

Introduction:

A Global Revolution in Life Expectancy

At the end of the twentieth century everyone could not expect to live an extended life, but humankind had moved closer to that goal than ever before. In 1800, with nearly one billion people alive, life expectancy at birth did not surpass thirty years. By 2000, with more than six billion people alive, life expectancy reached nearly sixty-seven years amidst a continuing rise. This is the crowning achievement of the modern era, surpassing wealth, military power, and political stability in import. Mindful of the effects of declining fertility and optimistic about the future course of survivorship, U.N. demographers project that the global average for males and females will rise from sixty-seven years at the end of the twentieth century to seventy-six years in the middle of the twenty-first century.¹

This dramatic change is called the “health transition,” in which humankind acquired an expectation of living to be old. These longer lives contributed to population growth, adding people who in earlier periods died at younger ages. Because death rates at ages above sixty-five did not

¹ United Nations Secretariat, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 1998 Revision*, 2 vols. (New York, 1998), I: 547.

Rising Life Expectancy

decline until late in the health transition, these longer lives initially filled the ranks of every population with people living in their most economically productive years, 15–64. Prior to the health transition more than half of all people died before reaching adulthood. In some countries and regions more than half died before they reached age ten. Generalized survival to old age also modified the emotions of life, making death in infancy, childhood, and youth an uncommon thing and causing the modal age of death to jump from infancy to older adulthood. In the longer run, during the second half of the twentieth century, these longer lives added vastly to the quantity and proportion of people of advanced age, who possess the wisdom of experience. In 1800, people aged sixty-five and higher made up less than 5 percent of most populations; by 2000 their share had tripled to 15 percent in high life expectancy societies.

The scale of rising life expectancy can most readily be grasped by examining a rectangle, which depicts the space of life and sets of survival curves within it. Each curve begins with a full population of people born alive and diminishes as people die. The rectangle itself extends to the age to which we can imagine any people might survive. For most of human history our imagination has been limited by the age of the oldest person we know. The older limit could be set at seventy years, following the pronouncement in Psalms 90:10. It could be fixed at eighty-five years, which has sometimes been described as the maximum age to which populations can aspire to survive. Recently it has often been put at 100 or 110 years: increasing numbers of people now live to be 100, though very few live past 110. Now, on the strength of the promised discovery of the genes responsible for specific diseases and learning that will show how to modify these genes and how to manipulate proteins that cause cell destruction, some set the older limit at 150 years.²

² S. Jay Olshansky, Bruce A. Carnes, and Christine Cassel, “In Search of Methuselah: Estimating the Upper Limits to Human Longevity,” *Science* 250 (1990): 634–40.

Introduction

Four sets of curves appear in the panels of Figure I.1a–d. Figures I.1a and I.1b show the survival of French females in the 1740s and 1996 and life expectancy in each period. Figure I.1c shows the survival of Japanese females in 1891–98, 1947, and 1996, and Figure I.1d the survival of Indian females in 1901 and 1993.³ These figures show some interesting and important things. First, they distinguish between the lived portion of the space of life, below each curve, and the unlived portion, above each curve. Compare the meager segment of the rectangle represented by survivorship before the health transition began in France or India with the much larger segment of recent years. Second, little progress was made at extending the lived portion before the eighteenth century, when the health transition began, but rapid progress has been made since then. Third, these figures show that survival prospects have improved at every age, from infancy to the oldest ages.⁴ The gain in infancy has been the largest, but every age has benefited. Fourth, the unlived space, which has been pushed toward the upper right corner in each, remains large. If it is true that we can realistically imagine people in general living to be 100 or 110, then much of the transition remains to be completed.

³ Here survival refers to a theoretical rather than an actual population. In an actual population the survival prospects of people at each age are known only when they live through that age. The life table, which reports the risk of death at each age for the current population, makes it unnecessary to wait until the people born in the same period have all died in order to estimate their life expectancy. The principal weakness of this approach is that it tends to understate the effect of changes under way. During the health transition survival rates rose and life expectancy calculated by means of the life table understated the average age to which people actually lived. Demographers also build cohort life tables, which show actual survival prospects for a group of people born at the same time. Of necessity, cohort tables cannot be constructed in full until the entire cohort has died.

