Health expectancy indicators

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An outline is presented of progress in the development of health expectancy indicators, which are growing in importance as a means of assessing the health status of populations and determining public health priorities.

Voir page 184 le résumé en français. En la página 185 figura un resumen en español.

Data on life expectancy, infant mortality and the causes of death used to be seen as a sufficient basis for assessing population health status and determining public health priorities. As mortality rates decline and life expectancy increases, however, more and more questions arise about the quality of the years lived. The former indicators remain indispensable as there are still major inequalities in mortality between countries and between groups within countries. These indicators have yet to be acquired in some countries. Nevertheless, changes during the last 20 years have demonstrated the need for indicators of a new type, namely disability-free life expectancy, healthy life expectancy or active life expectancy. These provide information on the functional state and vitality of populations as well as on their quality of life, and they are appropriate for the epidemiological conditions of today.

The notion of health expectancy was introduced in the USA in the 1960s (*1*). In 1984, a general model of health transitions was proposed which distinguished between total survival, disability-free survival and survival without disabling chronic disease and led to the calculation of life expectancy, disability-free life expectancy and life expectancy without chronic disease (*2*). This model makes it possible to assess changes in mortality, morbidity and disability conditions simultaneously. Changes in the differences between the three indicators allows the occurrence of the different health scenarios proposed to be assessed: expansion of chronic diseases and disabilities, compression of morbidity, contradictory changes including the scenario of dynamic equilibrium, or postponement of all morbid events at older ages.

Most researchers working on the development of health expectancy calculations are now members of the *Réseau Espérance de Vie en Santé* (REVES). A first estimate of health expectancy, generally expressed as disability-free life expectancy, is available in many countries. An increasing number of countries have chronological series of health expectancies, which allow them to monitor changes in population health status. Health expectancies are increasingly used to assess changes in population health status, particularly in respect of older people. In each country the calculation of health expectancies makes it possible to estimate differences between men's and women's health and between socioeconomic categories or regions, and to observe the changes that occur.

The calculation of gains in health expectancy resulting from the elimination of specific pathologies makes it possible to define public health priorities in relation to the expected effects on life expectancy, disability-free life expectancy and time lived with disability. A health expectancy figure is the combination of a life expectancy figure with a concept of health which makes it possible to calculate the number of years lived in the different health states. Consequently, there are as many possible health expectancies as there are concepts of health. For example, we can introduce the notions of physical, mental or social well-being, models of disease consequences and disability processes, models of performance for daily living activities, or models of "successful ageing".

In 1994, REVES proposed a classification system of health expectancies based on the concepts of the international classifications of diseases (*3*) and their consequences (*4*), and on those of perceived health and adjustments to health (*5*). This makes it possible to distinguish between life expectancies with or without disease, life expectancies with or without impairment, and life expectancies with or without disability. It is also possible to distinguish life expectancies in good or bad perceived health. The table below shows how the different concepts of the classification system are used in China (*6*). Any other carefully defined health criterion allowing distribution of the years lived could be used to calculate a specific health expectancy.

Health expectancies can be calculated by "the observed prevalence life table method" (*7*), "the double decrement life table method" (*8*), or "the multistate life table" method (*9*). The first method is the most often used, as it requires currently available data. Its limits are increasingly well understood and simulations provide a useful means of assessing its imprecision.

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Health expectancies at age 65 according to the different concepts of health, China, 1987–1992 (years)

	Male		Female	
	1987	1992	1987	1992
Life expectancy	12.6	13.0	15.0	15.6
Disability-free life expectancy	9.0	—	10.2	—
Active life expectancy	9.6	11.9	11.5	13.7
Life expectancy in good perceived health	9.4	10.2	10.7	11.7
Life expectancy without disease	—	4.2	—	4.4

Source: Qiao X, 1997(*6*)

Analysis of main results

Health expectancy calculations have been made in 49 countries, most of them with developed market economies. Direct comparison of values for different countries is difficult because of the specific characteristics of national health surveys. However, the following observations can be made.

