



SUMMARY MEASURES OF POPULATION HEALTH

*Concepts, Ethics,
Measurement and Applications*

Edited by
Christopher J.L. Murray, Joshua A. Salomon,
Colin D. Mathers and Alan D. Lopez



WORLD HEALTH ORGANIZATION
GENEVA

SUMMARY MEASURES
OF POPULATION HEALTH

Description of the cover artwork: The cover illustration is based on a simple graphical heuristic illustrating the key elements of summary measures of population health (see p. 16). From left to right, the segments of the graph represent time lived in full health, time lived in less than full health and time lost due to premature mortality.

SUMMARY MEASURES OF POPULATION HEALTH

CONCEPTS, ETHICS, MEASUREMENT
AND APPLICATIONS

EDITED BY

CHRISTOPHER J.L. MURRAY, JOSHUA A. SALOMON,
COLIN D. MATHERS AND ALAN D. LOPEZ



World Health Organization
Geneva

WHO Library Cataloguing-in-Publication Data

Summary measures of population health : concepts, ethics, measurement and applications/ edited by Christopher J.L. Murray ... [et al.].

1. Health status indicators
 2. Population surveillance
 3. Life expectancy
 4. Disability evaluation
 5. Cost of illness
 6. Quality of life
 7. Ethics
 8. Social justice
 9. Data interpretation, Statistical
 10. Analysis of variance
- I. Murray, Christopher J.L.

ISBN 92 4 154551 8

(NLM classification: WA 950)



The World Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full. Applications and enquiries should be addressed to the Office of Publications, World Health Organization, Geneva, Switzerland, which will be glad to provide the latest information on any changes made to the text, plans for new editions, and reprints and translations already available.

© World Health Organization 2002

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. All rights reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

Design and production: Digital Design Group, Newton, MA USA

Typeset and printed in Canada

Cover: Upper right-hand picture credit: JHU/CCP; lower left-hand picture credit: Patrick Coleman JHU/CCP. Pictures are courtesy of M/MC Photoshare at www.jhuccp.org/mmc.

CONTENTS

Preface	xiii
---------------	------



PART I. INTRODUCTION

1.1	Summary measures of population health in the context of the WHO framework for health system performance assessment....	1
	<i>Christopher J.L. Murray and Julio Frenk</i>	
1.2	A critical examination of summary measures of population health	13
	<i>Christopher J.L. Murray, Joshua A. Salomon and Colin D. Mathers</i>	
1.3	The individual basis for summary measures of population health	41
	<i>Christopher J.L. Murray, Joshua A. Salomon and Colin D. Mathers</i>	

PART 2. USES OF SUMMARY MEASURES OF HEALTH

2.1	Applications of summary measures of population health	53
	<i>Paul J. van der Maas</i>	
2.2	On the uses of summary measures of population health	61
	<i>Michael C. Wolfson</i>	
2.3	Commentary on the uses of summary measures of population health	67
	<i>Matthew McKenna and James Marks</i>	
2.4	Summary measures of population health: applications and issues in the United States	75
	<i>Edward Sondik</i>	
2.5	Priority-setting in the health sector and summary measures of population health	83
	<i>Prasanta Mahapatra</i>	

PART 3. BASIC CONCEPTS

3.1	Measuring the burden of disease by aggregating well-being	91
	<i>John Broome</i>	
3.2	The separability of health and well-being	115
	<i>Dan W. Brock</i>	

3.3	The limited moral arithmetic of health and well-being	121
	<i>Daniel M. Hausman</i>	
3.4	A note on measuring well-being	129
	<i>James Griffin</i>	
3.5	Fairness, goodness and levelling down	135
	<i>John Broome</i>	
3.6	My goodness—and yours: a history, and some possible futures, of DALY meanings and valuation procedures	139
	<i>Erik Nord</i>	
3.7	Evaluating summary measures of population health	147
	<i>Jeff Richardson</i>	
3.8	An equity motivated indicator of population health	161
	<i>Norberto Dachs</i>	
3.9	Levels of health and inequality in health	171
	<i>Michael C. Wolfson</i>	
 PART 4. HEALTH EXPECTANCIES		
4.1	Health expectancies: an overview and critical appraisal	177
	<i>Colin D. Mathers</i>	
4.2	A new health expectancy classification system	205
	<i>Jean-Marie Robine</i>	
4.3	Health expectancies: what can we expect from summary indicators of population health?	213
	<i>Eileen M. Crimmins</i>	
4.4	Incidence- and prevalence-based SMPH: making the twain meet	221
	<i>Jan J. Barendregt</i>	
 PART 5. HEALTH GAPS		
5.1	Health gaps: an overview and critical appraisal	233
	<i>Christopher J.L. Murray, Colin D. Mathers, Joshua A. Salomon and Alan D. Lopez</i>	
5.2	Healthy life years (HealYs)	245
	<i>Adnan A. Hyder and Richard Morrow</i>	
5.3	Using achievable mortality reductions to define a survivorship standard for calculating mortality gaps	259
	<i>Kiyotaka Segami</i>	
5.4	Shifting the goalpost—normative survivorship goals in health gap measures	267
	<i>Theo Vos</i>	

