

VOLUME **1**

DISEASE CONTROL PRIORITIES • THIRD EDITION

Essential Surgery

DISEASE CONTROL PRIORITIES • THIRD EDITION

Series Editors

Dean T. Jamison
Rachel Nugent
Hellen Gelband
Susan Horton
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DISEASE CONTROL PRIORITIES

Budgets constrain choices. Policy analysis helps decision makers achieve the greatest value from limited available resources. In 1993, the World Bank published *Disease Control Priorities in Developing Countries* (DCP1), an attempt to systematically assess the cost-effectiveness (value for money) of interventions that would address the major sources of disease burden in low- and middle-income countries. The World Bank's 1993 *World Development Report* on health drew heavily on DCP1's findings to conclude that specific interventions against noncommunicable diseases were cost-effective, even in environments in which substantial burdens of infection and undernutrition persisted.

DCP2, published in 2006, updated and extended DCP1 in several aspects, including explicit consideration of the implications for health systems of expanded intervention coverage. One way that health systems expand intervention coverage is through selected platforms that deliver interventions that require similar logistics but deliver interventions from different packages of conceptually related interventions, for example, against cardiovascular disease. Platforms often provide a more natural unit for investment than do individual interventions. Analysis of the costs of packages and platforms—and of the health improvements they can generate in given epidemiological environments—can help to guide health system investments and development.

The third edition of DCP is being completed. DCP3 differs importantly from DCP1 and DCP2 by extending and consolidating the concepts of platforms and packages and by offering explicit consideration of the financial risk protection objective of health systems. In populations lacking access to health insurance or prepaid care, medical expenses that are high relative to income can be impoverishing. Where incomes are low, seemingly inexpensive medical procedures can have catastrophic financial effects. DCP3 offers an approach to explicitly include financial protection as well as the distribution across income groups of financial and health outcomes resulting from policies (for example, public finance) to increase intervention uptake. The task in all of the DCP volumes has been to combine the available science about interventions implemented in very specific locales and under very specific conditions with informed judgment to reach reasonable conclusions about the impact of intervention mixes in diverse environments. DCP3's broad aim is to delineate essential intervention packages and their related delivery platforms to assist decision makers in allocating often tightly constrained budgets so that health system objectives are maximally achieved.

DCP3's nine volumes are being published in 2015 and 2016 in an environment in which serious discussion continues about quantifying the sustainable development goal (SDG) for health. DCP3's analyses are well-placed to assist in choosing the means to attain the health SDG and assessing the related costs. Only when these volumes, and the analytic efforts on which they are based, are completed will we be able to explore SDG-related and other broad policy conclusions and generalizations. The final DCP3 volume will report those conclusions. Each individual volume will provide valuable specific policy analyses on the full range of interventions, packages, and policies relevant to its health topic.

More than 500 individuals and multiple institutions have contributed to DCP3. We convey our acknowledgments elsewhere in this volume. Here we express our particular

gratitude to the Bill & Melinda Gates Foundation for its sustained financial support, to the InterAcademy Medical Panel (and its U.S. affiliate, the Institute of Medicine of the National Academy of Sciences), and to the External and Corporate Relations Publishing and Knowledge division of the World Bank. Each played a critical role in this effort.

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EDITORS

Haile T. Debas
Peter Donkor
Atul Gawande
Dean T. Jamison
Margaret E. Kruk
Charles N. Mock

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1818 H Street NW, Washington, DC 20433
Telephone: 202-473-1000; Internet: www.worldbank.org

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Cover photo: The 16 Makara hospital in Cambodia's remote Preah Vihear province is equipped with modern equipment. The maintenance of 16 Makara is supported by the World Bank and other international donors through the Health Sector Support Program and the Cambodia Second Health Sector Support Program. Photo: © Chhor Sokunthea/World Bank. Further permission required for reuse.

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Foreword

The past few decades have seen enormous changes in the global burden of disease. Although many people, especially those living in (or near) poverty and other privations, are familiar with heavy burdens and much disease, the term “global burden of disease” emerged in public health and in health economics only in recent decades. It was coined to describe what ails people, when, and where, and just as reliable quantification is difficult, so too is agreeing on units of analysis. Does this term truly describe the burden of disease of the globe? Of a nation? A city?

