptic drug</td>
</tr>
<tr>
<td>AHEAD</td>
<td>applied health education and development</td>
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<tr>
<td>AIDS</td>
<td>acquired immunodeficiency syndrome</td>
</tr>
<tr>
<td>AIN-C</td>
<td>atención integral a la niñez comunitaria</td>
</tr>
<tr>
<td>ALRI</td>
<td>acute lower respiratory infection</td>
</tr>
<tr>
<td>AMI</td>
<td>acute myocardial infarction</td>
</tr>
<tr>
<td>ANW</td>
<td>anganwadi worker</td>
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<tr>
<td>aP</td>
<td>acellular pertussis vaccine</td>
</tr>
<tr>
<td>APOC</td>
<td>African Programme for Onchocerciasis Control</td>
</tr>
<tr>
<td>ARF</td>
<td>acute rheumatic fever</td>
</tr>
<tr>
<td>ARI</td>
<td>acute respiratory infection</td>
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<td>ART</td>
<td>atraumatic restorative treatment</td>
</tr>
<tr>
<td>ASD</td>
<td>autism spectrum disorder</td>
</tr>
<tr>
<td>ATLS</td>
<td>advanced trauma life support</td>
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<td>AUD</td>
<td>alcohol-use disorder</td>
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<tr>
<td>AZT</td>
<td>Zidovudine</td>
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<tr>
<td>BCC</td>
<td>behavior-change communication</td>
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<tr>
<td>BCG</td>
<td>Bacillus Calmette-Guérin</td>
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<td>BEmOC</td>
<td>basic emergency obstetric care</td>
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<tr>
<td>BINP</td>
<td>Bangladesh Integrated Nutrition Program</td>
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<tr>
<td>BMI</td>
<td>body mass index</td>
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<td>BMT</td>
<td>buprenorphine maintenance treatment</td>
</tr>
<tr>
<td>BOD</td>
<td>burden of disease</td>
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<tr>
<td>BRAC</td>
<td>Bangladesh Rural Advancement Committee</td>
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<tr>
<td>BRFSS</td>
<td>behavioral risk factor surveillance system</td>
</tr>
<tr>
<td>BZA</td>
<td>benzimidazole anthelmintic</td>
</tr>
<tr>
<td>CABG</td>
<td>coronary artery bypass graft</td>
</tr>
<tr>
<td>CAD</td>
<td>coronary artery disease</td>
</tr>
<tr>
<td>CAM</td>
<td>complementary and alternative medicine</td>
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<tr>
<td>CAPP</td>
<td>Country/Area Profile Programme</td>
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<tr>
<td>CBA</td>
<td>cost-benefit analysis</td>
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<tr>
<td>CBE</td>
<td>clinical breast examination</td>
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<tr>
<td>CBHI</td>
<td>community-based health insurance</td>
</tr>
<tr>
<td>CBR</td>
<td>cost-benefit ratio</td>
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<tr>
<td>CDC</td>
<td>U.S. Centers for Disease Control and Prevention</td>
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<tr>
<td>CDD</td>
<td>control of diarrheal diseases</td>
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<tr>
<td>CEA</td>
<td>cost-effectiveness analysis</td>
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<td>CEmOC</td>
<td>comprehensive emergency obstetric care</td>
</tr>
<tr>
<td>CER</td>
<td>cost-effectiveness ratio</td>
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<tr>
<td>CFR</td>
<td>case-fatality rate</td>
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<td>CHA</td>
<td>community health aide</td>
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<tr>
<td>CHD</td>
<td>coronary heart disease</td>
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<td>CHF</td>
<td>congestive heart failure</td>
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<td>CHNP</td>
<td>community-based health and nutrition program</td>
