

**Bibliography of Works Providing Estimates of Life Expectancy at Birth  
and Estimates of the Beginning Period of Health Transitions in  
Countries with a Population in 2000 of at Least 400,000**

Compiled by James C. Riley

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## Introduction

This compilation of more than 700 sources lists works by hundreds of scholars in reconstructing life expectancy in the past and the recent period. It identifies sources employed for two essays published in 2005, "Estimates of Regional and Global Life Expectancy, 1800-2000," *Population and Development Review* 31 (3) and "The Timing and Pace of Health Transitions around the World," *Population and Development Review* 31 (4). Abstracts for these essays appear below.

Scholars may find this list useful as a starting point for research into the history of survivorship in individual countries. On that matter there is still much to be learned, especially for countries outside Western Europe. But my particular hope is that these sources, and others that may be added to this list, will stimulate work on the comparative history of survivorship and factors that advanced or retarded gains in life expectancy in groups of countries or among all countries. There is much yet to be learned about why so many countries still lag in life expectancy, and about why some subpopulations within high survival countries do not enjoy the same advantages in survival as more favored groups.

My initial goal in consulting these sources was to identify all the countries that could be considered to combine high life expectancy with low income levels, and to build a picture of life expectancy change over time in those countries. That work led me to study life expectancy gains in Jamaica, a country not previously considered to have combined good health and low income, and to write a book-length study of a dozen countries that share the experience of making rapid and impressive gains in life expectancy before becoming either middle or high-income lands.<sup>1</sup>

The research was eased and simplified by two things. First, the late George Stolnitz, in cooperation with Indiana University librarians, had assembled a rich collection of material on mortality that was readily available to me. Second, electronic bibliographic tools simplify the search for books and essays. I am grateful for the cooperation of IU librarians in obtaining additional material not already in our collections.

Yet I have no doubt that this bibliography is incomplete. The directors of the Human Life-Table Database, who agreed to provide a home for this list, have consented also to let me make additions as readers alert me to sources that should be included. Please send suggestions to me at [rileyj@indiana.edu](mailto:rileyj@indiana.edu), or to me at this address: History Department, Indiana University, Bloomington, IN 47405, USA.

The table of contents reveals the organization of this list. A brief summary of each country's history of survivorship precedes the list of sources used to build that

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<sup>1</sup> James C. Riley, *Poverty and Life Expectancy: The Jamaica Paradox* (Cambridge, 2005). A manuscript dealing with twelve countries is now under review.

picture and to assemble the quantitative evidence behind the two essays mentioned above. These summary histories focus on identifying the period during which a country began its health transition, a term used here to describe persistent and sustained but not uninterrupted gains in life expectancy. Those beginning periods and the levels of life expectancy in them are summarized in Appendix 1 of "The Timing and Pace of Health Transitions around the World." The countries themselves have been grouped in five regions: Africa, the Americas, Asia, Europe, and Oceania.

Reconstructions of life expectancy often disagree with one another. The different methods that demographers have used sometimes produce conflicting results, the quality and quantity of statistical data available for examination varies, and expectations differ. Researchers working in roughly the period 1950-1975 apparently expected to find lower levels of life expectancy in the past and present than researchers working in more recent years. In deciding which life expectancy estimates to use, I have often taken more recent work to supersede earlier work. That approach biases estimates upward, especially for the years since about 1950. Since so many agencies provide estimates of life expectancy for the period since 1950, I concentrated my search for sources on the earlier period, and especially on the periods during which each country's health transition might have begun. I accepted and have used World Bank and UN estimates of life expectancy since 1950 for countries for which there is little reliable evidence, but I suspect that those estimates are often too high.

Sometimes it proved impossible to choose between two or more versions of the life expectancy history of a country. Those cases are mentioned in the brief summary histories of each country.

For countries for which quantitative evidence is limited, it is often difficult to make firm estimates of life expectancy or to specify the period when the health transition began. Readers will notice that I have often used an estimate above 30 years to suggest that gains in survival may have begun in an earlier period. That is, of course, a rough estimate; when made it assumes that a country belongs to the large group of pre health transition countries with comparatively low life expectancy, between 20 and 30 years, rather than to the small group of countries known to have had expectancies above 30 years for much of the pre transition era.

This list includes sources for the estimates that I did not adopt. Thus any researcher can test my conclusions and choices by going back over the same material I examined. I hope this bibliography will prove useful for that purpose, as a convenient place to begin research on the history of life expectancy, and as a stimulus to the comparative study of controlling hazards to survival.

**abstracts:**

**"Estimates of Regional and Global Life Expectancy, 1800-2000"**

Historians and demographers have gone to considerable trouble to reconstruct life expectancy in the past in individual countries. This essay collects information from a large body of that work and links estimates for historical populations to those provided by the United Nations, the World Bank, and other sources for 1950-2001 to produce a picture of regional and global life expectancy at birth for certain years from 1800 to 2001.

**"The Timing and Pace of Health Transitions around the World"**

This essay assembles estimates from some 700 mostly national studies of survival in the past to create a broad picture of regional and global life expectancy gains across space and time, and to examine some implications of that picture. At the initiation of their health transitions most countries had a life expectancy between 25 and 35 years. Countries that began later made gains at a faster pace, which is well known. Those faster gains are usually associated with the dissemination of western medicine. But rapid gains occurred in the period 1920-1950, largely before the availability of antibiotics or the modern vaccines. Especially rapid gains came in the years immediately after World War II in countries where the leading causes of death were communicable diseases that could be managed with antibiotics as well as in countries where the leading causes of death were degenerative organ diseases. Both periods of rapid gain await satisfactory explanation.

**Acknowledgments:** This work was a byproduct of research supported by the National Endowment for the Humanities, the Agency for Healthcare Research and Quality, the Council for International Exchange of Scholars under its New Century Scholars program, and Indiana University. I am grateful for that support and for the assistance with translations given by a number of scholars and graduate students. I am grateful also to the editors at *Population and Development Review* for finding a home for this list of sources, and to Vladimir Shkolnikov and John Wilmoth, directors of the Human Life-Table Database, for providing that home.

**Sources used repeatedly, with abbreviations:**

- Arriaga 1968 Arriaga, Eduardo E. 1968. *New Life Tables for Latin American Populations in the Nineteenth and Twentieth Centuries*. Berkeley.
- B'Chir and Tabutin 1980 B'Chir, Mongi and Dominique Tabutin. 1980. "La mortalité au Maghreb," *Revue tunisienne des études de population* 1: 3-31.
- Brass et al. 1968 William Brass et al. 1968. *The Demography of Tropical Africa*. Princeton.
- Chesnais 1992 Chesnais, Jean-Claude. 1992. *The Demographic Transition: Stages, Patterns and Economic Implications: A Longitudinal Study of 67 Countries Covering the Period 1720-1984*. Trans. By Elizabeth and Philip Kreager. Oxford.
- Condé 1973 Julien Condé. 1973. *Some Demographic Aspects of Human Resources in Africa*. Paris.
- HMD The Human Mortality Database at [www.mortality.org](http://www.mortality.org)
- Mitchell EHS 1981 Mitchell, B. R. 1981. *European Historical Statistics 1750-1975*. 2<sup>nd</sup> ed. rev. New York.
- Mitchell IHS 1995 Mitchell, B. R. 1995. *International Historical Statistics: Africa, Asia & Oceania 1750-1988*. 2<sup>nd</sup> ed. New York.
- Pérez Brignoli 1989 Pérez Brignoli, Héctor. 1989. *El crecimiento demográfico de America Latina en los siglos XIX y XX: Problemas, metodos y perspectivas*. San Jose.
- UN#55 United Nations. 1955. Population Division. Working Papers No. 55. *Selected World Demographic Indicators by Countries, 1950-2000*. n.p.
- UNDY1967 United Nations. 1968. *Demographic Yearbook 1967*. New York.
- UNDYHS United Nations. 2000. *Demographic Yearbook: Historical Supplement, 1948-1997*. New York. CD-ROM.
- UNL&T1982 United Nations. 1982. Department of International Economic and Social Affairs, *Levels and Trends of Mortality since 1950*. New York.
- UNSDiv United Nations. Statistics Division, Demographic, Social and Housing Statistics. At <http://unstats.un.org/unsd/demographic/social/health.htm>, accessed 3/22/2004.
- WDI 2002 World Bank. 2002 *World Development Indicators 2002 on CD-ROM*. Washington.
- WDI 2004 World Bank. 2004 *World Development Indicators 2004 on CD-ROM*. Washington.

