Determining Health Expectancies

Edited by

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List of abbreviations

ADL	Activities of Daily Living
DALE	Disability-Adjusted Life Expectancy
DALY	Disability-Adjusted Life Year
DemLE	Dementia-free Life Expectancy
DFLE	Disability-Free Life Expectancy
DSM	Diagnostic and Statistical Manual of Mental Disorders
EC	European Community
GBD	Global Burden of Disease
GDP	Gross Domestic Product
GHQ	General Health Questionnaire
GNP	Gross National Product
HALE	Health-Adjusted Life Expectancy
HE	Health Expectancy
HLE	Healthy Life Expectancy
HSE	Health State Expectancy
HUI	Health Utility Index
IADL	Instrumental Activities of Daily Living
ICD	International Classification of Diseases
ICIDH	International Classification of Impairments, Disabilities and Handicaps
LE	Life Expectancy
LED	Life Expectancy with Disability
MHI	Mental Health Index
OECD	Organization for Economic Cooperation and Development
PYLL	Potential Years of Life Lost
QALY	Quality-Adjusted Life Years
REVES	Réseau Espérance de Vie en Santé/International Network on Health Expectancy and the Disability Process
SES	Socio-Economic Status
SMPH	Summary Measure of Population Health
UN	United Nations
UNFPA	United Nations Population Fund
WHO	World Health Organization
YLD	Years Lived with Disability
YLL	Years of Life Lost

Introduction

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The impetus for the creation of the International Network on Health Expectancy and the Disability Process, the French acronym for which was REVES (Réseau Espérance de Vie en Santé), came in the 1970s and 1980s. During this time life expectancy was increasing in the developed world and these countries were beginning to see substantially greater numbers of older people. The common view that old age brought a greater demand for health and social care warranted evidence of whether these new populations of elderly would be healthier, and therefore make fewer demands than previous cohorts, or whether they were simply successes of medical advances, being kept alive longer but with poorer health. Scenarios of the compressions and expansion of morbidity, as well as the intermediate ones, such as the dynamic equilibrium theory, were drawn up (Gruenberg, 1977; Kramer, 1980; Fries, 1980, 1989; Manton, 1882).

In 1964, Sanders first developed the idea of a population health indicator bringing together data on both quantity – through mortality – and quality of life – usually disability – (Sanders, 1964) with the first explicit method of calculation by Sullivan in 1971 (Sullivan, 1971a, 1971b). However, in the years following, the evidence for compression or expansion of morbidity was unclear, with some reports favouring one and some another, even in the same country. The first estimates of disability-free life expectancy (DFLE), called 'expectation of healthy life' and defined as 'free of bed-disability and institutionalization', were made for the United States in 1969 and showed that DFLE had increased slightly from 1958 to 1966 for both genders whilst life expectancy (LE) over the same period had appeared to stagnate (US Department of Health, 1969). In 1974, another calculation based on Japanese

data from 1966 to 1970 showed a slightly more rapid increase in LE than in DFLE (The Council of National Living, 1974). In these calculations, DFLE corresponded to the 'average healthy life span' and was defined as 'free from functional loss due to disease' and was the first example of a calculation of years of healthy life lost from injury and disease.

At the annual meeting of the American Public Health Association in 1979, a paper examined the trend in the health of Americans from 1964 to 1974. The calculations clearly showed that 'although overall life expectancy has increased over this decade, almost all of this increase was years of disability' (McKinlay and McKinlay, 1979; McKinlay *et al*, 1983). In 1980, a series of calculations with the US data spanning from 1966 to 1976 distinguished, for the first time, the levels of disability. Over this decade, LE increased by 2.2 years while DFLE only rose by 0.6 year. These alarming results were linked to an increase of both mild and severe forms of disability (Colvez, 1980, 1992; Colvez and Blanchet, 1983).

The first book totally devoted to health expectancies, *Healthfulness of Life*, was published in Canada in 1983 by Wilkins and Adams. Using the 1978–1979 data of the Canadian Health Survey, they computed DFLE for 1978 and then used the 1950–1951 data of the Canadian Sickness Survey to produce an estimate of DFLE for the past. Despite conceptual and methodological differences between the two surveys which limited comparisons, 'the importance of knowing (...) whether healthfulness increased or decreased as LE rose from 1951 to 1978 was sufficient to justify at least attempting to make such comparisons' (Wilkins and Adams, 1983a). Here, too, most of the increase in life expectancy was in years with disability (Wilkins and Adams, 1983b, 1987). In 1994, a short but valid series of health expectancies were published for Canada with the repetition in 1991 of the 1986 Health and Activity Limitation Survey – HALS (Wilkins *et al*, 1994). In 1983, another Canadian book devoted to health expectancies, *Durée ou qualité de la vie?*, presented a few previously unpublished calculations by Colvez based on the 1962 and 1965 US National Health Interview Survey (NHIS) data (Dillard, 1983).