</tr>
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<td>CHNW</td>
<td>community health and nutrition worker</td>
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<tr>
<td>CHOICE</td>
<td>choosing interventions that are cost-effective</td>
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<tr>
<td>CI</td>
<td>confidence interval</td>
</tr>
<tr>
<td>CKD</td>
<td>chronic kidney disease</td>
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<tr>
<td>CL</td>
<td>cutaneous leishmaniasis</td>
</tr>
<tr>
<td>CL/P</td>
<td>cleft lip and palate</td>
</tr>
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<td>CM</td>
<td>cerebral malaria</td>
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<td>CMH</td>
<td>Commission on Macroeconomics and Health</td>
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<td>CML</td>
<td>chronic myeloid leukemia</td>
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<td>CO</td>
<td>carbon monoxide</td>
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<td>COBRA</td>
<td>combination therapy for rheumatoid arthritis</td>
</tr>
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<td>COHRED</td>
<td>Council on Health Research for Development</td>
</tr>
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<td>COM</td>
<td>chronic otitis media</td>
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<tr>
<td>COPCORD</td>
<td>Community-Oriented Program for Control of Rheumatic Disease</td>
</tr>
<tr>
<td>COPD</td>
<td>chronic obstructive pulmonary disease</td>
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<td>CoV</td>
<td>coronavirus</td>
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<td>COX</td>
<td>cyclo-oxygenase</td>
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<td>CRA</td>
<td>comparative risk analysis</td>
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<td>CT</td>
<td>computed tomography</td>
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<td>CVD</td>
<td>cardiovascular disease</td>
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<td>CVS</td>
<td>chorionic villus sampling</td>
</tr>
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<td>CYP</td>
<td>couple-year of protection</td>
</tr>
<tr>
<td>DAH</td>
<td>development assistance for health</td>
</tr>
<tr>
<td>DALY</td>
<td>disability-adjusted life year</td>
</tr>
<tr>
<td>dBHL</td>
<td>decibel hearing level</td>
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<tr>
<td>DCPI</td>
<td>Disease Control Priorities in Developing Countries, first edition</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<td>DCP2</td>
<td>Disease Control Priorities in Developing Countries, second edition</td>
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<tr>
<td>DCPP</td>
<td>Disease Control Priorities Project</td>
</tr>
<tr>
<td>DDT</td>
<td>dichlorodiphenyltrichloroethane</td>
</tr>
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<td>DEET</td>
<td>N,N-diethyl-meta-toluamide</td>
</tr>
<tr>
<td>DF</td>
<td>dengue fever</td>
</tr>
<tr>
<td>DHF</td>
<td>dengue hemorrhagic fever</td>
</tr>
<tr>
<td>DHS</td>
<td>demographic and health survey</td>
</tr>
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<td>DMARD</td>
<td>disease-modifying antirheumatic drug</td>
</tr>
<tr>
<td>DMFT</td>
<td>decayed, missing, and filled teeth</td>
</tr>
<tr>
<td>DNA</td>
<td>deoxyribonucleic acid</td>
</tr>
<tr>
<td>DOT</td>
<td>directly observed therapy</td>
</tr>
<tr>
<td>DOTS</td>
<td>directly observed therapy short course</td>
</tr>
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<td>DRC</td>
<td>Democratic Republic of Congo</td>
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<tr>
<td>DSM-IVTR</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
</tr>
<tr>
<td>DSS</td>
<td>dengue shock syndrome</td>
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<td>DTP</td>
