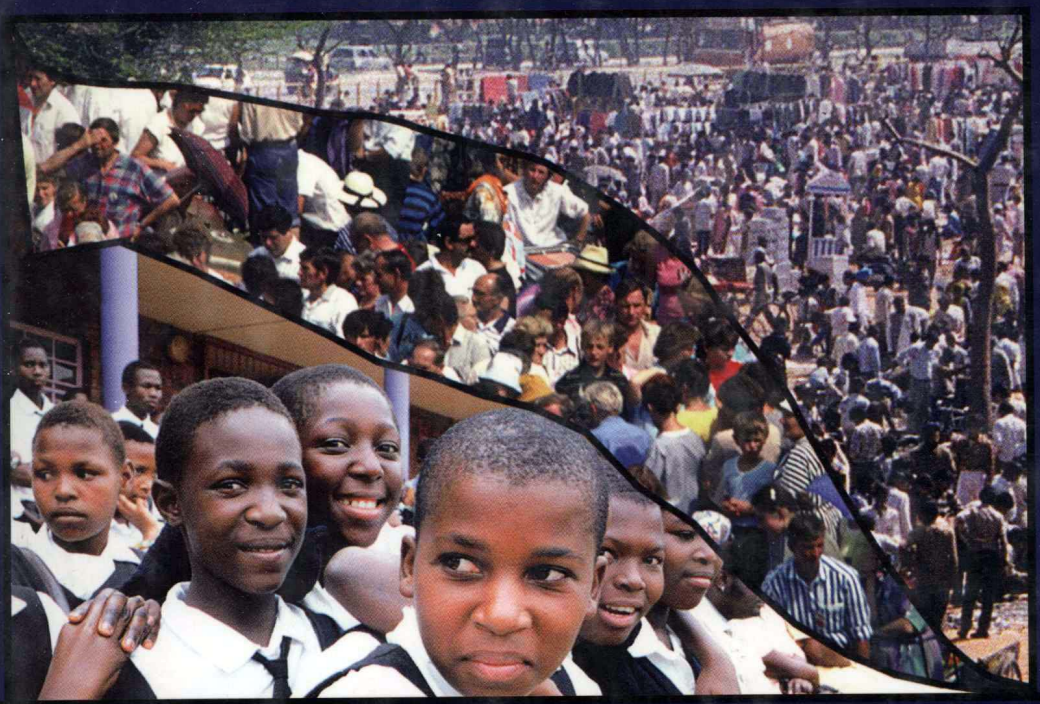

Summary Measures of Population Health

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

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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 policymakers. 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.

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