## AFRICA

### Algeria

Kateb (1998) reports survival improving among Europeans in Algeria from the 1890s. *Enquête* (1980) finds mortality in decline from the beginning of the 20<sup>th</sup> century. Negadi, Tabutin, and Vallin (1974) and Condé (1973) suggest decline as early as the 1920s. But Vaidyanathan and Al-Baradie (1982) and Fargues (1986) trace mortality decline to the period after World War II. Estimates of crude death rates provided by Negadi, Tabutin, and Vallin indicate that the health transition probably began in the 1930s, when life expectancy was about 31.2 years, but was interrupted by European armies fighting in Algeria during World War II and again in 1956-60 by the Algerian war. In each case the mortality decline seems to have resumed at or toward the level achieved before the interruption, which is an important clue that gains began earlier.

- UNDYHS; WDI 2002; UN#55; Condé 1973; B'Chir and Tabutin 1980  
*Enquête sur la mortalité infantile et juvénile à Alger, 1974-1975*. 1980. Alger.  
Fargues, Philippe. 1986. "Un siècle de transition démographique en Afrique méditerranéenne 1885-1985," *Population* 41: 205-32.  
Good, Dorothy. 1961. "Notes on the Demography of Algeria," *Population Index* 27: 3-32.  
Kateb, Kamel. 1998. "L'espérance de vie à la naissance et la surmortalité féminine en Algérie en 1954," *Population* 53: 1209-26.  
Negadi, G., D. Tabutin, and J. Vallin. 1974. "Situation démographique de l'Algérie," in A. M. Bahri, et al., *La population de l'Algérie*. n.p., pp. 16-62.  
Tabutin, Dominique. 1976. *Mortalité infantile et juvénile en Algérie*. Paris.  
Vaidyanathan, K. E., and Hussein Al-Baradie. 1982. "Trends and Differentials of Mortality in Algeria," in Cairo Demographic Centre Research Monograph Series No. 8, *Mortality Trends and Differentials in Some African and Asian Countries*. Cairo, pp. 77-123.  
Vallin, Jacques. 1975. "La mortalité en Algérie," *Population* 30: 1023-46.  
Zachariah, K.C., M. Al-Molla, and A. Al-Ayat. 1970. "Basic Demographic Measures of Algeria," in Cairo Demographic Centre, *Demographic Measures and Population Growth in Arab Countries*. Cairo, pp. 1-25.

### Angola

Carvalho (1979) estimates life expectancy for Africans (98% of the populace) in 1940 at 27 years. That and UN estimates suggest that sustained improvements in life expectancy began in the 1940s or 1950s, probably in the late 1940s. Life expectancy peaked in the early 1990s, and then declined.

- UNL&T1982; WDI 2002; UNDYHS  
Carvalho, Carlos A. da Costa. 1979. *La population noire de l'Angola: Évolution, structures, mortalité et fécondité, nuptialité, perspectives*. Lisbon.  
Heisel, Don F. 1968. "The Demography of the Portuguese Territories: Angola, Mozambique, and Portuguese Guinea," in Brass et al. 1968, pp. 440-61.

## **Benin**

Available estimates (UNDYHS; UN#55) are consistent enough to locate the starting point for gains in survival in the late 1940s or 1950s, and to give a beginning level of about 31 years. Life expectancy peaked around 1997 at some 53.4 years and has since retreated.

UN#55; WDI 2002; UNDYHS

## **Botswana**

The earliest estimates of life expectancy are for the 1950s from the UN, and they differ markedly, ranging for the early 1950s from 33.4 to 42.5 years, with more recent publications favoring the higher value. Whichever one may be preferred, the starting point for the health transition and for improvements in infant mortality will be the 1940s or 1950s. Later estimates of both remain problematic. Life expectancy peaked in the early 1980s at 60 to 61 years and has since declined disastrously.

UN#55; WDI 2002; UNDYHS

## **Burkina Faso**

UN estimates of life expectancy in the early 1950s, at 31 to 33.2 years, suggest that survival gains for the overall population began in the late 1940s or 1950s.

Brass et al. 1968; UN#55; UNDYHS; WDI 2002

Ouedraogo, Salimata, Alain Dominique Zoubga, and Eloi Ouedraogo. 1987. *Pauvreté et santé au Burkina Faso*. Ouagadougou.

## **Burundi**

UN estimates of life expectancy in the early 1950s, at 31.3 to 37.5 years, differ sharply but nevertheless suggest that survival gains began in the late 1940s or 1950s.

UN#55; UNDYHS; UNL&T1982; WDI 2002

## **Cameroon**

UN estimates of life expectancy in the early 1950s, at 33.5 to 36 years, suggest that survival gains began in the late 1940s or 1950s. The estimates for 1930-32 from Ayeni (1976) are for South Cameroon only.

UN#55; UNDYHS; WDI 2002

Ayeni, Olasola. 1976. "Retrospective Estimates of Mortality from the Nigerian Medical Censuses of 1930-1932: A Research Note," *The Nigerian Journal of Economic and Social Studies* 18: lacking pagination.

Lantum, Dan N. 1983. *Demographic Transition of Cameroon between 1900 and 1982 with Special Reference to Natality and Mortality*. Yaounde.

### **Cape Verde**

The UN estimate of life expectancy for the early 1950s (48.5 years) is high enough to suggest that gains started as early as the 1930s.

UNDYHS; UNSDiv

Morgado, Nuno Alves. 1963. *Crónicas demográficas: situação demográfica de Cabo Verde e S. Tomé e Príncipe*. Lisbon.

### **Central African Republic**

UN estimates of life expectancy in the early 1950s, at 33 to 35.4 years, suggest that survival gains began in the late 1940s or 1950s. Life expectancy peaked at about 47.6 years in the period 1987-1992, then declined.

UN#55; UNDYHS; WDI 2002

### **Chad**

UN estimates of life expectancy in the early 1950s, at 31.3 to 32.5 years, suggest that survival gains began in the late 1940s or 1950s. Life expectancy peaked at about 48.5 years in the 1990s, then declined.

UN#55; UNDYHS; WDI 2002

### **Comoros**

The UN estimate of life expectancy for the early 1950s (40 years) is high enough to suggest that gains started in the 1940s or 1950s.

UN#55; UNDYHS; UNSDiv; WDI

Comoros. 1997. Ministère de la Santé Publique et de la Population, *Situation et tendances démographiques de la République fédérale islamique des Comores*. Moroni.

### **Congo Democratic Republic**

Estimates of life expectancy (38.5 to 39 years) for the early 1950s suggest that mortality decline began in the 1930s or 1940s. But there is little reliable information. Life expectancy peaked around 1992 at 51.7 to 52 years and then declined.