⁴ Jacques Vallin, “La mortalité en Europe de 1720 à 1914: Tendances à long terme et changements de structure par sexe et âge,” *Annales de démographie historique* (1989): 31–54; and, for the twentieth century, Graziella Caselli, “National Differences in the Health Transition in Europe,” *Historical Methods* 29 (1996): 107–25.

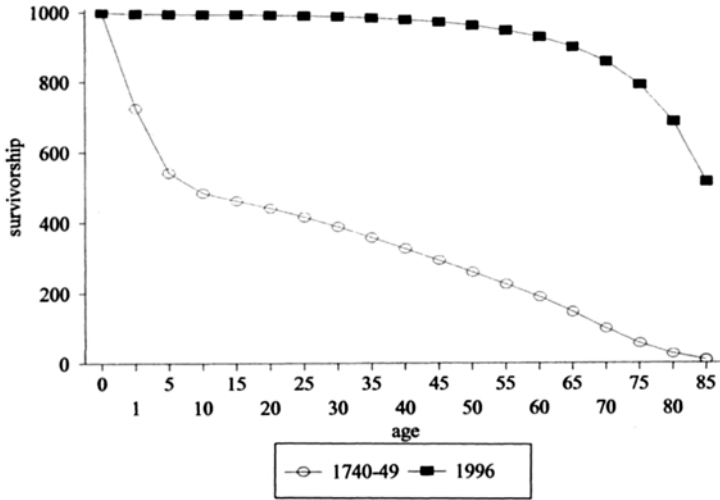


Figure I.1a. France: Survival curves for females. *Source:* Yves Blayo, “La mortalité en France de 1740 à 1829,” *Population* 30, Special Number (1975): 141; *Annuaire statistique de la France*, vol. 102 (Paris, 1999), pp. 84–85.

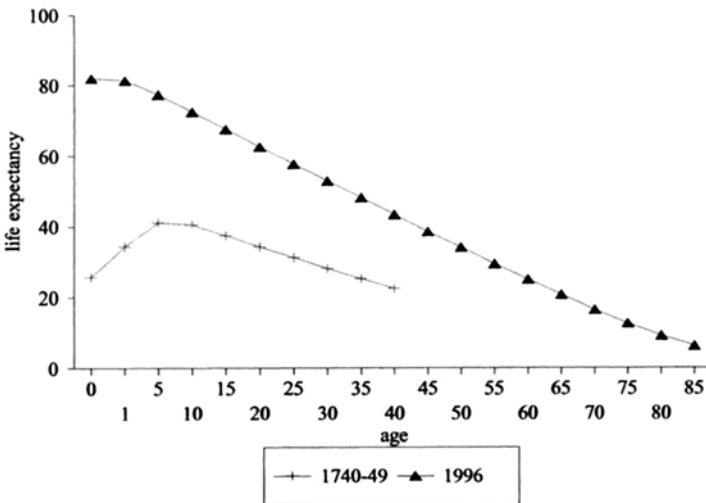


Figure I.1b. France: Life expectancy, females. *Source:* See Fig. I.1a.

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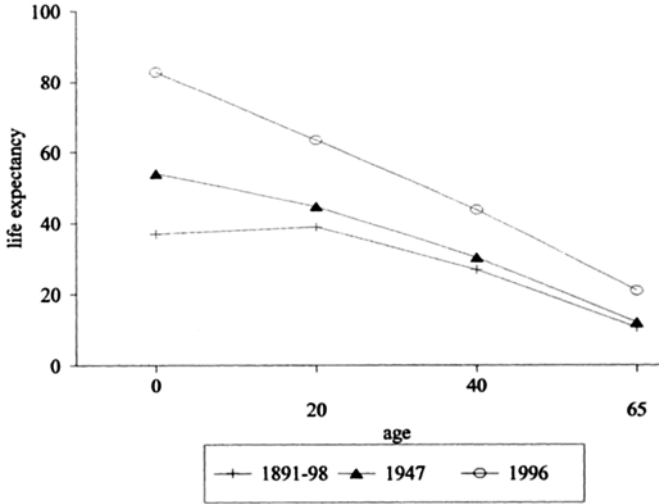