Differences between men and women

Most studies indicate that life expectancies and positive health expectancies are higher for females than for males, but the proportion of morbidity-free years to total life expectancy is slightly lower for females. The difference in life expectancy between the sexes is reduced when an estimate of health expectancy is produced. Results from studies using data from repeated wave surveys have suggested that the greater proportion of years lived with disability or handicap by women may be explained by the longer survival of women after the development of these problems.

Socioeconomic differences

Socioeconomic differences have been studied for nine countries. All but one of the studies have demonstrated that social inequalities in health are much greater than has been shown by differential mortality: not only are the poorest and the least educated people shorter-lived than others but they also experience a greater part of their lives with disability or handicap. This was first observed in Canada: the gap in life expectancy between the richest 20% and the poorest 20% in the community increased from 6.3 years for overall life expectancy to 14.3 years for disability-free life expectancy (*10*).

Finnish and Dutch studies have demonstrated socioeconomic inequalities by means of calculations for several educational levels. The higher the educational level, the higher both life expectancy and positive health expectancy. Calculations comparing different ethnic groups in the USA (*11*) show much lower life expectancies and disability-free life expectancies for black people than for Asian people.

Geographical comparisons within countries

In the United Kingdom, expected years of ill health have been computed for numerous local authorities in England and Wales, using data from the 1991 census. These calculations show that the places with the shortest life expectancies had the largest expected number of years of ill health (*12*). Thus there was a very strong relationship between short life expectancy and amount of morbidity.

Causes of handicap, disability and mortality

Disability-free or handicap-free life expectancies can be calculated after the elimination of specific pathologies, that is without taking into account the disability and the mortality associated with the pathologies. The gains in these life expectancies expressed in years allow a ranking of the causes of morbidity categorized by the theoretical effect of their elimination on both mortality and morbidity. The studies undertaken to date in this area show the important effect produced by eliminating osteoarticular diseases and accidents, the significance of which is just behind that of cardiovascular diseases in industrialized countries.

Data from the Netherlands for 1987–1988 indicate that while the elimination of fatal diseases leads to an increase in health expectancy it may also cause an increase in life expectancy with disability, thus increasing the burden of disability on society. On the other hand, the elimination of disabling non-fatal diseases results in a decline in life expectancy with disability. Thus the removal of certain causes of morbidity, for instance cancer, would strongly increase life expectancy without increasing disability-free life expectancy to the same degree. Consequently, there would be a substantial increase in life expectancy with disability. Conversely, the removal of non-lethal diseases, such as arthritis, would strongly increase disability-free life expectancy without changing total life expectancy, and would therefore reduce life expectancy with disability to a marked extent. Between these two extremes, the removal of both lethal and disabling diseases, such as heart diseases, would increase life expectancy and disability-free life expectancy in various proportions.

Change over time

A chronological series of handicap-free or disability-free life expectancies consists of at least two estimates based on surveys in which the same measures of handicap or disability and comparable samples have been used. If these conditions are fulfilled it is possible to make comparisons over time in a given study. Most authors now distinguish between life expectancy without severe handicap or severe disability on the one hand and life expectancy without handicap or disability, all levels of severity being combined, on the other.

Fig. 1 juxtaposes changes in total life expectancy and life expectancy without severe disability at birth for males in Australia, Canada, France, Japan and the USA. The oldest series begins in 1970 and the most recent ends in 1993. Life expectancy without severe disability roughly progresses in parallel with total life expectancy.

This appears to be the case whatever the country, the sex, the period of time studied or the indicator of severe disability considered. Thus, irrespective of the country considered, increase in total life expectancy does not reflect increase in time lived with severe disability. In some countries, a drastic decrease in the number of years lived with severe disabilities has been demonstrated.