Condé 1973; UN#55; UNDYHS; UNL&T1982; WDI 2002  
Romaniuk, Anatole. 1968. "The Demography of the Democratic Republic of the Congo,"  
in Brass et al., 1968, pp. 241-341.  
Schneidman, Miriam. 1990. *Mortality and Fertility Trends in Zaire*. Washington.

### **Congo Republic**

UN estimates of life expectancy (33.5 to 38.6 years) in the early 1950s suggest that mortality decline began in the 1940s or 1950s, but there is little reliable information. Life expectancy peaked around 1987 at 51 to 52 years and then declined.

UN#55; UNDYHS; WDI 2002

### **Cote d'Ivoire**

UN estimates of life expectancy (33.5 to 36 years) in the early 1950s suggest that mortality decline began in the 1940s or 1950s, but there is little reliable information. Life expectancy peaked around 1987 at 51 to 52.2 years and then declined.

UN#55; UNDYHS; WDI 2002

Domergue, Danielle. 1977. "La Côte d'Ivoire: essai de démographie historique (1905-1945)," in *African Historical Demography*. Edinburgh, pp. 295-330.

Roussel, Louis, ed. 1967. *Côte d'Ivoire 1965: Population*. n.p.

### **Djibouti**

A UN estimate of life expectancy (33 years) in the early 1950s suggests that mortality decline began in the 1940s or 1950s, but there is little reliable information. Life expectancy peaked around 1997 at 50.3 years and then declined.

WDI 2002; UNDYHS

### **Egypt**

Some authorities have located the beginning of the health transition in the late 1940s, or specifically in 1946, or in the 1950s (Omran, 1966; Askar, 1982; El-Badry, 1965; Grais et al., 1956), often using official estimates that understate mortality. Recast estimates of infant mortality, crude death rates, and life expectancy indicate that gains began earlier, in the 1930s when life expectancy at birth was 30 to 33 years, but were then interrupted by World War II (Fargues, 1986; Bucht and El-Badry, 1986). It may be that those gains should be associated with public health improvements in the 1930s (Francis, 1949).

UNDYHS; WDI 2002

- Askar, Gamal et al. 1982. *The Estimation of Recent Trends in Fertility and Mortality in Egypt*. Washington.
- Bucht, Birgitta, and M.A. El-Badry. 1986. "Reflections on Recent Levels and Trends of Fertility and Mortality in Egypt," *Population Studies* 40: 101-13.
- El-Badry, M. A. 1955. "Some Demographic Measurements for Egypt Based on the Stability of Census Age Distribution," *Milbank Memorial Fund Quarterly* 33: 268-305.
- El-Badry, M. A. 1965. "Trends and Components of Population Growth in the Arab Countries of the Middle East: A Survey of Present Information," *Demography* 2: 140-86.
- Fargues, Philippe. 1986. "Un siècle de transition démographique en Afrique méditerranéenne 1885-1985," *Population* 41: 205-32.
- Francis, René. 1949. *Public Health in Egypt*. Cairo.
- Grais, Munir, Deward E. Waggoner, and Parker Mauldin. 1956. "The Role of Mortality in Recent Population Trends in Egypt," *Journal of the Egyptian Public Health Association* 31: 155-95.
- Kiser, Clyde V. 1944. "The Demographic Position of Egypt," in *Demographic Studies of Selected Areas of Rapid Growth*. New York, pp. 97-122.
- Omran, Abdel R. 1966. "Impact of Economic Development on Health Patterns in Egypt," *Archives of Environmental Health* 13: 117-24.
- Panzac, Daniel. 1996. *Population et santé dans l'Empire ottoman (XVIIIe - Xxe siècles)*. Istanbul.

### **Equatorial Guinea**

A UN estimate of life expectancy (34 years) in the early 1950s suggests that mortality decline began in the 1940s or 1950s, but there is little reliable information.

UNDYHS; WDI 2002

### **Eritrea**

A UN estimate of life expectancy (35.9 years) in the early 1950s suggests that mortality decline began in the 1940s or 1950s, but there is little reliable information.

UNDYHS; WDI 2002

### **Ethiopia**

UN estimates of life expectancy in the early 1950s (31 to 32.9 years) suggest that mortality decline began in the 1940s or 1950s, but there is little reliable information before the 1984 census (Adugna, 1987). Life expectancy peaked around 1992 at 45.3 to 47.5 years.

UN#55; UNDYHS; WDI 2002

Adugna, Aynalem. 1987. *The Population of Ethiopia*. Addis Ababa.

## **Gabon**

François (1975) dates mortality control efforts from the 1950s, but UN estimates suggest the possibility that gains in life expectancy began in the 1940s. Life expectancy, some 31.3 years around 1950, has continued to rise and infant mortality to decline into the 21<sup>st</sup> century.

UN#55; UNDYHS; WDI 2002; WDI 2004

François, Michel. 1975. "Gabon," in John C. Caldwell, et al., eds., *Population Growth and Socioeconomic Change in West Africa*. New York, pp. 630-56.

## **Gambia**

UN estimates of life expectancy in the early 1950s (30 to 33.5 years) suggest that mortality decline began in the 1940s or 1950s, but there is little reliable information. Using census estimates, Williams et al. (1980) report higher infant mortality and lower life expectancy for 1973 than either the UN or the World Bank. Life expectancy has continued to rise into the 21<sup>st</sup> century.

UN#55; UNDYHS; WDI 2002; WDI 2004

Williams, P. et al. 1980. *Vital and Health Statistics in the Gambia*. n.p.

## **Ghana**

Engman (1986) and Caldwell (1967b) trace the beginning of the health transition to the early 20<sup>th</sup> century, probably the 1920s, and Caldwell gives an estimate of life expectancy in 1921, at 28 years, that is high enough to allow the possibility of an even earlier beginning. By 1948-1960 Ghana had nearly the highest life expectancy in sub-Saharan Africa, and also higher incomes and more effective government activity, although most of the high survival and prosperity was to be found in the south.

UNDYHS; WDI 2002

Caldwell, J. C. 1966-67. "Population Change," in Walter Birmingham, I. Neustadt, and E. N. Omaboe, eds., *A Study of Contemporary Ghana*. 2 vols.; Evanston, II, pp. 78-110.

Engmann, E. V. T. 1986. *Population of Ghana, 1850-1960*. Accra.

Gaisie, S. K. 1969. "Estimation of Vital Rates for Ghana," *Population Studies* 23: 21-42.

Gaisie, S. K. and K. T. de Craft-Johnson. 1976. *The Population of Ghana*. Paris.

Okorafor, Apia Ekpe. 1969. Demographic Characteristics of Ghana and Uganda: A Comparative Analysis. Unpublished PhD dissertation, University of Chicago.

Patterson, K. David. 1981. *Health in Colonial Ghana: Disease, Medicine, and Socio-economic Change, 1900-1955*. Waltham, Mass.

Scott, David. 1965. *Epidemic Disease in Ghana, 1901-1960*. London.

Tawiah, Emmanuel Okang. 1979. Levels, Pattern, Trends and Differentials in Infant and Early Child Mortality, Ghana 1960 and 1971. Unpublished PhD dissertation, Duke University.

## **Guinea**

UN estimates of life expectancy in the early 1950s (31 to 31.3 years) indicate that improvements began in the late 1940s or 1950s. However a French survey done in 1954-55 reported significantly lower life expectancy, at about 27 years, and a crude death rate of about 40 per 1000 (France, 1959). According to the UN, life expectancy continued to rise into the 21<sup>st</sup> century.

Condé 1973; UN#55; UNDYHS; UNL&T 1982; WDI 2002; WDI 2004  
France. 1959. Mission démographique de Guinée, *Étude démographique par sondage en Guinée, 1954-1955: resultants définitifs*. [Paris].