Figure I.1c. Japan: Life expectancy, females. *Source:* www.mhw.gp.jp/english/database/lifetb/part7.html, which gives official values from abridged life tables; Haruo Mizushima, "Reformation of Early Life Tables for Japan," *Minzoku Eisei* 28 (1962): 64-74 (in Japanese).

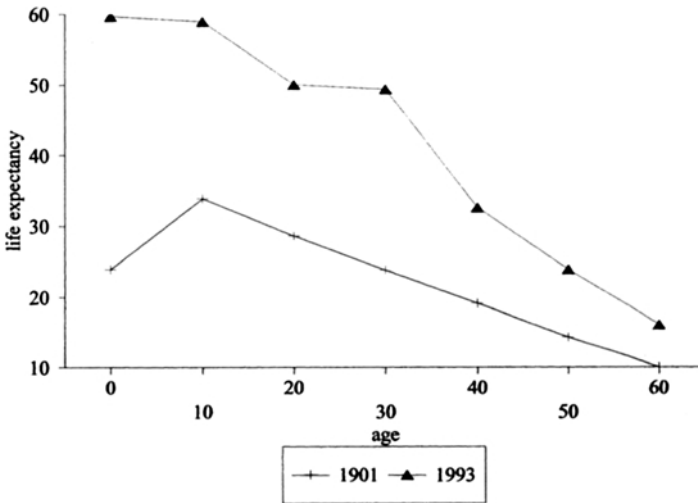


Figure I.1d India: Life expectancy, females. *Source:* *Statistical Abstract India 1997* (New Delhi, 1990), p. 51.

Rising Life Expectancy

On this evidence one might argue for the image of revolution rather than transition in survival since 1800. Why, then, is it called the health transition?

The History of This History

A comparatively new term,⁵ *health transition* describes the reduction of mortality in the long run. Historians often use the term *revolution* to describe changes as momentous and, on the scale of human history, as concentrated in time as the health transition. But the modern rise of life expectancy lacks the dramatic origin that usually accompanies such a usage. Whereas the industrial revolution can be said to have begun with sharp productivity gains in the manufacture of cotton textiles in Britain and Belgium before 1800, the health transition has no well-defined beginning point. It, too, was under way by 1800, but the discovery of a period or a country where it began is a quite difficult matter. The health transition also lacks singularity, or at least simplicity, in the means by which it was achieved. From the beginning, different regions and different countries advanced life expectancy by using their own tactics or combinations of tactics.

Many phrases, including “vital revolution,” “mortality transition,” and “mortality decline,” have been used to describe the modern rise of

⁵ Monroe Lerner, “Modernization and Health: A Model of the Health Transition,” paper presented at the American Public Health Association Conference, San Francisco, 1973, seems to have used the term first, but did not win acceptance of it. On the broader meaning of the term, see Julio Frenk et al., “Elements for a Theory of the Health Transition,” in Lincoln Chen, Arthur Kleinman, and Norma C. Ware, eds., *Health and Social Change in International Perspective* (Boston, 1994), pp. 25–49; W. Henry Mosley et al., “The Health Transition: Implications for Health Policy in Developing Countries,” in Dean T. Jamison et al., eds., *Disease Control Priorities in Developing Countries* (Oxford, 1993), pp. 673–99; and the journal *Health Transition Review*, which began publication in 1991.