We have also learned a thing or two about how to assess this global burden, and how to reveal its sharp local variation and transformation with changing conditions ranging from urbanization to a global rise in obesity (Murray, Lopez, and Jamison 1994; Murray and Lopez 1997; Lopez and others 2006; Mathers, Fat, and Boerma 2008; Jamison and others 2013; Lozano and others 2013). Measuring illness has never been easy, nor has attributing a death—whether premature or at the end of fourscore years—to a specific cause (Yarushalmy and Palmer 1959; Rothman 1976; Byass 2010; Byass and others 2013). Even countries with sound vital registries generate data of varying quality, given that cause of death is rarely confirmed by autopsy (Mathers and others 2005; Mahapatra and others 2007). When nonlethal or slowly debilitating illness is added to considerations of burden of disease, the challenge of both measurement and etiologic claims can appear overwhelming (Kleinman 1995; Arnesen and Nord 1999; Salomon and others 2012; Voigt and King 2014).

The challenges of measuring the burden of disease only get more complex when attempting to use the category of surgical disease. For starters, even experts do not agree on definitions of ostensibly simple terms such as “surgical disease” (Debas and others 2006; Duba and Hill 2007;

Ozgediz and others 2009; Bickler and others 2010). Some illnesses rarely considered to be surgical problems pose threats to health if neglected long enough. Some trends are clear, however. Take the examples offered by Haiti and Rwanda, where different types of trauma (intentional or the result of crush injuries) account for a majority of young-adult deaths. How many of these deaths are classified as attributable to surgical disease? If someone dies of acute abdomen—and if his or her death is recorded at all—was it attributed to appendicitis or to enteric fever? Are these infectious complications of surgical disease or surgical complications of infectious disease? If a child with untreated epilepsy falls into a fire and succumbs from burns, how is this death reported, if it is registered at all? Clinicians who work in settings far from any pathology laboratory have seen infected tumors (misdiagnosed as primary infection) as often as they have discovered that a suspected breast cancer was a long-untreated canalicular abscess. Brain tumors are revealed to be tuberculomas and vice versa.

A sound grasp of the burden of disease is essential to those seeking data-driven methods to design and evaluate policies aimed at decreasing premature death and suffering (Nordberg, Holmberg, and Kiugu 1995; Taira, McQueen, and Burkle 2009; Poenaru, Ozgediz, and Gosselin 2014). But surgical disease was not often on the agenda. The immensity and complexity of the task of quantifying the surgical burden of disease has led many to avoid that task, leading to an analytic vacuum with adverse consequences. For too long, the global health movement has failed to count surgery as an integral part of public health. Prevailing wisdom dictated that the surgical disease burden was too low, surgical expenses too high, and delivery of care too complicated. The predecessor to this volume, the second edition of *Disease Control Priorities in Developing Countries*

(*DCP2*; Jamison and others 2006), changed this paradigm. Published in 2006, it included, for the first time in a major global health platform, sustained attention to surgery. The editors sought to marshal the experience of its contributors to help quantify and classify the burden of surgical disease. Admittedly, this most widely cited estimate of surgical need—11 percent of the global burden of disease was surgical—was based on the best educated guesses of a convenience sample of 18 surgeons on an online survey. Nonetheless, this figure was later validated by the common experience of providers and patients alike from the poorest reaches of the world: the burden of surgical disease was never trivial.

DCP3 builds upon this foundation and substantially improves it. It enhances our understanding of *DCP2*'s pioneering work with more robust methodology. Over the years, researchers—led by the editors of and many of the contributors to this volume—have devoted attention to cancers, orthopedic injuries, disfigurements after burns, congenital defects such as cleft lip and palate, blindness from cataracts, and the many causes of death from acute surgical needs. This volume collates the knowledge gained through the increased attention to global surgery since 2006.

This new volume of *DCP* underlines the central importance of surgical care because, by these measures, surgical disease is thought to account for a significant portion of the global disease burden. The *Essential Surgery* volume of *DCP3* helps definitively dispel many of the myths about surgery's role in global health, in part by showing the very large health burden from conditions that are primarily or extensively treatable by surgery. It dispels the myth that surgery is too expensive by showing that many essential surgical services rank among the most cost-effective of all health interventions. This volume begins to dispel the myth that surgery is not feasible in settings of poverty by documenting many successful programs that have improved capacity, increased access, and enhanced quality of surgical care in countries across the globe.

As argued many times in the past—and worth repeating to clinical colleagues, students, trainees, and diverse interlocutors—global surgery is one of the most exciting frontiers in the quest for global health equity. Patients and providers, along with those who set and evaluate policies, will want (or need) to join this quest if we are to avert unnecessary suffering. We all have cause to be grateful for the many individuals whose time and energy have been invested in producing the wealth of knowledge presented in the *Essential Surgery* volume of *DCP3*.