## **Guinea Bissau**

UN estimates of life expectancy in the early 1950s (28 to 32.5 years) indicate that improvements began in the late 1940s or 1950s. According to the UN, life expectancy continued to rise into the 21<sup>st</sup> century.

Brass et al. 1968; UN#55; UNDYHS; WDI 2002; WDI 2004

## **Kenya**

Condé (1973) speculates about survival in the 1920s and 1930s in a way that suggests life expectancy began to rise in the 1930s, which is plausible in light of the development of medicine and public health in this British colony (Beck, 1970; Ndege, 2001). Life expectancy was about 23.9 years in the 1930s.

Condé 1973; UN#55; UNDYHS; WDI 2002  
Beck, Ann. 1970. *A History of the British Medical Administration of East Africa, 1900-1950*. Cambridge, Mass.  
Bonte, J. 1974. "Patterns of Mortality and Morbidity," in L. C. Vogel et al., eds., *Health and Disease in Kenya*. Nairobi, pp. 75-90.  
Brass, William and Carole L. Jolly, eds. 1993. *Population Dynamics of Kenya*. Washington.  
Ewbank, D., R. Henin, and J. Kekovole. 1986. "An Integration of Demographic and Epidemiologic Research on Mortality in Kenya," in *Determinants of Mortality Change and Differentials in Developing Countries*. New York, pp. 33-85.  
Ndege, George Oduor. 2001. *Health, State, and Society in Kenya*. Rochester, NY.  
Ominde, S. H., Roushdi A. Henin, and David F. Sly. 1984. *Population and Development in Kenya*. Nairobi.

## Lesotho

UN estimates of life expectancy in the early 1950s (35.9 to 39.5 years) are high enough to suggest that improvements began in the 1940s, or perhaps earlier. Life expectancy peaked around 1992 and by 2000-2005 had dropped to only 34.9 years (UNSDiv).

UN#55; UNDYHS; UNSDiv; WDI 2002

Sembajwe, Israel. 1986. *Morbidity and Mortality in Lesotho: Reflections from Health Statistics*. n.p.

Timaeus, Ian. 1984. *Mortality in Lesotho: A Study of Levels, Trends and Differentials Based on Retrospective Survey Data*. Voorburg.

United States. 1975. Department of Health, Education, and Welfare, *Syncrisis: The Dynamics of Health. XIII: Botswana, Lesotho and Swaziland*. Washington.

## Liberia

UN estimates of life expectancy in the early 1950s (34.5 to 37.4 years) are high enough to suggest that improvements began in the 1940s or 1950s. But Campbell (1981) prefers lower estimates for the 1960s. According to the World Bank, life expectancy peaked around 1987 at 53.5 years but then persistently dropped for the remainder of the century.

UN#55; UNDYHS; WDI 2002

Campbell, Eugene K. 1981. *Mortality in Liberia: Method, Levels and Policy Implications*. n.p.

Massalee, Abel Z. 1974. *The Population of Liberia*. n.p.

## Libya

Life expectancy may have begun to improve as early as the 1930s, but the censuses of 1931 and 1936 are too poor in quality to establish mortality levels. The UN estimate of life expectancy in the early 1950s, at 42.9 years, is high enough to suggest that gains began in the 1930s or 1940s.

B'Chir and Tabutin 1980; UN#55; UNDYHS; WDI 2002

Courbage, Youssef and Philippe Fargues. 1974. *La situation démographique au Liban*. 2 vols.; Bayrouth.

Issa, Mahmoud S. Abdou. 1982. "Estimation of Mortality Level in Libya: 1972," in Cairo Demographic Centre Research Monograph Series No. 8, *Mortality Trends and Differentials in Some African and Asian Countries*. Cairo, pp. 163-223.

## Malawi

UN estimates of life expectancy in the early 1950s (33.5 to 36.2 years) are high enough to suggest that improvements began in the 1940s or 1950s. Life expectancy peaked in the late 1980s at 45.8 years, but has since declined.

UN#55; UNDYHS; WDI 2002

Deane, Phyllis. 1953. *Colonial Social Accounting*. Cambridge.

## **Mali**

UN estimates of life expectancy in the early 1950s (32.5 to 33.5 years) are high enough to suggest that improvements began in the 1940s or 1950s. Life expectancy peaked in the late 1980s at 46.5 years, but has since declined.

UN#55; UNDYHS; WDI 2002

Bocquier, Philippe and Tiéman Diarra, eds. 1999. *Population et société au Mali*. Paris.

## **Mauritania**

UN estimates of life expectancy in the early 1950s (33.5 to 35.5 years) are high enough to suggest that improvements began in the 1940s or 1950s.

B'Chir and Tabutin 1980; UN#55; UNDYHS; WDI 2002

## **Morocco**

Little reliable information is available for any period before 1960, when there was a good quality census and by which time life expectancy at birth was about 47 years (Morocco, 1997). Ibrahim (1980) dates the decline of mortality from about 1910 beginning in urban areas with better medical services; Vaidyanathan and Nawar (1982) date it from 1940; and Johnson (1980) traces the decline to 1945-46. Life expectancy probably began to rise and infant mortality to decline either in the 1930s or in the postwar 1940s.

B'Chir and Tabutin 1980; UN#55; UNDYHS; WDI 2002

Ghoti, Mohamed. 1995. *Histoire de la médecine au Maroc: le XXe siècle, 1896-1994*. n.p.

Ibrahim, Saad Eddin. 1980. *Population and Urbanization in Morocco*. Cairo.

Johnson, Peter D. 1980. *Morocco*. Washington.

Morocco. 1997. Centre d'études et de recherches démographiques, *Situation et perspectives démographiques du Maroc*. [Rabat].

Vaidyanathan, K. E., and Laila Nawar. 1982. "Trends and Differentials in Mortality in Morocco," in Cairo Demographic Centre Research Monograph Series No. 8, *Mortality Trends and Differentials in Some African and Asian Countries*. Cairo, pp. 33-75.

## **Mozambique**

UN and World Bank estimates suggest that survival began to improve in the 1940s or 1950s (life expectancy in the early 1950s was about 33.5 years). But Kjolhede and Oliver (1992) maintain that there was little change in 0-5 mortality until the 1970s. Life

expectancy reached 44.4 years around 1982 but then fluctuated and, in the late 1990s, declined.

UN#55; UNDYHS; WDI 2002

Heisel, Don F. 1968. "The Demography of the Portuguese Territories: Angola, Mozambique, and Portuguese Guinea," in Brass et al. 1968, pp. 440-65.

Kjølhede, Chris and Charles Oliver. 1992. *Health and Health Care Delivery in Mozambique*. Baltimore.

## **Namibia**

Notkola and Siiskonen (2000) suggest a decline in mortality among Evangelical Lutherans in Ovamboland from the 1930s or 1940s. UN estimates of life expectancy in the early 1950s range from 31.3 to 38.7 years, which is wide enough to accommodate the idea that gains began in the 1930s or 1940s. Life expectancy peaked around 1992 at 58.5 years.

UN#55; UNDYHS; WDI 2002

Calitz, J. M. and J.M. Pieterse. 1991. *A Regional Profile of the Namibian Population 1970-2000*. n.p.

Notkola, Veijo and Harri Siiskonen. 2000. *Fertility, Mortality and Migration in Sub-Saharan Africa: The Case of Ovamboland in North Namibia, 1925-90*. London.

## **Niger**

UN estimates of life expectancy in the early 1950s (33 to 33.5 years) are high enough to suggest that improvements began in the 1940s or 1950s.

UN#55; UNDYHS; WDI 2002

## **Nigeria**

UN estimates of life expectancy in the early 1950s (31.3 to 36.5 years) are high enough to suggest that improvements began in the 1940s or 1950s. Life expectancy peaked around 1997 at just over 50 years and then declined.