<td>diphtheria-tetanus-pertussis</td>
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<td>EAP</td>
<td>economically active population</td>
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<td>EBM</td>
<td>evidence-based medicine</td>
</tr>
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<td>ED</td>
<td>emergency department</td>
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<td>EFA</td>
<td>education for all</td>
</tr>
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<td>EFM</td>
<td>electronic fetal monitoring</td>
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<td>EHCAP</td>
<td>Effective Health Care Alliance Programme</td>
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<td>EIR</td>
<td>entomological inoculation rate</td>
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<td>ELISA</td>
<td>enzyme-linked immunosorbent assay</td>
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<td>EMR</td>
<td>electronic medical record</td>
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<td>EMS</td>
<td>emergency medical services</td>
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<tr>
<td>EPI</td>
<td>Expanded Program on Immunization</td>
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<td>ESRD</td>
<td>end-stage renal disease</td>
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<tr>
<td>EUROSTAT</td>
<td>European Statistical Office</td>
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<td>FA</td>
<td>folic acid</td>
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<td>FBD</td>
<td>food-borne disease</td>
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<tr>
<td>FCTC</td>
<td>Framework Convention on Tobacco Control</td>
</tr>
<tr>
<td>FDA</td>
<td>U.S. Food and Drug Administration</td>
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<td>FDC</td>
<td>fixed-dose combinations</td>
</tr>
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<td>FEO</td>
<td>first expiry, first out</td>
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<tr>
<td>FETP</td>
<td>Field Epidemiology Training Program</td>
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<tr>
<td>FEV1</td>
<td>forced expiratory volume in one second</td>
</tr>
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<td>FGM</td>
<td>female genital mutilation</td>
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<td>FHP</td>
<td>family health program</td>
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<td>FIC</td>
<td>fully immunized child</td>
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<td>FRESH</td>
<td>focusing resources on effective school health</td>
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<td>FTE</td>
<td>full-time equivalent</td>
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<td>G6PD</td>
<td>glucose-6-phosphate dehydrogenase</td>
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<td>G-7</td>
<td>Group of Seven</td>
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<tr>
<td>GATB</td>
<td>Global Alliance for TB Drug Development</td>
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<tr>
<td>GAVI</td>
<td>Global Alliance for Vaccines and Immunization</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<td>GET 2020</td>
<td>World Health Organization Alliance for the Global Elimination of Trachoma</td>
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<tr>
<td>GFHR</td>
<td>Global Forum on Health Research</td>
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<tr>
<td>GIS</td>
<td>geographic information system</td>
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<tr>
<td>GM</td>
<td>genetic modification</td>
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<td>GMP</td>
<td>good manufacturing practice</td>
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<td>GNI</td>
<td>gross national income</td>
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<tr>