Paul Farmer
Harvard Medical School
Brigham and Women's Hospital
Partners in Health

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Preface

Conditions that are treated primarily or frequently by surgery constitute a significant portion of the global burden of disease. In 2012, injuries killed nearly 5 million people, and about 270,000 women died from complications of pregnancy. Many of these deaths, as well as deaths from abdominal emergencies, congenital anomalies, and other causes, could be prevented by improved access to quality surgical care. However, surgical care itself has barely been addressed within the field of global health. A growing number of people from diverse backgrounds are attempting to change this, and to increase access to appropriate, safe, surgical care in low- and middle-income countries. The *Essential Surgery* volume of *Disease Control Priorities*, third edition (DCP3), contributes to these efforts by (1) better defining the health burden from conditions requiring surgery, (2) identifying those surgical procedures that are the most cost-effective and cost-beneficial, and (3) describing the health care policies and platforms that can universally deliver these procedures safely and effectively.

Essential Surgery identifies and studies a group of “essential” surgical conditions and the procedures needed to treat them. These surgical conditions can be defined as those that (1) are primarily or extensively treated by surgery, (2) have a large health burden, and (3) can be successfully treated by surgical procedures that are cost-effective and feasible to promote globally. To address these conditions, the authors derive a set of 44 essential surgical procedures. These include procedures to treat injuries, obstetric complications, abdominal emergencies, cataracts, and congenital anomalies, among others. We estimate that universal access to this package of essential procedures would prevent about 1.5 million deaths per year or 6 to 7 percent of all preventable deaths in low- and middle-income countries. These procedures rank among the most

cost-effective of all health interventions. They are eminently feasible to promote globally, and many could be delivered at first-level hospitals.

The large burden of surgical conditions, cost-effectiveness of essential surgical procedures, and strong public demand for those procedures suggest that universal coverage of essential surgery should be implemented early on the path to universal health coverage. Implementation would include measures such as using public funds to ensure access to essential procedures and including them in the packages covered by national health insurance programs. Such measures would also offer financial risk protection against medical impoverishment from the costs of surgical care. Surgery should be considered an indispensable component of a properly functioning health system and can be a means for strengthening the entire system, thus increasing the return on investment.

Not covered in this volume are procedures to treat other surgical conditions, such as transplantation, or surgery for cancer and vascular disease. Improving access to these procedures will also have benefits. But for prioritization of the sequencing and use of public funds, efforts to ensure greater access to the essential surgical services should be undertaken first, relative to increased investment in those conditions that are more expensive to treat or that have smaller health impacts.

The editors and authors of *Essential Surgery* hope that this volume will increase efforts to improve access to and quality of essential surgical care in low- and middle-income countries. We especially hope to stimulate increased attention to addressing essential surgery on the part of two very different communities: the global health community and the surgical community. With the exception of obstetric care, the global health community has largely failed to address the unmet need

for surgery. The surgical community, in turn, has not tackled broader requirements for incorporating surgery into resource-constrained health systems (with the important exceptions of exploring task-sharing and improving safety of care). We hope that this volume invigorates the global health community to advocate for inclusion of essential surgery as part of universal health coverage and as an integral part of a well-functioning health system. Likewise, we hope that this volume motivates the surgical community to advocate for increased investment in surgical capabilities in first-level hospitals and for greater access to the basic essential procedures. Ensuring that essential surgical services are available to everyone who needs them when they need them is in part about improving training in safe surgical care and techniques, and in part about improving the functioning of health systems, including better monitoring and evaluation and developing appropriate financing mechanisms. It is also about promoting equity, social justice, and human rights.