UN#55; UNDYHS; WDI 2002

Ayeni, Olasola. 1976. "Retrospective Estimates of Mortality from the Nigerian Medical Censuses of 1930-1932: A Research Note," *The Nigerian Journal of Economic and Social Studies* 18: no pagination.

Olusanya, P. O. 1981. "Indices temoignant de la variation et de la baisse de la mortalité au Nigeria," in UN Economic Commission for Africa, *Dynamique de la population: Fecondité et mortalité en Afrique*. n.p., pp. 470-99.

Uche, Chukwudum. 1981. "The Contexts of Mortality in Nigeria," *Genus* 37: 123-33.

## Rwanda

Niyibizi (1982) reports that survival began to improve in the 1930s as Belgian colonial authorities built a public health infrastructure, the crude death rates dropping to about 30 per 1000 by 1952. Meheus and Bizimungu (1982) find little improvement between 1952 and the 1970 demographic survey, which reported a CDR of 22 in a much younger population; even the 22 per 1000 estimate may be too low. UN estimates of life expectancy in the early 1950s range from 33.5 to 40.0 years. While WDI 2002 estimates life expectancy in 1970 at 44.5 years, Meheus and Bizimungu prefer 39. Life expectancy rose sharply during the 1970s and early 1980s, reaching a peak around 1987 (at 48.3 years) but then fell abruptly during the massacres of 1994.

UN#55; UNDYHS; UNL&T1982; WDI 2002

Meheus, A. and C. Bizimungu. 1982. "Mortalité et morbidité," in A. Meheus et al., eds., *Santé et maladies au Rwanda*. Brussels, pp. 194-210.

Niyibizi, S. 1982. "Situation démographique," in A. Meheus et al., eds., *Santé et maladies au Rwanda*. Brussels, pp. 37-52.

## Senegal

Pison et al. (1995) report from official statistics that mortality began to decline in the 1910s in Dakar and Saint-Louis. Sankalé and Pène (1960) find mortality decline in the same two cities from the period 1925-35. Condé (1973) suggests gains in life expectancy from the 1930s, but without identifying sources. UN estimates of life expectancy in the early 1950s, at 33.5 to 36.5 years, likewise suggest an earlier beginning. Garenne, Cantrelle, and Diop (1985) report that improvements in infant mortality and life expectancy at the national level began in the 1940s.

Condé 1973; UN#55; UNDY1967; UNDYHS; WDI 2002

Cantrelle, P. et al. 1986. "The Profile of Mortality and Its Determinants in Senegal, 1960-1980," in *Determinants of Mortality Change and Differentials in Developing Countries: The Five-Country Case Study Project*. New York, pp. 86-116.

Garenne, Michel, Pierre Cantrelle, and Ibrahima Diop. 1985. "The Case of Senegal," in Jacques Vallin and Alan D. Lopez, eds., *Health Policy, Social Policy and Mortality Prospects*. Liège, pp. 315-40.

Pison, Gilles et al., eds. 1995. *Population Dynamics of Senegal*. Washington.

Sankalé, Marc and Pierre Pène. 1960. *Médecine sociale au Sénégal*. Dakar.

Verrière, Louis. 1965. La population du Sénégal (Aspects quantitatifs). Unpublished PhD thesis, University of Dakar.

## Sierra Leone

Tekse (1975) considers the possibility of mortality decline beginning in the 1930s but settles on the late 1940s as the likelier beginning point. This is consistent with UN estimates of life expectancy in the early 1950s, at 30 to 33.5 years. Gains in life

expectancy have been uneven, leaving the country at 39.2 years in 2000, that dropping to a UN estimate of 34.3 years in 2000-2005.

UN#55; UNDYHS; UNSDiv; WDI 2002

Tekse, K. 1975. *Some Estimates of Vital Rates for Sierra Leone*. Brazzaville.

### **Somalia**

UN estimates of life expectancy in the early 1950s (33 to 33.5.5 years) are high enough to suggest that improvements began in the 1940s or 1950s.

UN#55; UNDYHS; WDI 2002

### **South Africa**

According to official figures, life expectancy began to rise for whites before the 1920s and for coloreds and Asians by the 1920s or 1930s (Van Tonder and van Eeden, 1975). Less information is available for the majority black population, but separate estimates for the African population in 1935-40, at 38.1 to 40 years, are high enough to suggest that life expectancy began to rise in the 1920s or 1930s (Van Tonder and van Eeden, 1975; Sadie, [1972]). Thus gains for the country as a whole began in the 1920s or 1930s. Life expectancy peaked around 1992 at about 62.9 years and then declined.

UN#55; UNDY1967; UNDYHS; WDI 2002

Sadie, J. L. [1972]. *Projections of the South African Population 1970-2020*. Johannesburg.

South Africa. 1978. *South African Statistics 1978*. Pretoria.

Van Rensburg, H. C. J. and A. Mans. 1987. *Profile of Disease and Health Care in South Africa*. 2<sup>nd</sup> ed.; Pretoria.

Van Tonder, J. L. and I. J. van Eeden. 1975. *Abridged Life Tables for All the Population Groups in the Republic of South Africa (1921-70)*. Pretoria.

Walker, A. R. P. 2001. "Changes in Public Health in South Africa from 1876," *Journal of the Royal Society for the Promotion of Health* 121: 85-93.

### **Sudan**

Bell (1996) suggests that smallpox vaccination and sulfa drugs may have initiated a mortality decline in the 1930s, but very little information is available about actual levels of mortality. UN estimates of life expectancy in the early 1950s suggest an early beginning to decline because they are surprisingly high at 37.7 to 38.6 years. Zachariah and Soliman's (1970) estimate for 1955-56, at 42.9 years, is higher still. Sustained improvements in life expectancy and infant mortality probably began in the 1930s or 1940s.

UN#55; UNDYHS; WDI 2002

- Bell, Heather. 1996. *Medical Research and Medical Practice in the Anglo-Egyptian Sudan, 1899-1940*. Unpublished D. Phil. thesis, University of Oxford.
- Zachariah, K. C. and S. H. Soliman. 1970. "Use of Population and Housing Survey Data of the Sudan for Estimating Its Current Demographic Measures," in Cairo Demographic Centre, *Demographic Measures and Population Growth in Arab Countries*. Cairo, pp. 169-93.

### **Swaziland**

UN estimates of life expectancy in the early 1950s (33.4 to 35.6 years) are high enough to suggest that improvements began in the 1940s or 1950s. Life expectancy peaked in the mid 1990s and then began a rapid decline to a UN estimate of 34.3 years in 2000-2005.

UN#55; UNDY1967; UNDYHS; WDI 2002

### **Tanzania**

Incomplete data suggest that life expectancy began to rise in the 1940s or 1950s. The UN estimate of life expectancy in 1950 at 34.2 years is consistent with successive estimates provided by Egerö and Henin (1973), Henin (1979), and Kamuzora and Komba (1991) for 1957, 1967, and 1973. Life expectancy peaked around 1987 at 51.0 years.

UN#55; UNDY1967; UNDYHS; WDI 2002

Egerö, Bertil and Roushdi A. Henin. 1973. "Mortality," in Bertil Egerö and Roushdi A. Henin, eds., *The Population of Tanzania: An Analysis of the 1967 Population Census*. Dar es Salaam, pp. 176-85.

Henin, Roushdi A., ed. 1979. *The Demography of Tanzania: An Analysis of the 1973 National Demographic Survey of Tanzania*. Dar es Saleem.

Kamuzora, C. L. and A. S. Komba. 1991. "Demographic Trends," in G. M. P. Mwaluko et al., eds., *Health and Disease in Tanzania*. London, pp. 279-88.