In 1988, Bebbington published the first series of expectation of life without disability in England and Wales for the years 1976, 1981 and 1985. His conclusions were as pessimistic as the American or Canadian ones: most of the increase in LE was in years with chronic disability. However, this author emphasized that during the previous decade a significant improvement both in LE and in DFLE had taken place for older people (Bebbington, 1988). This series has since been regularly updated (Bebbington, 1991, 1992; Bone *et al*, 1995; Bebbington and Darton, 1996).

Immediately prior to the first REVES meeting in 1989, further results for the US were published for the decade beginning in 1970. The conclusion was similar to others: 'Over the decade 1970–80, life expectancy at birth increased in the United States by about three years for both males and females. Most of this increase was in years with disability' (Crimmins *et al*, 1989; Crimmins,

1992). This work differed from previous studies in that greater importance was attached to the validity and quality of the data. Calculations were restricted to the census years when accurate estimation of the institutionalized population was possible and to a period of time without major change in the NHIS data collection (such major changes occurred between 1957 and 1958 and between 1981 and 1982). The same authors were also able to reproduce the calculation of DFLE made by Sullivan for the year 1965 (Sullivan, 1971b), for 1970 and 1980 (Crimmins *et al*, 1989), and then for 1990 (Crimmins *et al*, 1997), and observed that 'looking only at bed disability, most of the increase in LE at birth between 1970 and 1980 was in non-disabled or healthy years'. Also in 1989 a previous series from 1964 to 1974 was updated with a calculation for 1985 (MacKinlay *et al*, 1989) but without attention to the changes that had occurred in the NHIS design. Interestingly, they noticed a major decrease in average life free of disability.

These early calculations, prior to the creation of REVES, highlight the difficulties of monitoring DFLE consistently both within countries over time and between countries. In this context, it is easy to understand why one of the main goals of the REVES network in 1989 was to know if the increase in LE was accompanied by an increase in DFLE. When REVES was created, 11 papers dealing with this topic had been published (Colvez and Blanchet, 1981; Wilson, 1981; Feldman, 1983; Verbrugge, 1984; Wilson and Drury, 1984; Newachek *et al*, 1984; Verbrugge and Madans, 1985; Palmore, 1986; Newachek *et al*, 1986; Chirikos, 1986; Robine and Brunelle, 1986). Even if most of the authors had underlined that no evidence existed for an increase of disability among the elderly (Verbrugge, 1989), taken all together these studies gave the general impression that disability was increasing.

At the time of its creation in 1989, the REVES network was made up of 10 invited teams coming from Canada, France, the Netherlands, Switzerland, the United States and the United Kingdom. The first three meetings continued with these teams but in 1991, at the fourth meeting in Leiden in the Netherlands, the network was opened up to any researchers interested in health expectancy and disability. From 48 participants and 6 countries represented at the first meeting in Quebec in 1989, REVES now includes amongst its membership some 150 scientists from 30 countries and at every meeting new scientists and policy makers are welcomed to the network.

The role of REVES has developed much over the decade. The extension of the name to include the disability process, at the Geneva meeting in 1990, highlighted the need to be able to differentiate levels of disability for comparability and to explain potential changes over time in the distribution of severity. Issues such as the interpretation of time series of health expectancies and the promotion of health expectancy for planning public policy and public health programmes have always been

in the forefront. However, over the years, REVES has paid more attention to improving the quality and comparability of the available data, and in particular promoting the use of standardized and new methods for both data collection and calculation of health expectancies. In this context REVES members have conducted three workshops – in association with Nihon University, Peking University and IUSSP (International Union for the Scientific Study of Population) – to disseminate methods to researchers and policy makers in developing countries. The first two workshops, Tokyo (1999) and Beijing (2001), concentrated on the basic method of health expectancy calculation, the Sullivan method, requiring only cross-sectional data on the prevalence of health states. The most recent workshop in Tokyo (2002) focused on advanced methods using long-itudinal data.

A considerable strength of REVES is the wide range of scientists and policy makers it attracts, from disciplines including: demography, epidemiology, gerontology, sociology, psychology, public health, health policy, health economics, medicine, biology, and statistics, and it has developed strong links with international agencies such as the UN, WHO, OECD and Eurostat. More geographically close sub-networks have also been spawned, to encourage and support more local research, including Asia-REVES and Euro-REVES. Much of the passage of information is via the REVES web pages (www.reves.net).