Fig. 2 juxtaposes the evolution of total life expectancy and life expectancy without disability for males at birth, with all levels of severity combined, in Australia, Canada, France, Germany, United Kingdom and the United States. The series range from 1970 to 1995. Analysis of the oldest series indicates that life expectancy without disability is stagnating. However, whereas the series for Canada and the United Kingdom still suggest that disability-free life expectancy is stagnating, those for France, Germany and the USA show that disability-free life expectancy is increasing and the Australian series continues to indicate a decrease. A similar picture emerges for females at birth. No general conclusion is therefore possible for this disability level.

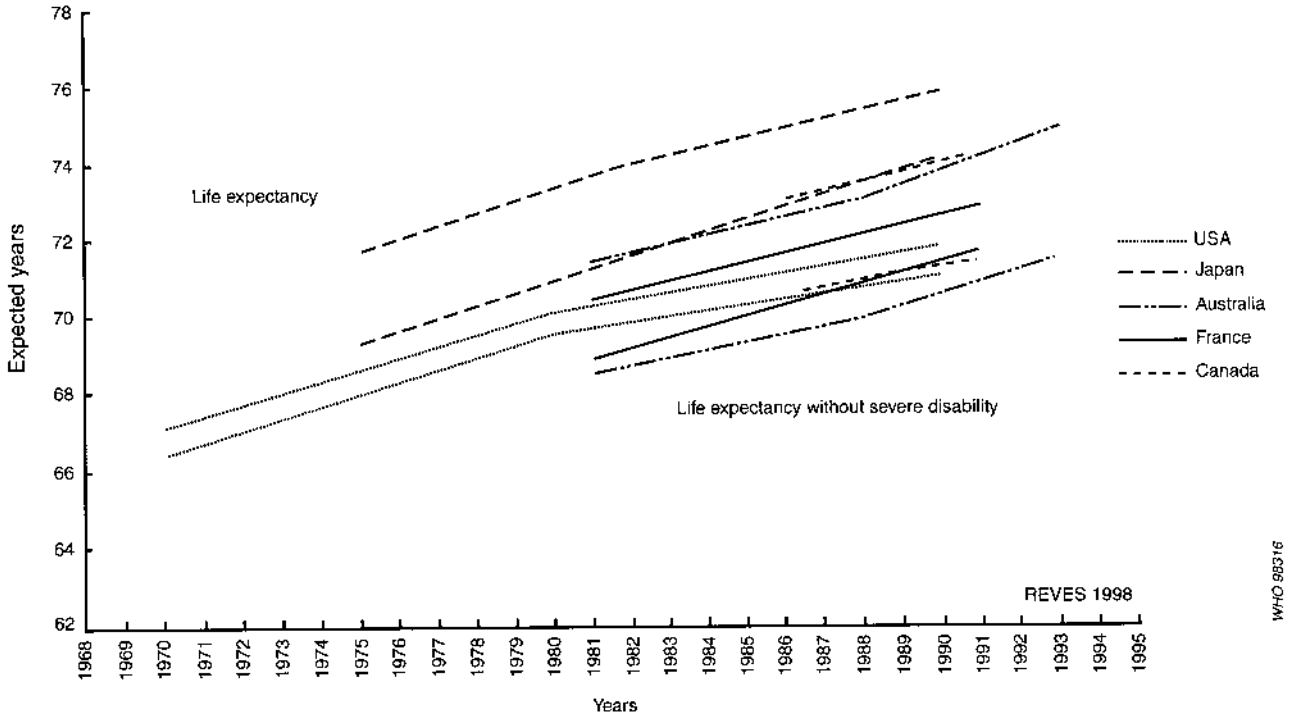
The studies reviewed show that increased life expectancy is not accompanied by an increase in the time spent with severe handicap or severe disability. At worst there may be a pandemic of light and moderate handicaps or disabilities. This tends to confirm the theory of dynamic equilibrium, which partly explains increased life expectancy in terms of a slowing down in the rate of progression of chronic diseases. Thus, although a decline in mortality can lead to an increase in the prevalence of handicaps or disabilities, these are less severe than would otherwise be the case. The theory of dynamic equilibrium is again illustrated in France, where increased life expectancy between 1981 and 1991 was accompanied by a parallel increase in disability-free life expectancy but life expectancy without chronic disease remained constant (*13*).