PART 6. CAUSAL DECOMPOSITION

- 6.1 Causal decomposition of summary measures of population health 273
Colin D. Mathers, Majid Ezzati, Alan D. Lopez, Christopher J.L. Murray and Anthony Rodgers
- 6.2 Causality theory for policy uses of epidemiological measures 291
Sander Greenland
- 6.3 On causal decomposition of summary measures of population health 303
Michael C. Wolfson
- 6.4 Causality and counterfactual analysis 309
Daniel M. Hausman

PART 7. HEALTH STATE DESCRIPTION

- 7.1 Development of standardized health state descriptions 315
Ritu Sadana
- 7.2 Health-status classification systems for summary measures of population health 329
David Feeny
- 7.3 The international classification of functioning, disability and health—a common framework for describing health states 343
Bedirhan Üstün
- 7.4 The 6DSL description system for health state valuation 349
Prasanta Mahapatra, Lipika Nanda and K.T. Rajshree

PART 8. MEASUREMENT OF HEALTH STATUS IN POPULATION SURVEYS

- 8.1 Comparative analyses of more than 50 household surveys on health status 369
Ritu Sadana, Colin D. Mathers, Alan D. Lopez, Christopher J.L. Murray and Kim Moesgaard Iburg
- 8.2 The measurement and interpretation of health in social surveys 387
Duncan Thomas and Elizabeth Frankenberg
- 8.3 New approaches to enhance cross-population comparability of survey results 421
Christopher J.L. Murray, Ajay Tandon, Joshua A. Salomon, Colin D. Mathers and Ritu Sadana
- 8.4 Cross-population comparability of physician-assessed and self-reported measures of health 433
Kim Moesgaard Iburg, Joshua A. Salomon, Ajay Tandon and Christopher J.L. Murray

PART 9. VALUATION METHODS

- 9.1 How to derive disability weights 449
Marie-Louise Essink-Bot and Gouke J. Bonsel
- 9.2 The case against annual profiles for the valuation of
disability weights 467
Theo Vos
- 9.3 Measuring health state values in developing countries—
results from a community survey in Andhra Pradesh 473
Prasanta Mahapatra, Joshua A. Salomon and Lipika Nanda
- 9.4 Estimating health state valuations using a multiple-method
protocol 487
Joshua A. Salomon and Christopher J.L. Murray

PART 10. MODELLING THE RELATIONS BETWEEN HEALTH STATUS DOMAINS AND HEALTH STATE VALUATIONS

- 10.1 Modelling the relationship between the description and
valuation of health states 501
Paul Dolan
- 10.2 The utility approach to assessing population health 515
David Feeny
- 10.3 Modelling health state valuation data 529
John Brazier, Nigel Rice and Jennifer Roberts

PART 11. DETERMINANTS OF VARIANCE IN HEALTH STATE VALUATIONS

- 11.1 Determinants of variance in health state valuations 549
*Johannes Sommerfeld, Rob M.P.M. Baltussen, Laurien Metz,
Mamadou Sanon and Rainer Sauerborn*
- 11.2 Are disability weights universal? Ranking of the disabling
effects of different health conditions in 14 countries by
different informants 581
Bedirhan Üstün, Juergen Rehm and Somnath Chatterji
- 11.3 Measurement of variance in health state valuations in Phnom
Penh, Cambodia 593
Ritu Sadana
- 11.4 A conceptual framework for understanding adaptation,
coping and adjustment in health state valuations 619
Joshua A. Salomon and Christopher J.L. Murray

PART 12. EMPIRICAL ETHICS

- 12.1 The poverty of ethical analyses in economics and the
unwarranted disregard of evidence 627
Jeff Richardson
- 12.2 The limits to empirical ethics 641
Daniel M. Hausman