This book presents essentially the first decade of work of REVES, with almost annual meetings from 1989. The first section provides the background to health expectancies and how they evolved. The second section concentrates on the use of health expectancies to describe social and geographical inequalities in health as well as the contributions to ill-health from different diseases and conditions. The third section is focused around the problems involved in comparability of health expectancies: the measurement of disability, collection of data and method of calculation employed. This section also includes a description and critique of other forms of health expectancies (health-adjusted life expectancy and disability-adjusted life expectancy). The final section provides an up-to-date description of health expectancies in different regions of the world. In the preparation of this book and in the work of REVES as a whole, we have concluded that the language we use is of paramount importance, particularly in the context of an international network with researchers from a variety of disciplines. We have tried to make as explicit as possible the underlying concepts of health measurement, the definitions of disability and health, and the way in which we have merged and weighted different health dimensions. It is only in this way that we can have truly comparable health expectancies to answer the important question of whether we are living longer, healthier lives.

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The Main Trends in the Evolution of the Population's Health Status

Introduction

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During the last decade of the 20th century, the increase of the oldest-old population attracted significant attention (Suzman *et al*, 1994). Some feared that the combination of low mortality with the increasing size of birth cohorts, especially the baby-boom cohorts, would dramatically increase the size of the oldest-old population of the future. The most critical point in evaluating the meaning of a growing and longer-lived older population was uncertainty about the level of health of this population and the associated costs. People feared not only an increase in the costs associated with medical care but also increased costs associated with high levels of disability and dependency of these oldest old persons.

Since the mid-1980s three conflicting theories about the relationship between mortality and population health have been put forward. For Gruenberg and Kramer the observed decline in mortality rates among the oldest old was due to the decrease in the fatality rate of chronic conditions leading to a significant increase in the prevalence of disability, dementia and co-morbidity among these new survivors (Gruenberg, 1977, 1980; Kramer, 1980). At the same time, Fries and Crapo proposed the exact opposite theory, that the natural limit to human life expectancy would prevent future gains in term of years of life but that the postponement of the onset of chronic diseases to more advanced ages would lead to a compression of the period of morbidity (Fries, 1980; Fries and Crapo, 1981). Between these two extremes, Manton introduced the theory of dynamic equilibrium acknowledging a possible slowing down in the pace of progression of chronic diseases leading to an increase in the prevalence of light and moderate (but not severe) disability as mortality falls among the oldest old (Manton, 1982). Although the three theories offered three possible visions of the future, the first one, the pandemic of disability, was both the most feared and the most foreseen at the beginning of the 1990s.

In this context, there was a growing interest from policy makers and various public authorities in global health indicators that take into account both the quantity and the quality of life, such as disability-free life expectancy proposed by Sullivan as early as 1971 (Sullivan, 1971), or active life expectancy proposed by Katz and his colleagues in 1983 (Katz *et al*, 1983). But chronological series that allowed these demo-epidemiological changes to be monitored were still rare. Some calculations brought good news such as parallel increases in life expectancy and disability-free life expectancy, for instance in France. In 1997 several international agencies, including the G7 who gathered in Denver and the World Health Organization, recommended the calculation of various heath expectancies, including active life expectancy, to improve the relevance of health indicators and monitor the world health situation (G7, 1997; WHO, 1997).

At the end of the 1990s, the interest in the calculation of health expectancies was boosted by accumulation of new data on the oldest old and on human longevity. Firstly the number of centenarians was shown to be doubling every 10 years in low mortality countries since the end of World War II. Secondly, in several countries, female life expectancy at birth was approaching the value of 85 years, presented by Fries as the natural limit (Fries, 1980), and there did not appear to be any slowing down in the annual pace of increase of this life expectancy. These empirical data raised new questions about the length of human life and the shape of the survival curve. Again a crucial point was to know whether the compression of morbidity foreseen by Fries or the dynamic equilibrium anticipated by Manton could occur in such a context. What is the likelihood of a limit to the increase in the number of extremely old persons, frail and disabled, if human life span is not limited per se?

The four chapters of this first section examine these issues – which formed the background framework of the development of the health expectancies – from a historical and theoretical point of view. France Meslé and Jacques Vallin from the National Institute of Demographic Studies in France (INED) describe how life expectancy increased during the last decades of the 20th century in low mortality countries and discuss the impacts of this increase on the shape of the survival curve and its 'rectangularization'. Behind this odd word stands a measure of the heterogeneity/homogeneity of individual life duration. In the second chapter Wilma Nusselder from Erasmus University in the Netherlands describes in detail the occurrence of the compression of morbidity in low mortality countries. In the third chapter George Myers, Vicki Lamb and Emily Agree from Duke University and Johns Hopkins University in the United States put these new demo-epidemiologic facts in perspective and introduce the functional transition (disability) which explains how the occurrence (incidence), the level (prevalence) and the severity of disability change with the mortality changes associated with the demographic and epidemiologic transitions. Finally, Jean-Marie Robine, Isabelle Romieu and

Jean-Pierre Michel from the National Institute of Health and Medical Research in France (INSERM) and from the University of Geneva introduce and discuss the various chronological series of health expectancies. Thus together these four chapters present the context and the relevance of the health expectancy indicators to be examined in greater detail in the following sections.

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