### **Togo**

UN estimates of life expectancy for the early 1950s (31.3 to 36 years) are high enough to suggest that improvements began in the 1940s or 1950s. Life expectancy peaked around 1987 at 51.4 years.

UN#55; UNDYHS; UNL&T1982; WDI 2002

Agouké, Akoua, Mensan Assogba, and Kodjo Anipah. 1989. *Enquête démographique et de santé au Togo*. Lomé.

Alonou, Kokou Benjamin. 1994. *La politique sanitaire de la France au Togo à l'époque coloniale, 1919 à 1960*. Unpublished doctoral thesis, University of Poitiers.

## Tunisia

According to estimates of life expectancy provided by Condé (1973), overall mortality began to decline in the 1920s from a beginning level of some 28.8 years. B'Chir (1981) and B'Chir and Tabutin (1980) detect decline before World War II, as does Seklanie (1967-68), but all are indefinite about a beginning period. Correcting for underregistration of deaths, Waltisperger et al. (2001) adjust Seklanie's estimates of life expectancy and infant mortality downward, but not so far down as to exclude the possibility of gains in survival before World War II. Tunisia's health transition is estimated to have begun in the 1920s.

Condé 1973; B'Chir and Tabutin 1980; UN#55; UNDYHS; WDI 2002

B'Chir, Mongi. 1981. "Mortality in Some North African Countries," in *Population Dynamics: Fertility and Mortality in Africa*. Addis Ababa, pp. 168-89.

Charmes, Jacques. 1981-82. "Principales tendances de la démographie tunisienne au cours des deux décennies 1960-1980 et perspectives pour la décennie 1980-1990: La diversité des sources, un dilemme pour le planificateur?" *Cah. O.R.S.T.O.M., ser Sci. Hum.* 18: 303-40.

Chékir, Hafedh and Jacques Vallin. 2001. "Les derminants de la santé et de la baisse de la mortalité," in Jacques Vallin and Thérèse Locoh, eds., *Population et développement en Tunisie: La métamorphose*. Tunis, pp. 113-42.

Seklani, Mahmoud. 1967-68. *La mortalité et le coût de la santé publique en Tunisie depuis l'après-guerre*. 2 vols.; Tunis.

Seklani, Mahmoud. 1974. *La population de la Tunisie*. Paris.

Speziale, Salvatore. 1997. *Oltre la peste: sanità, popolazione e società in Tunisia e nel Maghreb (XVIII-XX secolo)*. Cosenza.

Tabutin, Dominique. 1993. "Evolution comparée de la mortalité en Afrique du Nord de 1960 à nos jours," *Social Science & Medicine* 36: 1257-65.

Waltisperger, Dominique, Jacques Vallin, and Abdelhamid Ben Mrad. 2001. "La dynamique naturelle de la population depuis l'Indépendance," in Jacques Vallin and Thérèse Locoh, eds., *Population et développement en Tunisie: La métamorphose*. Tunis, pp. 53-88.

## Uganda

Following Condé's (1973) estimates, life expectancy began to rise in the 1930s from a beginning level of some 23.9 years. It peaked between 1977 and 1982, declined to 42.1 years in 2000, and then began to rise again.

Condé 1973; UN#55; UNDYHS; WDI 2002

Langlands, B.W. 1970. *The Demographic Condition of Uganda as a Developing Country*. Kampala.

Miller, Norman N. 1971. *The Dynamics of Population in Uganda*. Hanover, NH.

Okorafor, Apia Ekpe. 1969. Demographic Characteristics of Ghana and Uganda: A Comparative Analysis. Unpublished PhD dissertation, University of Chicago.

## **Zambia**

Estimates made by Hill (1985) and the UN (the latter at 36 to 37.8 years in the early 1950s) suggest that life expectancy began to rise in the 1940s or 1950s, peaked around 1982, and then faltered, falling from a high of 51.2 years in 1982 to no more than 38.0 years in 2000 and to 32.4 years in 2000-2005.

UN#55; UNDY1967; UNDYHS; UNSDiv; WDI 2002  
Hill, Althea. 1985. *The Demography of Zambia*. n.p.

## **Zimbabwe**

Condé's (1973) estimates suggest that life expectancy began to rise in the 1930s or 1940s from a level in the mid 1930s of 26.4 years. UN and WDI 2002 estimates show that it peaked around 1987 and then fell from a high of 56.9 years in 1987 to 39.9 years in 2000 and then to 33.2 years in 2000-2005.

Condé 1973; UN#55; UNDYHS; UNSDiv; WDI 2002  
Sambisa, William. 1994. "Mortality Overview in Zimbabwe: A Chitungwiza Case Study," in William Muhwava, ed., *The Demography of Zimbabwe: Some Research Findings*. Harare, pp. 181-207.

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### Argentina

Somoza (1971a, 1971b, and 1973) and Pérez Brignoli (1989) provide estimates that suggest that life expectancy began to rise in the period 1895-1905 from a level of some 33.3 years. Estimates for later years, from UNDYHS and WDI 2002, appear to confirm this picture by closely matching the development of life expectancy over time estimated by Somoza and Pérez Brignoli.

Pérez Brignoli 1989; UNDY1967; WDI 2002

Camisa, Zulma C. 1970. "República Argentina: Evaluación y ajuste del censo de población de 1960 por sexo y edad y tabla abreviada de mortalidad 1959-1961," in *Argentina: Población económicamente activa, fecundidad, mortalidad*. Santiago, pp. 165-239.

Müller, María S. 1978. *La mortalidad en la Argentina: Evolución histórica y situación en 1970*. n.p.

Somoza, Jorge L. 1971b. "Algunos efectos sociales y económicos derivados de la baja de la mortalidad en la Republica Argentina entre 1900 y 1960," *Desarrollo económico* 11: 113-23.

Somoza, Jorge L. 1971a. *La Mortalidad en la Argentina entre 1869 y 1960*. Buenos Aires.

Somoza, Jorge L. 1973. "La Mortalidad en la Argentina entre 1869 y 1960," *Desarrollo económico* 12: 807-26.

### Bolivia

Estimates of life expectancy for the 1950s from Bartlema et al. (1985) and various UN sources, which range from about 38 to 49.7 years, are high enough to suggest that improvements began in the 1930s or perhaps the 1940s.

UN#55; UNDYHS; WDI 2002

Arriaga, Eduardo E. 1970. *Mortality Decline and Its Demographic Effects in Latin America*. Berkeley.

Bartlema, Jan et al. 1985. "Fertility and Mortality in Bolivia: 1950-1976," in Committee on Population and Demography, *Fertility and Mortality in Bolivia and Guatemala*. Washington, pp. 3-62.

### Brazil

Estimates of infant mortality and life expectancy for Brazil in the period before 1950 fall into two groups. One suggests comparatively favorable survival in the late 19<sup>th</sup> and early 20<sup>th</sup> century and slight but noticeable gains from the late 19<sup>th</sup> century forward. Thus Smith (1946) and Martin and Camargo (1984) provide estimates of crude death rates that show mortality in decline from the latter part of the nineteenth century. Mortara's (1941, 1954-55) estimates for 1870-1890 and later periods are in agreement with this picture.

Arriaga (1968 and 1970) also suggests life expectancy gains from the 1890s and from lower levels. In the other approach Carvalho (1973) suggests lower survival in the earlier period and a deferral of gains until the 1920s or 1930s, with faster gains once the transition was underway. Because the estimates of infant mortality from Smith and Martin and Camargo appear to be unrealistically low, due to defects in official population estimates and vital statistics underregistration, and because there are no strong explanations for why survival should have improved in the late 19<sup>th</sup> or early 20<sup>th</sup> century, I have adopted the second group's position.