The studies reviewed demonstrate the policy relevance of the health expectancy indicators. It becomes possible to assess whether increased life expectancy is accompanied by a diminution in morbidity or an increase in disability. Irrespective of the country considered, increased life expectancy is evidently not accompanied by an increase in the time lived with severe disability.

Health expectancies make it possible to specify inequalities between social groups, regions in a country, and the sexes. It is increasingly clear that a very strong relationship exists between short life expectancy and amount of morbidity. There is little evidence of a trade-off between quantity and quality of life. In almost all the situations studied, life expectancy and disability-free or handicap-free life expectancy are positively associated.

It is also possible to determine priorities in health policy through the calculation of potential

Fig. 1. **Changes in life expectancy and life expectancy without severe disability for males at birth in five countries**

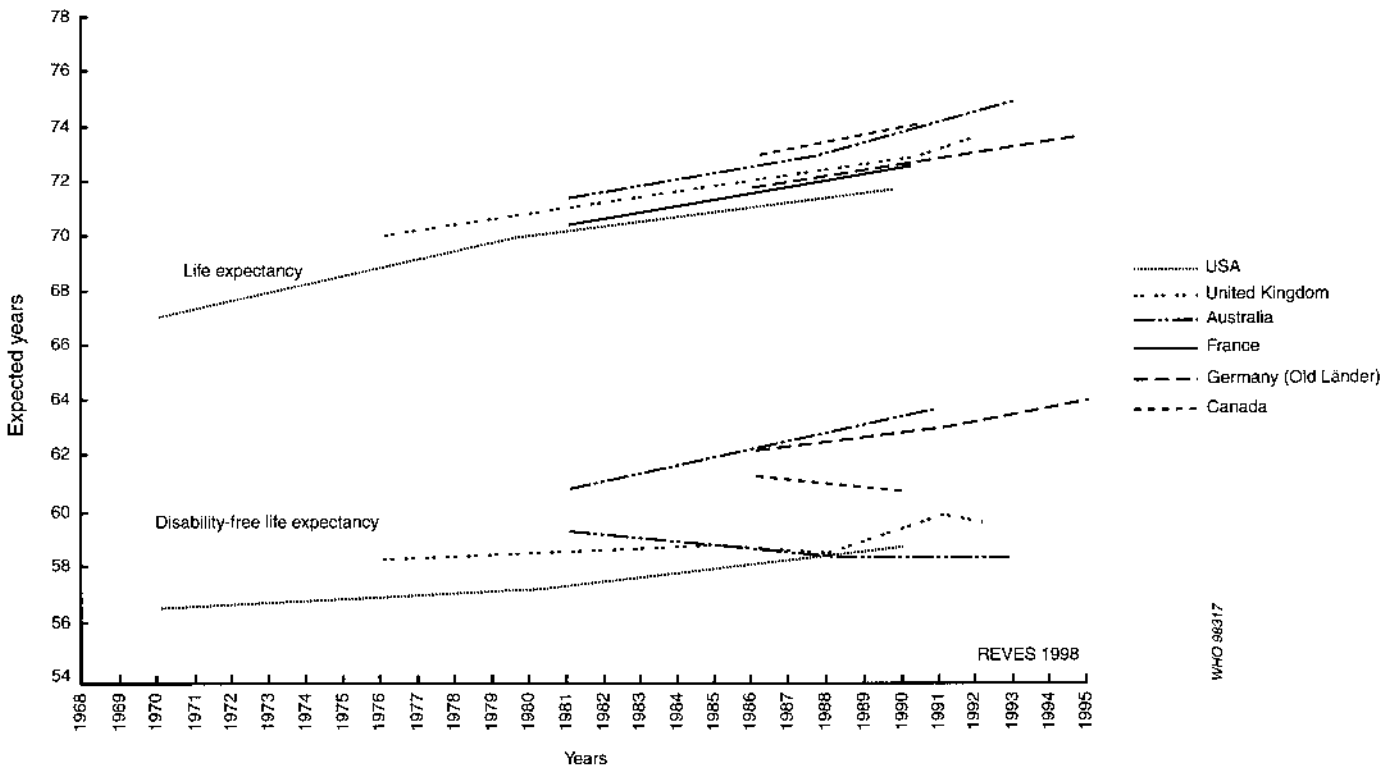


Sources: Compiled by the authors from data published separately by Crimmins, Inoue et al., Mathers, Robine & Mormiche, and Wilkins et al.

gains in health expectancy deriving from the elimination of different causes of morbidity. Such calculations distinguish between gains in mortality and gains in morbidity or disability, and thus show whether the elimination of one or another pathology can be expected to reduce or increase overall morbidity. For example, the elimination of osteo-articular diseases could be expected to produce important gains in health expectancy, comparable to those resulting from the elimination of cardiovascular diseases. It also becomes apparent that the elimination of osteo-articular diseases significantly increases disability-free life expectancy without influencing total life expectancy, and thus decreases the burden of disease.

However, direct international comparisons based on health expectancy indicators are often impossible because of the specific characteristics of national health surveys with regard to protocol or question formulation. To overcome this difficulty, an international measure of disability is required. ■

Fig. 2. **Evolution of life expectancy and disability-free life expectancy — all disability levels combined — at birth for males in six countries**



Sources: Compiled by the authors from data published separately by Crimmins et al., Bone at al., Mathers, Robine & Mormiche, Brückner, and Wilkins et al.