<td>GNP</td>
<td>gross national product</td>
</tr>
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<td>GSE</td>
<td>glutathione S-transferase</td>
</tr>
<tr>
<td>GUSTO</td>
<td>global use of strategies to open occluded coronary arteries</td>
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<tr>
<td>HAART</td>
<td>highly active antiretroviral therapy for the treatment of HIV/AIDS</td>
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<tr>
<td>Hb</td>
<td>hemoglobin</td>
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<td>HBV</td>
<td>hepatitis B virus</td>
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<tr>
<td>HDL</td>
<td>high-density lipoprotein</td>
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<td>HepB</td>
<td>hepatitis B</td>
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<tr>
<td>HHV</td>
<td>human herpes virus</td>
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<tr>
<td>Hib</td>
<td><em>Haemophilus influenzae</em> type B</td>
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<tr>
<td>HIC</td>
<td>high-income country</td>
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<tr>
<td>HIS</td>
<td>health information system</td>
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<td>HIV</td>
<td>human immunodeficiency virus</td>
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<td>HMN</td>
<td>Health Metrics Network</td>
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<td>HPLC</td>
<td>high-performance liquid chromatography</td>
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<tr>
<td>HPS</td>
<td>health promoting school</td>
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<td>HPV</td>
<td>human papillomavirus</td>
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<tr>
<td>HR</td>
<td>human resource</td>
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<tr>
<td>HRT</td>
<td>hormone replacement therapy</td>
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<tr>
<td>HSV-1</td>
<td>herpes simplex virus type 1</td>
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<tr>
<td>HSV-2</td>
<td>herpes simplex virus type 2</td>
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<tr>
<td>IAEA</td>
<td>International Atomic Energy Agency</td>
</tr>
<tr>
<td>IAP</td>
<td>indoor air pollution</td>
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<tr>
<td>IAVI</td>
<td>International AIDS Vaccine Initiative</td>
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<tr>
<td>ICD-10</td>
<td><em>International Statistical Classification of Diseases and Related Health Problems</em>, 10th revision</td>
</tr>
<tr>
<td>ICDS</td>
<td>integrated child development services</td>
</tr>
<tr>
<td>ICER</td>
<td>incremental cost-effectiveness ratio</td>
</tr>
<tr>
<td>ICPD</td>
<td>international conference on population and development</td>
</tr>
<tr>
<td>ICT</td>
<td>information and communication technologies</td>
</tr>
<tr>
<td>IDA</td>
<td>International Development Association</td>
</tr>
<tr>
<td>IDD</td>
<td>iodine deficiency disorders</td>
</tr>
<tr>
<td>IDS</td>
<td>integrated disease surveillance and response</td>
</tr>
<tr>
<td>IEC</td>
<td>information, education, and communication</td>
</tr>
<tr>
<td>IFF</td>
<td>International Finance Facility</td>
</tr>
<tr>
<td>IHD</td>
<td>ischemic heart disease</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organisation</td>
</tr>
<tr>
<td>IMCI</td>
<td>integrated management of infant and childhood illness</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>IMR</td>
<td>infant mortality rate</td>
</tr>
<tr>
<td>INCB</td>
<td>International Narcotics Control Board</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>INDEPTH</td>
<td>International Network of Field Sites with Continuous Demographic Evaluation of Populations and Their Health in Developing Countries</td>
</tr>
<tr>
<td>INFECTOM</td>