12.3	Issues in comparing the health of two populations	647
	<i>Gavin Mooney</i>	
12.4	Empirical ethics, moral philosophy, and the democracy problem	653
	<i>Dan W. Brock</i>	
PART 13. TIME AND AGE		
13.1	Accounting for time and age in summary measures of population health	657
	<i>Aki Tsuchiya</i>	
13.2	Age weighting and time discounting: technical imperative versus social choice	663
	<i>Jeff Richardson</i>	
13.3	Age weights and discounting in health gaps reconsidered	677
	<i>Christopher J.L. Murray and Arnab Acharya</i>	
PART 14. FAIRNESS		
14.1	Health and equity	685
	<i>Frances P. Kamm</i>	
14.2	Fairness in evaluating health systems	707
	<i>Erik Nord</i>	
14.3	Fairness and health	717
	<i>Dan W. Brock</i>	
14.4	All goods are relevant	727
	<i>John Broome</i>	
PART 15. CONCLUSIONS		
15.1	Summary measures of population health: conclusions and recommendations	731
	<i>Christopher J.L. Murray, Joshua A. Salomon, Colin D. Mathers and Alan D. Lopez</i>	
	Glossary of terms	757
	Index	765

ACKNOWLEDGMENTS

A key goal for this book was to solicit contributions from numerous authors to ensure that a wide diversity of views about summary measures of population health were reflected. We are extremely grateful to the many experts who contributed chapters to this book for their discipline in meeting production deadlines and their patience with the editorial process. In addition, we thank all of the other participants at the Marrakech conference that gave rise to this book. The debate and discussions at that conference have without doubt enriched and informed the final contributions that appear in this volume. We give special acknowledgment to the various peer reviewers of the chapters in this book, whose valuable comments have helped ensure the scientific integrity of the volume.

We are indebted to Nankhonde Kasonde for managing the production process and keeping the publication on schedule. Her contribution to the style and presentation of the book are also gratefully acknowledged. We wish to thank Marc Kaufman for his efficient and professional management of a challenging publication process. We would also like to thank Gabriella Covino for organizing the Marrakech conference and Sue Piccolo for administrative assistance.

We gratefully acknowledge financial support for this project from the National Institute on Aging (Research Grant No. P01 AG17625-01).

PREFACE

The epidemiological transition, characterized by a progressive rise in the average age of death in virtually all populations across the globe, has necessitated a serious reconsideration of how the health of populations is measured. Average life expectancy at birth is becoming increasingly uninformative in many populations where, because of the non-linear relationship between age-specific mortality and the life expectancy index, significant declines in death rates at older ages have produced only relatively modest increases in life expectancy at birth. At the same time there is considerable uncertainty in many populations as to whether—and to what extent—gains in life expectancy have been accompanied by improvements in health status. Such considerations are critical for the planning and provision of health and social services. Separate measures of survival and of health status among survivors, while useful inputs into the health policy debate, need to be combined in some fashion if the goal is to provide a single, holistic measure of overall population health.

Summary measures of population health (SMPH) are measures that combine information on mortality and non-fatal health outcomes. Interest in summary measures has been rising in recent years, and the calculation and reporting of various measures have become routine in a number of settings. With the proliferation of work on summary measures, there has been increasing debate about their application in public health, ranging from the ethical implications of the social values incorporated in these measures, to technical and methodological issues regarding the formulation of different measures, to concerns about distributive justice and the use of summary measures as an input to resource allocation decisions. Given these developments, and the diverse opinions about the construction and uses of summary measures, the World Health Organization's Global Programme on Evidence for Health Policy convened a conference in Marrakech, Morocco, in December 1999, to provide a forum for discussion and debate over the scientific, ethical and policy issues around summary measures of population health.

One key objective for WHO, in addition to advancing the technical work on summary measures, has been to promote greater transparency and understanding of the inputs to calculate summary measures and their appropriate application. The Marrakech Conference provided a unique opportunity to challenge existing notions and advance the conceptual and

methodological research agenda on summary measures. Leading experts from a range of disciplines addressed the current state of the art, from basic concepts and uses, to detailed considerations on conceptual frameworks for measurement of population health, description and valuation of health states, as well as social values and key ethical arguments. The meeting engendered a rich debate about conceptual, technical and measurement issues and addressed a number of implications for the uses of summary measures.