Résumé

Indicateurs de l'espérance de santé

Les indicateurs de l'espérance de santé sont de plus en plus utilisés pour étudier l'évolution de l'état de santé des populations. Ils permettent de montrer que la récente augmentation de l'espérance de vie dans les pays les plus développés ne s'accompagne pas d'une augmentation du temps vécu avec des incapacités ou des handicaps sévères. Au pire, on observe une pandémie des incapacités ou handicaps légers ou modérés. Ces indicateurs permettent également d'étudier les inégalités de santé entre les groupes sociaux, entre les régions d'un pays, entre les sexes, etc. : l'espérance de vie et l'espérance de vie sans incapacité ou sans handicap sont le plus souvent positivement associées. En évaluant simultanément les gains au regard de la mortalité, de la morbidité ou de l'incapacité, le calcul théorique des gains d'espérance de vie par élimination de différentes causes de morbidité permet de dégager des priorités pour les politiques de santé publique. Ainsi, l'élimination des maladies ostéo-articulaires pourrait produire d'importants gains d'espérance de vie sans incapacité, l'espérance de vie totale demeurant inchangée.

Resumen

Indicadores de la esperanza de salud

Los indicadores de la esperanza de salud se utilizan cada vez más para estudiar la evolución del estado de salud de la población. Permiten mostrar que el reciente aumento de la esperanza de vida registrado en los países más desarrollados no ha ido acompañado de un aumento del tiempo vivido con discapacidades o minusvalías graves. En el peor de los casos se observa una pandemia de discapacidades o minusvalías leves o moderadas. Estos indicadores permiten asimismo estudiar las desigualdades en materia de salud entre grupos sociales, entre regiones de un país, entre los sexos, etc.: la esperanza de vida y las esperanzas de vida sin discapacidad o sin minusvalía guardan entre sí las más de las veces una correlación positiva. Evaluando simultáneamente los avances conseguidos en materia de mortalidad, morbilidad o discapacidad, el cálculo teórico de la elevación de la esperanza de vida realizado eliminando diferentes causas de mortalidad permite establecer prioridades para las políticas de salud pública. Así, cabe prever que la eliminación de las enfermedades osteoarticulares dé lugar a importantes aumentos en la esperanza de vida sin discapacidad, sin que ello influya en la esperanza de vida total.

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