<td>information, feedback, contracting with providers to adhere to practice guidelines, and ongoing monitoring</td>
</tr>
<tr>
<td>IPT</td>
<td>intermittent preventive treatment</td>
</tr>
<tr>
<td>IPTi</td>
<td>intermittent preventive treatment in infancy</td>
</tr>
<tr>
<td>IPV</td>
<td>inactivated polio vaccine</td>
</tr>
<tr>
<td>IRB</td>
<td>institutional review board</td>
</tr>
<tr>
<td>IRR</td>
<td>internal rate of return</td>
</tr>
<tr>
<td>IRS</td>
<td>indoor residual spraying</td>
</tr>
<tr>
<td>ISDR</td>
<td>international strategy for disaster reduction</td>
</tr>
<tr>
<td>ISIC</td>
<td>international standard industrial classification of all economic activities</td>
</tr>
<tr>
<td>ITN</td>
<td>insecticide-treated net</td>
</tr>
<tr>
<td>IUATLD</td>
<td>International Union against Tuberculosis and Lung Disease</td>
</tr>
<tr>
<td>IUD</td>
<td>intrauterine device</td>
</tr>
<tr>
<td>IUGR</td>
<td>intrauterine growth retardation</td>
</tr>
<tr>
<td>JE</td>
<td>Japanese encephalitis</td>
</tr>
<tr>
<td>LAAM</td>
<td>levo-alpha-acetyl-methadol</td>
</tr>
<tr>
<td>LBW</td>
<td>low birthweight</td>
</tr>
<tr>
<td>LDD</td>
<td>learning and developmental disability</td>
</tr>
<tr>
<td>LDL</td>
<td>low-density lipoprotein</td>
</tr>
<tr>
<td>LE 20</td>
<td>life expectancy at age 20</td>
</tr>
<tr>
<td>LF</td>
<td>lymphatic filariasis</td>
</tr>
<tr>
<td>LIC</td>
<td>low-income country</td>
</tr>
<tr>
<td>LMICs</td>
<td>low- and middle-income countries</td>
</tr>
<tr>
<td>LPG</td>
<td>liquid petroleum gas</td>
</tr>
<tr>
<td>LRI</td>
<td>lower respiratory tract infection</td>
</tr>
<tr>
<td>LSD</td>
<td>lysergic acid diethylamide</td>
</tr>
<tr>
<td>MBB</td>
<td>marginal budgeting for bottlenecks</td>
</tr>
<tr>
<td>MCE</td>
<td>multi-country evaluation of IMCI effectiveness, cost, and impact</td>
</tr>
<tr>
<td>MCH</td>
<td>maternal child and health</td>
</tr>
<tr>
<td>MDA</td>
<td>mass drug administration</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
</tr>
<tr>
<td>MDMA</td>
<td>methylenedioxyamphetamine</td>
</tr>
<tr>
<td>MDR-TB</td>
<td>multidrug-resistant tuberculosis</td>
</tr>
<tr>
<td>MDT</td>
<td>multidrug therapy</td>
</tr>
<tr>
<td>MEASURE</td>
<td>monitoring and evaluation to assess and use results</td>
</tr>
<tr>
<td>MIC</td>
<td>middle-income country</td>
</tr>
<tr>
<td>MMR</td>
<td>measles-mumps-rubella</td>
</tr>
<tr>
<td>MMT</td>
<td>methadone maintenance treatment</td>
</tr>
<tr>
<td>MMV</td>
<td>Medicines for Malaria Venture</td>
</tr>
<tr>
<td>MNCH</td>
<td>maternal, neonatal, and child health</td>
</tr>
<tr>
<td>MOH</td>
<td>ministry of health</td>
</tr>
<tr>
<td>MR</td>
<td>mental retardation</td>
</tr>
<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
</tr>
<tr>
<td>MSF</td>
<td>Médecins Sans Frontières (Doctors Without Borders)</td>
</tr>
<tr>
<td>MTCT</td>
<td>mother-to-child transmission</td>
</tr>
<tr>
<td>MVA</td>
<td>modified vaccinia virus Ankara</td>
</tr>
<tr>
<td>NAFTA</td>
<td>North American Free Trade Agreement</td>
</tr>
<tr>
<td>NAP</td>
<td>nonaffectional psychosis</td>
</tr>
<tr>
<td>NCCAM</td>
<td>National Center for Complementary and Alternative Medicine</td>
</tr>
<tr>
<td>NCE</td>
<td>new chemical entity</td>
</tr>
<tr>
<td>NDP</td>
<td>national drug policy</td>
</tr>
<tr>
<td>NGO</td>
<td>nongovernmental organization</td>
</tr>
<tr>
<td>NHA</td>
<td>national health account</td>
</tr>
<tr>
<td>NHS</td>
<td>national health service</td>
</tr>
<tr>
<td>NIH</td>
<td>National Institutes of Health</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute for Occupational Safety and Health</td>
</tr>
<tr>
<td>NIPA</td>
<td>national income and product accounts</td>
</tr>
<tr>
<td>NMR</td>
<td>neonatal mortality rate</td>
</tr>
<tr>
<td>NO₂</td>
<td>nitrogen dioxide</td>
</tr>
<tr>
<td>NORA</td>
<td>national occupational research agenda</td>
</tr>
<tr>
<td>NOx</td>
<td>nitrogen oxide and nitrogen dioxide</td>