The various papers presented at the Marrakech meeting form the basis of this volume, supplemented by additional chapters that arose from the discussion or were commissioned to fill important gaps in the debate. All chapters have been peer-reviewed to ensure their suitability for publication in this volume.

ORGANIZATION OF CONTENTS

The chapters in this book provide elaborations of these various themes, issues and concerns. Part 1 of the book begins by describing the framework adopted by WHO for the assessment of health system performance in countries and the specific role of SMPH within this framework. Some of the key issues in the development and critical appraisal of summary measures, and their foundations in the measurement of individual health, are then introduced. Part 2 presents a series of viewpoints on the uses of summary measures, from the perspectives of both researchers and policy-makers. These uses range from comparisons of the health of populations (or of the same population over time), quantification of health inequalities and priority-setting for health services delivery and planning, to guiding research and development in the health sector, improving professional training, and analyzing the benefits of health interventions in cost-effectiveness studies.

BASIC CONCEPTS

Given the array of potential uses of summary measures, the chapters in part 3 address many of the fundamental concepts underlying their definition and construction. How broadly, for example, should the concept of “health” be defined? Is health separable from other components of well-being? Quite apart from such philosophical considerations, how should health be measured and aggregated across individuals in order to construct population indices? Other chapters in part 3 consider issues arising from the need to quantify both levels and distributions of health in populations. Several contributions in this section consider the question of whether summary measures should assess simultaneously both the average level of health, and health inequalities, or whether separate measures are required.

HEALTH EXPECTANCIES, HEALTH GAPS AND CAUSAL ATTRIBUTION

Summary measures of population health fall into two broad categories: health expectancies and health gaps. A wide range of health expectancies

has been proposed since the original notion was developed. The chapters in part 4 review the basic components of health expectancy measures, including the methods used to calculate life expectancy (period or cohort) and the methods used to incorporate non-fatal health experience in health expectancies (for example, prevalence-rate life tables and multi-state life tables). Of key concern are the consequences of using different definitions and measurements of health status in the calculation of health expectancies, and, perhaps most importantly, the implications of basing health expectancy measures on dichotomous versus multi-state valuations of health states.

Of the different summary measures that have been widely used, none simultaneously includes information on both incidence and prevalence. There are long-standing arguments in health statistics about the relative merits of incidence-based and prevalence-based measures, but simple evaluative criteria suggest that summary measures should include information on both for the purpose of comparing the health of different populations. The final chapter in this section addresses the need for, and construction of, summary measures that include both incidence and prevalence information.

As a complement to health expectancies, health gap measures are critical to understanding the comparative importance of diseases, injuries and risk factors for population health levels. A variety of health gap measures have been proposed and calculated, following the tradition of mortality gap measures developed over the last half-century. Health gaps extend the notion of mortality gaps to include time lived in health states worse than ideal health. Part 5 of the book develops this notion further, with chapters addressing questions such as the choice of implicit or explicit population targets and other issues around the specification of normative goals for health gaps, and providing examples of different alternative health gap measures. The implications of the age-dependent formulation of typical gap measures, which is not an issue for health expectancies, are also discussed, and criteria are advanced and debated for desirable properties of health gap measures.

Given that one of the fundamental goals in constructing summary measures is to identify the relative magnitude of different health problems, including diseases, injuries and risk factors, an appropriate framework is required which will be both coherent and readily interpretable. There are two dominant traditions in widespread use for causal attribution: categorical attribution and counterfactual analysis. In categorical attribution, an event such as a death is attributed to a single cause according to a defined set of rules (in the case of mortality, the International Classification of Diseases). In counterfactual analyses, the contribution of a disease, injury or risk factor to overall disease burden is estimated by comparing the current levels of a summary measure with the levels that would be expected under some alternative hypothetical scenario. Chapters in part 6 discuss the relative advantages and disadvantages of these two approaches and

the implications for comparability, of using the two approaches in the same analysis.