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Introduction

life expectancy. The term *health transition* links changes in mortality to those in morbidity, or sickness, and to the modern decline of fertility. Thus this phrase associates survival and health with the demographic transition, the movement from high mortality and fertility to low. By focusing on causes of death and sickness, it suggests a strong link between demography and epidemiology. It also reveals the incomplete nature of this change. Even though already two centuries old, the health transition has not yet stopped and probably will not stop for many decades to come. It is an ongoing thing that we manipulate and manage with great variations in skill. Much of the most helpful recent scholarly writing has focused explicitly on the problem of setting an agenda and on the task of discovering how to use past human experience in the health transition to serve better health in the future.⁶

The health transition was under way by 1800, but for a long time it was noticed more readily in individual countries than as an international, and eventually a global, development. By the early twentieth century observers understood that death rates had fallen in much of Europe and North America, but, until the 1950s, interest in the history of the mortality decline developed slowly. Since then scholars from many disciplines – especially history, demography and historical demography, medicine and medical history, public health, epidemiology, biology, anthropology, economics, and sociology – have sought to understand the history and the present development of mortality change. A huge literature has

⁶ In addition to the sources cited below in this chapter, see Samuel H. Preston, “Causes and Consequences of Mortality Decline in Less Developed Countries during the Twentieth Century,” in R. A. Easterlin, ed., *Population and Economic Change in Developing Countries* (Chicago, 1980), pp. 289–360; Jacques Vallin, “Theories of Mortality Decline and the African Situation,” in Etienne van de Walle, Gilles Pison, and Mpenbele Sala-Diakanda, eds., *Mortality and Society in Sub-Saharan Africa* (Oxford, 1992); Michael Alderson, *International Mortality Statistics* (New York, 1981); Evelyn Thiltgès, Josianne Duchêne, and Guillaume Wunsch, “Causal Theories and Models in the Study of Mortality,” in Alan D. Lopez, Graziella Caselli, and Tapani Valkonen, eds., *Adult Mortality in Developed Countries: From Description to Explanation* (Oxford, 1995), pp. 21–36.

Rising Life Expectancy

appeared. Perhaps no other topic has drawn so much multidisciplinary interest or so much discussion and learning across the ordinary boundaries of disciplines.

As is usually the case with historical dramas, the scholars of the 1950s already had some ideas about why death rates had declined. At that point most of the available information was national, and most explanations referred to leading developments in specific countries. The attempt to test explanations that seemed to account for change in one country by making explicit comparisons across countries began with a United Nations publication in 1953. There the health transition is described as a process occurring in stages with the important causative factors shifting from stage to stage. Before 1850 a higher standard of living, manifested in nutrition and better housing and clothing, enhanced survival; between 1850 and 1900 sanitary projects played the leading part; after 1900 a combination of factors came into play: economic development, public health, and biomedicine. George Stolnitz added an influential article in two parts in 1955–56 in which he stressed disease control more than economic development and called attention to the global nature of the health transition. Both approaches sought to generalize the problem by pointing out the degree to which different circumstances in another country require a re-assessment of explanations offered for one country. But neither essay managed to divert scholars from attending first to national cases and leading factors.⁷

⁷ United Nations, *The Determinants and Consequences of Population Trends* (New York, 1953); United Nations, *Population Studies, Age and Sex Patterns of Mortality: Model Life Tables for Under-developed Countries* (New York, 1955); and George J. Stolnitz, "A Century of International Mortality Trends," *Population Studies* 9 (1955): 24–55, and 10 (1956): 17–42. See also George J. Stolnitz, "International Mortality Trends: Some Main Facts and Interpretations," *The Population Debate: Dimensions and Perspectives*, 2 vols. (New York, 1974), I: 220–36; United Nations and World Health Organization, *Levels and Trends of Mortality since 1950* (New York, 1982); United Nations, "Mortality and Health," in *World Population Trends and Policies* (New York, 1988), pp. 116–73; H. O.