Castro-Santos (1987) reports crude death rate series for some cities that begin in the late nineteenth century, describing the rates for Rio de Janeiro as the most reliable. Those suggest decline from as early as the 1890s even though Castro-Santos finds that mortality did not begin a persistent decline in Rio and São Paulo until the 1920s and in Brazil as a whole until the 1930s. Thus it may be that the early decline school has been influenced by conditions in the major cities.

Arriaga 1968; UNDYHS; UNSD Div; WDI 2002

Arretx, Carmen et al. 1983. *Levels and Recent Trends in Fertility and Mortality in Brazil*. Washington.

Arriaga, Eduardo E. 1970. *Mortality Decline and Its Demographic Effects in Latin America*. Berkeley.

Blount, John Allen. 1971. The Public Health Movement in São Paulo, Brazil: A History of the Sanitary Service, 1892-1918. Unpublished PhD dissertation, Tulane University.

Carvalho, José Alberto Magno de. 1973. Analysis of Regional Trends in Fertility, Mortality, and Migration in Brazil, 1940-1970. Unpublished PhD dissertation, London School of Economics.

Carvalho, J. A. M. 1974. "Regional Trends in Fertility and Mortality in Brazil," *Population Studies* 28: 401-21.

Carvalho, José Alberto M. de, and Charles H. Wood. 1978. "Mortality, Income Distribution, and Rural-Urban Residence in Brazil," *Population and Development Review* 4: 405-20.

Castro-Santos, Luiz Antonia de, Power. 1987. Ideology and Public Health in Brazil, 1889-1930. Unpublished PhD dissertation, Harvard University.

Martine, George and Lísicio Camargo. 1984. "Crescimento e distribuição da população brasileira: tendências recentes," *Revista brasileira de estudos de população* 1: 99-144.

Merrick, Thomas and Douglas H. Graham. 1979. *Population and Economic Development in Brazil: 1800 to the Present*. Baltimore.

Mortara, Giorgio. 1941-42. "The Calculation of Life Tables for Populations Lacking Reliable Birth and Death Statistics, with Application to Brazil," in *Proceedings of the Eighth American Scientific Congress held in Washington May 10-18, 1940*. Washington, pp. 321-33.

Mortara, G. 1954-55. "The Development and Structure of Brazil's Population," *Population Studies* 8: 121-39.

Mortara, Giorgio. 1941. "Estudos sobre a Utilização do Censo Demográfico para a Reconstrução das Estatísticas do Movimento da População do Brasil. VI. Sinopse

- da Dinâmica da População do Brasil nos Últimos Cem Anos,” *Revista Brasileira de Estatística* 2: 267-76.
- Mortara, Giorgio. 1946. *Tábuas Brasileiras de Mortalidade e Sobrevivência*, Estudos Brasileiros de Demografia, Monografia No. 1. Rio de Janeiro, pp. 40-43.
- Smith, T. Lynn. 1946. *Brazil: People and Institutions*. Baton Rouge.
- Williams, Steven C. 1994. Prelude for Disaster: The Politics and Structures of Urban Hygiene in Rio de Janeiro, 1808-1860. Unpublished PhD dissertation, University of California at Los Angeles.

## Canada

Bourbeau and Légaré (1982) find that mortality decline was underway in Canada in the 1830s, the earliest decade for which they supply an estimate, from a beginning level of some 39 years. They report also that survival in Quebec very slightly surpassed that in Canada as a whole. Gains were slow until the 1890s

### HMD

- Bourbeau, Robert and Jacques Légaré. 1982. *Evolution de la mortalité au Canada et au Québec, 1831-1931: Essai de mesure par generation*. Montreal.
- Leacy, F. H., ed. 1983. *Historical Statistics of Canada*. 2<sup>nd</sup> ed. [Ottawa].
- Lespérance, A. 1970. La mortalité à Québec de 1771 à 1870. Unpublished Masters thesis, University of Montreal.
- Nagnur, Dhruva and Michael Nagrodski. 1990. “Epidemiologic Transition in the Context of Demographic Change: The Evolution of Canadian Mortality Patterns,” *Canadian Studies in Population* 17: 1-24.
- Pelletier, François, Jacques Légaré, and Robert Bourbeau. 1997. “Mortality in Quebec during the Nineteenth Century: From the State to the City,” *Population Studies* 51: 93-103.
- Wargon, Sylvia T. 2002. *Demography in Canada in the Twentieth Century* Vancouver.

## Chile

Although some authorities (e.g., Gutiérrez Roldán, 1975) have suggested an earlier beginning, most locate the initial rise in life expectancy in the 1920s (Cabello, 1955-56; McCaa, 1978; Pérez Brignoli, 1989; Tacla Chamy, 1975; Mamalakis, 1980; and United States, 1943). The beginning level was some 31.6 years.

- Arriaga 1968; Pérez Brignoli 1989; UNDYHS; UNSDiv; WDI 2002
- Cabello, Octavio. 1955-56. “The Demography of Chile,” *Population Studies* 9: 237-50.
- Cabello, Octavio, Jerjes Vildósola, and Marta Latorre. 1946. “Tablas de vida para Chile 1920, 1930 y 1940,” *Revista chilena de higiene y medicina preventiva*. 8: 103-36.
- Gutiérrez Roldán, Hector. 1975. *La Población de Chile*. [Paris].
- Mamalakis, Markos J. 1980. *Historical Statistics of Chile*. 2 vols. Westport, Conn.
- McCaa, Robert. 1978. “Chilean Social and Demographic History: Sources, Issues and Methods,” *Latin American Research Review* 13: 104-26.

- Muñoz Pradas, Francisco. 1989. "La Estimación de la mortalidad chilena (1865-1940): Límites y posibilidades," *Latin American Population History Newsletter* No. 15: 2-9.
- Tacla Chamy, Odette. 1975. *Panorama demográfico de Chile y su evolución en el presente siglo*. 2nd ed. Santiago.
- United States. 1943. Bureau of the Census, *Chile, Demographic Data: Analytical Discussion, Graphic Presentation, Population, Natality and Mortality Statistics*. Washington.

## Colombia

Colombia lacks reliable data until about 1960, and authorities have differed in estimating mortality levels and the timing of transitions. Flórez and Méndez (2000) indicate that life expectancy began to rise in the 1930s, or possibly the late 1920s. This is plausible for timing, but their early estimates of life expectancy (40.0 years centered on 1928) may be too high and of infant mortality (183.3 per 1000 centered on 1928) too low. Lopez Toro (1968) estimates life expectancy at 43.8 for females and 40.0 for males across the period 1938-51. Zlotnik (1982) following Arriaga (1968) prefers estimates that suggest that life expectancy began to rise in the first decade of the 20<sup>th</sup> century. The estimate adopted is that survival began to improve in the 1930s from a beginning level within the range 32 to 40 years.

- Arriaga 1968; UNDYHS; UNSDdiv; WDI 2002
- Flórez Nieto, Carmen Elisa, and Regina Méndez H. 2000. *Las Transformaciones sociodemográficas en Colombia durante el siglo XX*. Bogotá.
- Lopez Toro, Alvaro. 1968. *Análisis demográfico de los Censos Colombianos 1951 y 1964*. Bogota.
- Zlotnik, Hania. 1982. *Levels and Recent Trends in Fertility and Mortality in Colombia*. Washington.

## Costa Rica

Costa Rica's health transition began between the latter decades of the nineteenth century and the 1920s. The two leading experts, Luis Rosero Bixby and Héctor Pérez Brignoli, offer incompatible estimates of infant mortality and life expectancy for the period from the 1860s to about 1900. According to Rosero and Caamaño (1984) and Rosero (1985) mortality may have declined as early as the 1870s but certainly decreased in the 1890s, then changed little, rising slightly, until the 1920s when the decline resumed. According to Pérez Brignoli (1989), life expectancy was unusually high in the 1860s and 1870s and then declined to around 32 years until the 1920s, when sustained gains began.