HEALTH STATUS DESCRIPTION AND CLASSIFICATION

Standardized assessments of multiple health domains are increasingly being used to describe the health states of individuals, both as quantities of interest in their own right, as well as critical inputs in the construction of summary measures. All efforts at measuring health state valuations and the subsequent calculation of severity weights incorporated within summary measures of population health depend on using meaningful, complete and comprehensible health state descriptions. Two key issues in describing health states are: (i) what constitutes a complete description of a health state, and (ii) how to convey this information effectively to an individual undertaking valuations. For the purposes of developing a valid and reliable approach to eliciting health state valuations, descriptions of health states must be standardized to provide information on the major domains considered important for individual valuation, and they must be comprehensible by individuals with widely varying levels of educational attainment and from different socio-economic, professional and cultural backgrounds. In addition to traditional psychometric criteria such as reliability and validity, it is also critical to ensure that measures of health levels are comparable across different populations. Chapters in parts 7 and 8 address these and other theoretical and empirical issues in the measurement of health states. Part 7 addresses various questions relating to the choice of domains in different health state classification systems and the presentation of health states to survey respondents, and part 8 describes different strategies for improving the cross-population comparability of survey results on health domain levels.

HEALTH STATE VALUATION

Any summary measure of population health, by definition, requires the quantification or explicit valuation of states of health worse than perfect health, given that, at any one time, a large number of individuals are likely to be in sub-optimal health. There has been extensive debate in the health economics literature on a number of fundamental issues relating to health state valuations, including: (i) whose values should be used; (ii) the advantages and disadvantages of various value elicitation techniques; (iii) the mode of presentation of health states as stimuli for valuations; and (iv) the combination of multiple methods, multiple states and deliberative processes in the development of standard data collection instruments and protocols. The empirical basis for the calculation of summary measures would be improved considerably through the collection of population-based data on individual valuations of a wide range of health states. The chapters in part 9 address many of the important conceptual and methodological issues that form the foundation for these data collection efforts.

Regardless of the resources available, it is clearly not feasible to measure health state valuations in a population for every possible health state. For the calculation of summary measures of population health, a predictive model that allows indirect estimation of health state valuations from information on domain levels would be invaluable. Several major efforts to develop such mapping functions have been undertaken, and the chapters in part 10 present the most prominent examples to date, describing the major characteristics of different approaches and outlining a broad research agenda for further work in this area.

One of the major empirical questions relating to health state valuation concerns the extent to which values may vary within and across populations. There are a number of arguments as to why health state valuations might be expected to vary between populations that have different cultural beliefs on disease causation, individual responsibility, fatalism, social roles and functioning or expectations for well-being, etc. Further, individual variation in valuations according to age, sex, education, income and other socio-demographic variables might also be expected. To date, however, there has been little empirical evidence that health state values vary markedly within and across populations. Part 11 examines concepts and methods for modelling the determinants of variation in health state valuations within and between populations, and includes examples of empirical studies relating to this question.

GOODNESS, FAIRNESS AND SOCIAL VALUE CHOICES

A key concern in the use of summary measures for resource allocation is that policies and programmes are chosen based on several considerations, and not only on the concern to maximize health outcomes. Level of health, in other words, constitutes one component in the overall goals for social policy, but there are compelling moral arguments that support additional desiderata for health policy. Should we give moral priority to the worst-off? Or should we attach greater significance to large benefits than to the sum of many small benefits, with life-saving interventions counting the most of all? Might we attach lower importance to life extension beyond a normal lifespan, thus attaching greater moral weight to achieving what has been described as a “fair innings”? Cutting across these moral choices are two methodological issues which have broad implications for measurement. One is whether our judgments on these moral trade-offs should be explicitly incorporated into the summary measures themselves, via weighting, or rather should be regarded as an altogether separate set of considerations in the allocation debate. The other issue is whether these questions of resource allocation should ideally be settled by processes of democratic deliberation and the elicitation of the public’s values, or by the best of moral argumentation and theory. Chapters in parts 12 and 14 lay out some of the key debates regarding this moral arithmetic in detail, including tradeoffs between goodness and fairness and the role for empirical ethics.

The calculation and specification of summary measures of population health also involves several explicit social value choices. One key issue is whether or not to differentially weight healthy years of life lost at different ages, and if so, on what basis. Even if most people consider the period of young adulthood (e.g. the early childbearing years) as more valuable than years lived at the beginning or end of life, this view may be objectionable if the basis is the societal value of young adults compared to other people. Secondly, the choice of a discount rate for health benefits, even if technically desirable, may entail morally unacceptable allocations between generations. Are there other widely held values, and on what basis should we decide to incorporate social values into the summary measure, if at all? If they are to be incorporated, should these values be determined at the local or national level for country analyses and/or at the international level for cross-national comparisons? The debate on social value choices, as well as their application in summary measures, is the focus of part 13 of the book.