</tr>
<tr>
<td>NRA</td>
<td>national regulatory authority</td>
</tr>
<tr>
<td>NRT</td>
<td>nicotine replacement therapies</td>
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<tr>
<td>NSAID</td>
<td>nonsteroidal anti-inflammatory drug</td>
</tr>
<tr>
<td>NSO</td>
<td>national statistics office</td>
</tr>
<tr>
<td>NTD</td>
<td>neural tube defect</td>
</tr>
<tr>
<td>OA</td>
<td>osteoarthritis</td>
</tr>
<tr>
<td>OCP</td>
<td>Onchocerciasis Control Program</td>
</tr>
<tr>
<td>ODA</td>
<td>official development assistance</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>OEPA</td>
<td>Onchocerciasis Elimination Program for the Americas</td>
</tr>
<tr>
<td>OP</td>
<td>osteoporosis</td>
</tr>
<tr>
<td>OPV</td>
<td>oral polio vaccine</td>
</tr>
<tr>
<td>ORS</td>
<td>oral rehydration solution</td>
</tr>
<tr>
<td>ORT</td>
<td>oral rehydration therapy</td>
</tr>
<tr>
<td>PAHO</td>
<td>Pan American Health Organization</td>
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<tr>
<td>PAL</td>
<td>practical approach to lung health</td>
</tr>
<tr>
<td>PARIS21</td>
<td>Partnership in Statistics for Development in the 21st Century</td>
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<tr>
<td>PCBs</td>
<td>polychlorinated biphenyls</td>
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<tr>
<td>PCD</td>
<td>Partnership for Child Development</td>
</tr>
<tr>
<td>PCP</td>
<td>Pneumocystis carinii pneumonia</td>
</tr>
<tr>
<td>PCR</td>
<td>polymerase chain reaction</td>
</tr>
<tr>
<td>PCV</td>
<td>protein-conjugated polysaccharide vaccine</td>
</tr>
<tr>
<td>PD</td>
<td>Parkinson’s disease</td>
</tr>
<tr>
<td>PDOH</td>
<td>Philippine Department of Health</td>
</tr>
<tr>
<td>PDSA</td>
<td>plan-do-study-act</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>PFGE</td>
<td>pulsed-field-gel-electrophoresis</td>
</tr>
<tr>
<td>PHC</td>
<td>primary health care</td>
</tr>
<tr>
<td>PHSOW</td>
<td>public health school without walls</td>
</tr>
<tr>
<td>PLACE</td>
<td>Priorities for Local AIDS Control Effort</td>
</tr>
<tr>
<td>PM</td>
<td>particulate matter</td>
</tr>
<tr>
<td>PMTCT</td>
<td>prevention of mother-to-child transmission</td>
</tr>
<tr>
<td>PopEd</td>
<td>population and family life education</td>
</tr>
<tr>
<td>ppm</td>
<td>parts per million</td>
</tr>
<tr>
<td>PPPs</td>
<td>public-private partnerships</td>
</tr>
<tr>
<td>PRSC</td>
<td>poverty reduction support credit</td>
</tr>
<tr>
<td>PRSP</td>
<td>Poverty Reduction Strategy Paper</td>
</tr>
<tr>
<td>PSV</td>
<td>polysaccharide vaccine</td>
</tr>
<tr>
<td>PTA</td>
<td>parent-teacher association</td>
</tr>
<tr>
<td>PTCA</td>
<td>percutaneous transluminal coronary angioplasty</td>
</tr>
<tr>
<td>PTSD</td>
<td>posttraumatic stress disorder</td>
</tr>
<tr>
<td>PZQ</td>
<td>Praziquantel</td>
</tr>
<tr>
<td>QALY</td>
<td>quality-adjusted life year</td>
</tr>
<tr>
<td>RA</td>
<td>rheumatoid arthritis</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>research and development</td>
</tr>
<tr>
<td>RCT</td>
<td>randomized clinical trial</td>
</tr>
<tr>
<td>RDI</td>
<td>recommended dietary intake</td>
</tr>
<tr>
<td>RESU</td>
<td>regional epidemiology and surveillance unit</td>
</tr>
<tr>
<td>RHD</td>
<td>rheumatic heart disease</td>
</tr>
<tr>
<td>RNA</td>
<td>ribonucleic acid</td>
</tr>
<tr>
<td>ROP</td>
<td>retinopathy of prematurity</td>
</tr>
<tr>
<td>RRT</td>
<td>renal replacement therapy</td>
</tr>
<tr>
<td>RSV</td>
<td>respiratory syncytial virus</td>
</tr>
<tr>
<td>RTI</td>
<td>road traffic injury</td>
</tr>
<tr>
<td>rt-PA</td>
<td>recombinant tissue plasminogen activator</td>
</tr>
<tr>
<td>SAFE</td>
<td>surgery, antibiotics to control the infection, facial cleanliness, and environmental improvements</td>
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<tr>
<td>SAR</td>
<td>search and rescue</td>
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<tr>