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*Haile T. Debas
Peter Donkor
Atul Gawande
Dean T. Jamison
Margaret E. Kruk
Charles N. Mock*

Abbreviations

ADLA	adenolymphangitis
AIDS	acquired immune deficiency syndrome
ALS	advanced life support
AMO	assistant medical officer
ANAC	African Network of Associate Clinicians
ARM	anorectal malformation
ASA	American Society of Anesthesiologists
BC	benefit-cost
BCA	benefit-cost analysis
BCVA	best-corrected visual acuity
BCR	benefit-cost ratio
BLD	banana leaf dressing
BLS	basic life support
bpm	beats per minute
BPOC	Basic Package of Oral Care
CC	Copenhagen Consensus
CEA	cost-effectiveness analysis
CFR	case fatality rate
CLP	cleft lip and palate
CYP	couple-year of protection
DALY	disability-adjusted life year
DCP	Disease Control Priorities
<i>DCP2</i>	<i>Disease Control Priorities in Developing Countries</i> , second edition
<i>DCP3</i>	<i>Disease Control Priorities</i> , third edition
D&C	dilation and curettage
ECCE	extracapsular cataract extraction
ECG	electrocardiogram
EESC	Emergency and Essential Surgical Care
EHCP	Essential Health Care Program
EMLA	eutectic mixture of local anesthetics
EMRI	Emergency Management and Research Institute
EMS	emergency medical service
ETV	endoscopic third ventriculostomy
EVA	electric vacuum aspiration
FI	fascial interposition
FIGO	International Federation of Gynecology and Obstetrics

GBD	Global Burden of Disease study
GCCCC	Guwahati Comprehensive Cleft Care Center
GCS	Glasgow Coma Score
GDP	gross domestic product
GHE	Global Health Estimates
GHS	Ghana Hernia Society
GIEESC	Global Initiative for Emergency and Essential Surgery Care
GNI	gross national income
GPELF	Global Programme to Eliminate Lymphatic Filariasis
HD	Hirschsprung's disease
HDI	Human Development Index
HIC	high-income country
HIV	human immunodeficiency virus
HPV	human papilloma virus
IA	inflammatory arthropathies
ICD-9	International Classification of Diseases, Ninth Revision
ICER	incremental cost-effectiveness ratio
IMEESC	Integrated Management of Emergency and Essential Surgical Care
ISO	International Organization for Standardization
ISOFS	International Society of Obstetric Fistula Surgeons
IOL	intraocular lens
IUD	intrauterine device
IVD	intra vas device
LBP	low back pain
LE	life expectancy
LF	lymphatic filariasis
LIC	low-income country
LMICs	low- and middle-income countries
LYS	life-year saved
M&M	Morbidity and Mortality Conference
MBBHS	
M&E Matrix	<i>Monitoring the Building Blocks of Health Systems</i> Monitoring and Evaluation Matrix
MDA	mass drug administration
MDG	Millennium Development Goals
MEBO	moist exposed burn ointment
MIC	middle-income country
MLP	midlevel provider
MMR	maternal mortality ratio
mm	millimeter
MSICS	manual small-incision cataract surgery
MSK	musculoskeletal system
MVA	manual vacuum aspiration
NGO	nongovernmental organization
NHANES	National Health and Nutrition Examination Survey (U.S.)
NHS	National Health Service (U.K.)
NIS	Nationwide Inpatient Sample
NPC	nonphysician clinician
NSAID	nonsteroidal anti-inflammatory drug
OA	osteoarthritis
PE	phacoemulsification
PCO	posterior capsule opacification
PCR	posterior capsular rupture
PMMA	polymethylmethacrylate

POMR	perioperative mortality rate
PPP	purchasing power parity
QALY	quality-adjusted life year
QI	quality improvement
QOL	quality of life
RA	rheumatoid arthritis
RTI	road traffic injury
RVF	recto-vaginal fistula
SIA	surgically induced astigmatism
TBA	traditional birth attendant
TBSA	total body surface area
TBI	traumatic brain injury
TC	<i>técnicos de cirurgia</i> (Mozambique)
TJR	total joint replacement
TTO	time tradeoff
UCVA	uncorrected visual acuity
UMIC	upper-middle-income country
UNFPA	United Nations Population Fund
VA	vacuum aspiration
VSL	value of a statistical life
VSLY	value of a statistical life year
VVF	vesico-vaginal fistula
WFSA	World Federation of Societies of Anaesthesiologists
WHA	World Health Assembly
WHO	World Health Organization
WTP	willingness to pay
YLD	years lived with disability
YLL	years of life lost
YLS	years of life saved

Income Classifications

World Bank Income Classifications as of July 2014 are as follows, based on estimates of annual gross national income (GNI) per capita for 2013:

- Low-income countries (LICs) = US\$1,045 or less
- Middle-income countries (MICs) are subdivided:
 - a) lower-middle-income = US\$1,046 to US\$4,125
 - b) upper-middle-income (UMICs) = US\$4,126 to US\$12,745
- High-income countries (HICs) = US\$12,746 or more.