In the final section of the book, a series of conclusions and recommendations relating to the application of summary measures of population health are presented as a guide for the construction and use of these measures in practice. These conclusions represent the consolidated opinions of the editors, based on careful consideration of the issues and viewpoints raised in the preceding chapters, about the specific formulation of summary measures for various uses. Recommendations are provided not only on measurement issues and methodological choices in the construction of the measures, but more broadly on the types of information that need to be developed in order to calculate these measures reliably.

* * *

The chapters which follow will, we hope, provide a comprehensive and coherent treatise on the many complex but critical considerations which underly the construction and use of summary measures of population health. It is hoped that this volume—in drawing on the contributions of leading scientists in the area—will bolster the scientific and ethical foundations for the widespread promotion and use of summary measures. We believe that the publication represents an important contribution to the continuing evolution of health metrics, and hope that it will serve as a useful resource in guiding national and international applications in the coming decades.

Christopher J.L. Murray

Joshua A. Salomon

Colin D. Mathers

Alan D. Lopez

LIST OF AUTHORS

Arnab Acharya

The Institute of Development Studies
University of Sussex
Brighton, BN1 9RE, UK
Tel: +44 1273 877 261
Email: a.acharya@ids.ac.uk

Rob M.P.M. Baltussen

Global Programme on Evidence for Health Policy
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: baltussenr@who.int

Jan J. Barendregt

Department of Public Health
Faculty of Medicine
Erasmus University of Rotterdam
PO Box 1738
3000 DR Rotterdam, The Netherlands
Tel: +31 10 408 7714 Fax: +31 10 408 9449/9455
Email: barendregt@mgz.fgg.eur.nl

Gouke J. Bonsel

Institute of Social Medicine/Public Health
Academisch Medisch Centrum
Meibergdreef 9
Postbus 22660
1100 DD Amsterdam, The Netherlands
Tel: +31 20 566 9111
Email: g.j.bonsel@amc.uva.nl

John Brazier

Sheffield Health Economics Group
University of Sheffield
Regent Court, 30 Regent Street
Sheffield S1 4DA, UK
Tel: +44 114 222 0715
Email: j.e.brazier@sheffield.ac.uk

Dan W. Brock

Department of Clinical Bioethics
Warren G. Magnuson Clinical Center
Building 10, Room 1C118
National Institutes of Health
Bethesda, MD 20892-1156, USA
Tel: +1 301 435 8717
Fax: +1 301 496 0760
Email: dbrock@mail.cc.nih.gov

John Broome

Department of Philosophy
Oxford University
10 Merton Street
Oxford OX1 4JJ, UK
Tel: +44 1865 276926 Fax: +44 1865 276932
Email: john.broome@philosophy.oxford.ac.uk

Somnath Chatterji

Health Financing and Stewardship
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: chatterjis@who.int

Eileen M. Crimmins

Andrus Gerontology Center
University of Southern California
3715 McClintock Avenue
Los Angeles, CA 90089-0191, USA
Tel: +1 213 740 1707
Email: crimmin@usc.edu

Norberto Dachs

Pan American Health Organization
Pan American Sanitary Bureau
Regional Office of the World Health Organization
525 Twenty-third Street, N.W.
Washington, DC 20037, USA
Tel: +1 202 974 3228 Fax: +1 202 974 3675
Email: dachsnor@paho.org

Paul Dolan

Sheffield Health Economics Group
Department of Economics University of Sheffield
Regent Court, 30 Regent Street
Sheffield S1 4DA, UK
Tel: +44 114 222 0670 Fax: +44 114 272 4095
Email: P.Dolan@shef.ac.uk

Marie-Louise Essink-Bot

Department of Public Health
Erasmus University
PO Box 1738
3000 DR Rotterdam, The Netherlands
Tel: +31 10 408 7714 Fax: +31 10 408 9455
Email: essink@mgz.fgg.eur.nl

Majid Ezzati

Center For Risk Management
Resources For the Future
1616 P. Street, N.W.
Washington, DC 20036, USA
Tel: +1 202 328 5004 Fax: +1 202 939 3460
Email: ezzati@rff.org or ezzatim@who.int

David Feeny

Institute of Health Economics
#1200, 10405 Jasper Avenue
Edmonton, AB T5J 3N4 Canada
Tel: +1 780 448 4881 Fax: +1 780 448 0018
Email: dfeeny@pharmacy.ualberta.ca
Web: <http://www.ihe.ab.ca>