Introduction

One of these national investigations in particular, Thomas McKeown's study of England and Wales, stimulated scholarly interest in the health transition. After having suggested in an earlier series of articles that public health improvements played a large part in reducing death rates in nineteenth-century England, McKeown changed his mind. Breaking down diseases causing death by their modes of transmission, he found reasons to continue to reject a medical explanation and to downgrade the public health explanation. In their place McKeown argued that a rising standard of living, especially better nutrition, mattered most. Assuming that nutritional status regulates susceptibility to disease, McKeown maintained that better nutrition helped people resist disease. His 1976 book, *The Modern Rise of Population*, has remained an influential study, with two leading effects. First, it promotes the idea that modernization, especially economic modernization, played a central role in the health transition. According to this view, populations and societies needed to develop their political, legal, and economic institutions in certain ways as a foundation for other kinds of change.⁸ Modernization gets credit for having improved the standard of living and nutrition. Indeed, in McKeown's approach modernization seems to be a prerequisite for mortality decline. Second, McKeown concentrated on nineteenth-century England and Wales; his work helped focus scholarly attention on Britain, especially on nineteenth-century England.⁹ Although scholars writing about England's health

Lancaster, *Expectations of Life: A Study in the Demography, Statistics, and History of World Mortality* (New York, 1990); Kenneth F. Kiple et al., *The Cambridge World History of Human Disease* (Cambridge, 1993); and World Bank, *World Development Report 1993: Investing in Health* (Oxford, 1993).

⁸ For example, modernization means limitation on the powers of monarchs and imperial rulers, such as exercised in England and Wales by Parliament.

⁹ Thomas McKeown, *The Modern Rise of Population* (London, 1976). McKeown also related his findings to some other countries in Thomas McKeown, R. G. Brown, and R. G. Record, "An Interpretation of the Modern Rise of Population in Europe," *Population Studies* 26 (1972): 345–82.

Rising Life Expectancy

transition have often criticized McKeown's interpretation, those writing about rising survivorship elsewhere have often accepted that interpretation as the reigning paradigm for England and other countries, too. McKeown's interpretation suggests that the most important short-term relief measure for people facing high death rates is to augment their diets. The most effective long-term measure is to promote economic development and the capacity to buy food on favorable terms. Two of the questions that can be kept in mind while reading the chapters that follow derive from McKeown's work. Did improvements in nutrition play a major role in the retreat of early death in nineteenth-century Britain and Europe? Can McKeown's interpretation of the nineteenth-century British mortality decline be generalized to other places and times?

McKeown's writings attracted more initial interest than did a 1971 article by Abdel Omran depicting the mortality decline as an epidemiologic transition.¹⁰ Using an implicitly comparative approach, Omran described the health transition as a series of sea changes in the leading causes of death, moving from an era of pandemic infectious diseases to an era in which chronic organ diseases dominate all causes of death. By calling his

¹⁰ Abdel Omran, "The Epidemiologic Transition: A Theory of the Epidemiology of Population Change," *Milbank Memorial Fund Quarterly* 49 (1971): 509–38; Omran, "The Epidemiologic Transition Theory: A Preliminary Update," *Journal of Tropical Pediatrics* 29 (1983): 305–16; S. J. Olshansky and A. B. Ault, "The Fourth Stage of the Epidemiologic Transition: The Age of Delayed Degenerative Diseases," *Milbank Memorial Fund Quarterly* 64 (1986): 355–91; and J. C. Riley and George Alter, "The Epidemiological Transition and Morbidity," *Annales de démographie historique* (1989): 199–213.

Ronald Bennett et al., "Emerging and Re-emerging Infectious Diseases: The Third Epidemiologic Transition," *Annual Review of Anthropology* 27 (1998): 247–71, recast Omran's ideas. For an earlier version of epidemiologic transition theory, see Odin W. Anderson and George Rosen, *An Examination of the Concept of Preventive Medicine* (New York, 1960). Still useful for understanding the frequency and the array of communicable diseases is Charles Creighton, *A History of Epidemics in Britain*, 2 vols. (Cambridge, 1891–94). Judith Wolleswinkel-van den Bosch, *The Epidemiological Transition in The Netherlands* (n.p., 1998), provides a recent literature review.