<td>SARS</td>
<td>severe acute respiratory syndrome</td>
</tr>
<tr>
<td>SBP</td>
<td>systolic blood pressure</td>
</tr>
<tr>
<td>SCC</td>
<td>short-course chemotherapy</td>
</tr>
<tr>
<td>SD</td>
<td>standard deviation</td>
</tr>
<tr>
<td>SiC</td>
<td>significant caries (index)</td>
</tr>
<tr>
<td>SMA</td>
<td>severe malarial anemia</td>
</tr>
<tr>
<td>SO₂</td>
<td>sulfur dioxide</td>
</tr>
<tr>
<td>SP</td>
<td>sulfadoxine-pyrimethamine</td>
</tr>
<tr>
<td>SSO</td>
<td>social security organization</td>
</tr>
<tr>
<td>SSRI</td>
<td>selective serotonin reuptake inhibitor</td>
</tr>
<tr>
<td>STATCAP</td>
<td>statistical capacity building</td>
</tr>
<tr>
<td>STH</td>
<td>soil-transmitted helminth</td>
</tr>
<tr>
<td>STI</td>
<td>sexually transmitted infection</td>
</tr>
<tr>
<td>SWAp</td>
<td>sectorwide approach</td>
</tr>
<tr>
<td>TB</td>
<td>tuberculosis</td>
</tr>
<tr>
<td>TCA</td>
<td>tricyclic antidepressant</td>
</tr>
<tr>
<td>TDR</td>
<td>Special Programme for Research and Training in Tropical Diseases</td>
</tr>
<tr>
<td>TEHIP</td>
<td>Tanzania Essential Health Interventions Program</td>
</tr>
<tr>
<td>THC</td>
<td>tetrahydrocannabinol</td>
</tr>
<tr>
<td>TINP</td>
<td>Tamil Nadu Integrated Nutrition Program</td>
</tr>
<tr>
<td>TLTI</td>
<td>treatment for latent tuberculosis infection</td>
</tr>
<tr>
<td>TLV</td>
<td>threshold limit value</td>
</tr>
<tr>
<td>TM</td>
<td>traditional medicine</td>
</tr>
<tr>
<td>TRIPS</td>
<td>Agreement on Trade-Related Aspects of Intellectual Property Rights</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNAIDS</td>
<td>Joint United Nations Programme on HIV/AIDS</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Education, Scientific, and Cultural Organization</td>
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<tr>
<td>UNFPA</td>
<td>United Nations Population Fund</td>
</tr>
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<td>UNICEF</td>
<td>United Nations Children's Fund</td>
</tr>
<tr>
<td>UNIDO</td>
<td>United Nations Industrial Development Organization</td>
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<tr>
<td>URI</td>
<td>upper respiratory tract infection</td>
</tr>
<tr>
<td>USAID</td>
<td>U.S. Agency for International Development</td>
</tr>
<tr>
<td>VAD</td>
<td>vitamin A deficiency</td>
</tr>
<tr>
<td>VC</td>
<td>vital capacity</td>
</tr>
<tr>
<td>VCT</td>
<td>voluntary counseling and testing</td>
</tr>
<tr>
<td>VERC</td>
<td>village education resource center</td>
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<tr>
<td>VF</td>
<td>ventilation factor</td>
</tr>
<tr>
<td>VIA</td>
<td>visual inspection after application of an acetic acid solution</td>
</tr>
<tr>
<td>VL</td>
<td>visceral leishmaniasis</td>
</tr>
<tr>
<td>VOI</td>
<td>value-of-information (techniques)</td>
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<tr>
<td>VSL</td>
<td>value of a statistical life</td>
</tr>
<tr>
<td>WFP</td>
<td>World Food Programme</td>
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<tr>
<td>WHO</td>
<td>World Health Assembly</td>
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<td>WHOCC</td>
<td>WHO Collaborating Center</td>
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<td>WHO/OH</td>
<td>World Health Organization</td>
</tr>
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<td>WHO/TDR</td>
<td>WHO Special Programme for Research and Training in Tropical Diseases</td>
</tr>
<tr>
<td>WISE</td>
<td>work improvement in small enterprises</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organization</td>
</tr>
<tr>
<td>YF</td>
<td>yellow fever</td>
</tr>
<tr>
<td>YLD</td>
<td>year of life lived with disability</td>
</tr>
<tr>
<td>YLL</td>
<td>year of life lost</td>
</tr>
<tr>
<td>YLS</td>
<td>year of life saved</td>
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All dollar amounts are U.S. dollars unless otherwise indicated.