Elizabeth Frankenberg

264 Haines Hall
Department of Sociology
University of California at Los Angeles
375 Portola Plaza
Los Angeles, CA 90095-1551, USA
Tel: +1 310 825 1313 Fax: +1 310 206 9838
Email: efranken@ucla.edu

Julio Frenk

Minister of Health, Mexico
Secretaría de Salud de México
Lieja 7, Col. Juárez, 06696 Mexico, D.F.
Email: Jfrenk@mail.ssa.gob.mx

Sander Greenland

University of California at Los Angeles School of Public Health
Department of Epidemiology
16-035 Center for Health Sciences
PO Box 951772
Los Angeles, CA 90095-1772, USA
Tel: +1 310 825 5140 Fax: +1 310 825 8440
Email: lesdomes@ucla.edu

James Griffin

Department of Philosophy
Oxford University
10 Merton Street
Oxford OX1 4JJ, UK
Tel: +44 1865 276926 Fax: +44 1865 276932

Daniel M. Hausman

Department of Philosophy
University of Wisconsin-Madison
600 N. Park Street
Madison, WI 53706-1474, USA
Tel: +1 608 263 5178 Fax: +1 608 265 3701
Email: dhausman@facstaff.wisc.edu
Web: <http://philosophy.wisc.edu/hausman>

Adnan A. Hyder

Department of International Health
Johns Hopkins University School of Public Health
615 North Wolfe Street, Suite E-8132
Baltimore, MD 21205, USA
Tel: +1 410 955 3928 Fax: +1 410 614 1419
Email: ahyder@jhsph.edu

Frances P. Kamm

Department of Philosophy
New York University
100 Washington Square East, 503K
New York, NY 10012, USA
Tel: +1 212 998 8331 Fax: +1 212 995 4179
Email: fmk1@is4.nyu.edu

Alan D. Lopez

Global Programme on Evidence for Health Policy
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: lopeza@who.int

Mathew McKenna

National Center For Chronic Diseases, Prevention and Health
Promotion
Centers for Disease Control and Prevention
4770 Burford Highway, N.E.
Mailstop K40, Atlanta, GA 30341, USA
Tel: +1 770 488 4227
Email: mtm1@cdc.gov

Prasanta Mahapatra

Institute of Health Systems
HACA Bhavan
Hyderabad-500004, AP, India
Tel: +91 40 321 0136
Email: pmahapat@ihsnet.org.in

James Marks

National Center for Chronic Diseases, Prevention and Health
Promotion
Centers for Disease Control and Prevention
4770 Burford Highway, N.E.
Mailstop K 40, Atlanta, GA 30341, USA
Tel: +1 770 488 5403 Fax: +1 770 488 5971
Email: jms1@cdc.gov

Colin D. Mathers

Global Programme on Evidence for Health Policy
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: mathersc@who.int

Laurien Metz

The Netherlands Red Cross
PO Box 28120
2502 KC The Hague, The Netherlands
Email: lmetz@redcross.nl

Gavin Mooney

Social and Public Health Economics Research Group
Department of Public Health and Community Medicine
University of Sydney
Sydney, New South Wales 2006, Australia
Tel: +61 2 9351 5997 Fax: +61 2 9351 7420
Email: g.mooney@curtin.eedu.au

Kim Moesgaard Iburg

Department of International Health
University of Copenhagen
Blegdamsvej 3
DK-2100 Copenhagen, Denmark
Tel: +45 35 32 7472 Fax: +45 35 32 7736
Email: k.m.iburg@pubhealth.ku.dk

Richard Morrow

Department of International Health
Johns Hopkins University School of Public Health
615 North Wolfe Street, Room E-8148
Baltimore, MD 21205, USA
Tel: +1 410 955 3928 Fax: +1 410 614 1419
Email: rmorrow@jhsph.edu

Christopher J.L. Murray

Evidence and Information for Policy
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: murrayc@who.int

Lipika Nanda

Institute of Health Systems
HACA Bhavan
Hyderabad-500004, AP, India
Tel: +91 40 321 0136 Fax: +91 40 324 1567
Email: lipika@ihsnet.org.in

Erik Nord

National Institute of Public Health
PO Box 4404
Torshov, 0403 Oslo, Norway
Tel: +47 22 04 2342 Fax: 47 22 04 2595
Email: erik.nord@folkehelsa.no

K.T. Rajshree

Institute of Health Systems
HACA Bhavan
Hyderabad-500004, AP, India
Tel: +91 40 321 0136 Fax: +91 40 324 1567

Juergen Rehm

Addiction Research Institute
University of Zürich
Rämistrasse 71
8006 Zürich, Switzerland
Tel: +41 01 634 1111 Fax: +41 01 634 2304
Email: jtrehm@isf.unizh.ch

Jeffrey Richardson

Health Economics Unit
Centre for Health Program Evaluation
PO Box 477
West Heidelberg, Victoria 3081, Australia
Tel: +61 3 9496 4441 Fax: +61 3 9496 4424
Email: jeff.richardson@buseco.monash.edu.au

Nigel Rice

Centre for Health Economics
University of York, Heslington
York, YO10 5DD, UK
Tel: +44 1904 433718 Fax: +44 1904 433644
Email: nr5@york.ac.uk

Jennifer Roberts

Sheffield Health Economics Group
University of Sheffield
Regent Court, 30 Regent Street
Sheffield S1 4DA, UK
Email: J.R.Roberts@sheffield.ac.uk
Web: <http://www.shef.ac.uk>

Jean-Marie Robine

INSERM Démographie et Santé
Centre Val d'Aurelle Parc
Euromédecine 34298 Montpellier Cedex 5, France
Tel: +33 467 61 30 43 Fax: +33 467 61 30 47
Email: Robine@valdorel.fnlcc.fr

Anthony Rodgers

Clinical Trials Research Unit
The University of Auckland
Private Bag 92019
Auckland, New Zealand
Tel: +64 9 373 7599 Fax: +64 9 373 1710
Email: a.rodgers@ctr.u.auckland.ac.nz

Ritu Sadana

Research Policy and Cooperation
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: sadanar@who.int

Joshua A. Salomon

Global Programme on Evidence for Health Policy
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: salomonj@who.int

Mamadou Sanon

Centre de Recherche en Santé de Nouna
BP 02
Nouna, Burkina Faso
Email: sanon@pra.bf

Rainer Sauerborn

Department of Tropical Hygiene and Public Health
Ruprecht-Karls-Universität Heidelberg
Im Neuenheimer Feld 324
D-69120 Heidelberg, Germany
Tel: +49 6221 565038 Fax: +49 6221 565948
Email: rainer.sauerborn@urz.uni-heidelberg.de

Kiyotaka Segami

Department of Public Health Policy
National Institute of Public Health, 2-3-6 Minami
Wako-city, Saitama Prefecture, 351-0197, Japan
Email: segami@iph.go.jp

Johannes Sommerfeld

Special Programme For Research and Training in Tropical Diseases
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: sommerfeldj@who.int

Edward Sondik

National Center for Health Statistics
Centers for Disease Control and Prevention
6525 Belcrest Road
Hyattsville, MD 20782, USA
Tel: +1 303 458 4636 Fax: +1 301 436 8459
Email: ESondik@cdc.gov

Ajay Tandon

Global Programme on Evidence for Health Policy
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: tandona@who.int

Duncan Thomas

Bunche Hall 9365
Department of Economics
University of California at Los Angeles
PO Box 951477
Los Angeles, CA 90095-1477, USA
Tel: +1 310 825 5304 Fax: +1 310 825 9528
Email: dt@ucla.edu

Aki Tsuchiya

Centre for Health Economics
University of York, Heslington
York, YO10 5DD, UK
Tel: +44 1904 433651 Fax: +44 1904 433644
Email: a.tsuchiya@sheffield.ac.uk

Bedirhan T. Üstün

Health Financing and Stewardship
World Health Organization
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: ustunb@who.int

Paul J. van der Maas

Department of Public Health
Erasmus University Rotterdam
P.O. Box 1738
3000 DR Rotterdam, The Netherlands
Tel: +31 10 408 7714 Fax: +31 10 408 9482
Email: vandermaas@facb.fgg.eur.nl

Theo Vos

Health Outcomes Section
Public Health Division
Department of Human Services
18-120 Spencer Street
Melbourne, Victoria 3000, Australia
Tel: +61 3 9637 4236 Fax: +61 3 9637 4763
Email: Theo.Vos@dhs.vic.gov.au

Michael C. Wolfson

Analysis and Development
Statistics Canada
RH Coats Building 24A
Ottawa, Ontario, Canada K1A 0T6
Tel: +1 613 951 8216 Fax: +1 613 951 5643
Email: wolfson@statcan.ca