- Arriaga 1968; Pérez Brignoli 1989; UNDYHS; UNSDdiv; WDI 2002
- Mata, Leonardo, and Luis Rosero Bixby. 1988. *National Health and Social Development in Costa Rica: A Case Study of Intersectoral Action*. Washington.
- Pérez Brignoli, Héctor. 1979. "Notas sobre el descenso de la mortalidad en Costa Rica (1866-1973), in *Sétimo seminario nacional de demografía*. San José, pp. 44-56.

- Rosero, Luis. 1985. "Determinantes del descenso de la mortalidad infantil en Costa Rica," in *Demografía y epidemiología en Costa Rica*. San José, pp. 9-36.
- Rosero, Luis and Herman Caamaño. 1984. "Tablas de vida de Costa Rica, 1900-1980," in *Mortalidad y fecundidad en Costa Rica*. San José, pp. 7-19.

## **Cuba**

For Cuba there is a possibility that life expectancy gains began in the 1880s but were interrupted in a devastating way during the Spanish-American War. Garcia Quiñones (1996) reports Gonzalez Quiñones' unpublished 1994 inverse projection estimates for 1799-1959, which suggest this pattern. Authorities agree that life expectancy rose from around 1900 and a beginning level within the range 33.1 to 38.4 years. At first gains came slowly but then at a rapid pace from about 1925 to 1975.

- Pérez Brignoli 1989; UN#55; UNDYHS; UNSDiv; WDI 2002
- Debasa R., Jorge, and Fernando González Q. 1971. *Cuba: Los componentes de la mortalidad entre 1919 y 1954: Utilidad en la proyección de la mortalidad*. Santiago de Chile.
- Díaz-Briquets, Sergio. 1977. Mortality in Cuba: Trends and Determinants, 1880-1971. Unpublished PhD dissertation. University of Pennsylvania.
- Díaz-Briquets, Sergio. 1991. "Mortality in Cuba," in Ira Rosenwaike, ed., *Mortality of Hispanic Populations: Mexicans, Puerto Ricans, and Cubans in the United States and in the Home Countries*. New York, pp. 55-77.
- Garcia Quiñones, Rolando. 1996. *La transición de la mortalidad en Cuba: Un estudio sociodemográfico*. Havana.
- González Quiñones, Fernando R., and Oscar R. Ramos Piñol. 1996. *Cuba: Balance e indicadores demográficos: Estimados des periodo 1900-1959*. Havana.
- Gutiérrez, Hector. 1984. "La mortalité par cause à Cuba, avant et après la Révolution," *Population* 39: 383-88.
- Hernández Castellon, Raúl. 1981. "El comienzo de la revolución demográfica en Cuba," *Revista Cubana de Administración de Salud*. 7: 1-23.
- Hernández Castellon, Raúl. 1988. *Le Revolución demográfica en Cuba*. Havana.

## **Dominican Republic**

Life expectancy began to rise and infant mortality to decline in the 1930s or 1940s, more probably in the 1930s, and rose quite rapidly in the 1950s and 1960s (Arriaga, 1968; Ramírez, Duarte, and Gómez, 1986; and Ramírez et al., 1988). The beginning level was about 29.9 years.

- Arriaga 1968; UN#55; UNDYHS; WDI 2002
- Ramírez, Nelson, Isis Duarte, and Carmen Gómez. 1986. *Población y salud en la República Dominicana*. Santo Domingo.
- Ramírez, Nelson, et al. 1988. *Republica Dominicana: Población y desarrollo*. San José.

## Ecuador

Delaunay (in Delaunay, León, and Portais, 1990) dates the beginning of a decline in crude death rates from the 1920s. Uquillas (1976), reporting corrected estimates, finds that the crude death rate was significantly lower in 1950 than it had been in 1920 or 1925. Ecuador's health transition began in the 1930s or 1940s. No estimates were found for the beginning level. In the 1950s survival remained one of the lowest in Latin America.

UN#55; UNDYHS; WDI 2002

Delaunay, Daniel, Juan B. León, and Michel Portais. 1990. *Transición demográfica en el Ecuador*. n.p..

*La Mortalidad y las políticas de salud en el Ecuador*. 1985. Quito.

Páez Molestina, Francisco et al. 1985. *Población y desarrollo socioeconómico en el Ecuador*. Quito.

Uquillas Rodas, Jorge Enrique. 1976. Public Health Policy and Mortality in Latin America: The Case of Ecuador. Unpublished PhD dissertation. University of Florida.

## El Salvador

Barón Castro (1978) reports that crude death rates began to decline in the 1920s. But the earliest estimate for life expectancy, at 28.7 years in 1930, is still low (Arriaga, 1968). The UN estimate of life expectancy in 1949-51, at 51.1 years, indicates substantial interim gains for infants and the overall population beginning in the 1930s or 1940s.

Arriaga 1968; UN#55; UNDYHS; WDI 2002

Barón Castro, Rodolfo. 1978. *La población de El Salvador*. 2<sup>nd</sup> ed. San Salvador.

## Guatemala

Early's (1982) adjusted CDR estimates indicate that mortality began to decline in the 1930s from a beginning level of some 25.8 years. This agrees with Arriaga's (1968) estimates of life expectancy and infant mortality. (Arias de Blois (1976) provides official estimates of CDR from 1920-24 and infant mortality from 1915-19, in both of which deaths are underregistered.) Gains were especially rapid in the 1940s and 1950s (UNDYHS; Chackiel, Hill, and Isaacs, 1985).

Arriaga 1968; UN#55; UNDYHS; WDI 2002

Arias de Blois, Jorge. 1976. *La población de Guatemala*. [Guatemala].

Camisa, Zulma. 1969. *Las estadísticas demográficas y la mortalidad en Guatemala hacia 1950 y 1964*. San José.

Chackiel, Juan, Kenneth Hill, and Mario Isaacs. 1985. "Fertility and Mortality in Guatemala: 1950-1973," in Committee on Population and Demography, *Fertility and Mortality in Bolivia and Guatemala*. Washington, pp. 63-161.

Early, John D. 1982. *The Demographic Structure and Evolution of a Peasant System: The Guatemalan Population*. Boca Raton.

Guatemala. 1997. *Tablas abreviados de mortalidad 1950-2050*. Guatemala.  
Shattuck, George Cheever. 1939. *A Medical Survey of the Republic of Guatemala*.  
Washington.

## **Guyana**

Life expectancy began to rise in the early 1920s (Mandle, 1970; Smith, 1962; Taeuber, 1952) from a 1911 level of some 31.1 years. Gains in the period since independence have been meager, and may have been interrupted by an early reversal of trend. According to the World Bank, life expectancy peaked around 1992 and then declined.

UN#55; UNDYHS; WDI 2002

Mandle, Jay R. 1970. "The Decline of Mortality in British Guiana, 1911-1960,"  
*Demography* 7: 301-15.

Mandle, Jay R. 1973. *The Plantation Economy: Population and Economic Change in Guyana, 1838-1960*. Philadelphia.

Smith, Raymond T. 1962. *British Guiana*. London.

Taeuber, Irene B. 1952. "British Guiana: Some Demographic Aspects of Economic Development," *Population Index* 18: 3-19.

## **Haiti**

Life expectancy probably began to rise and infant mortality to decline in the late 1940s or 1950s, but the various authorities (Arriaga 1968; UN#55; UNDYHS; and WDI 2002) offer conflicting estimates of its level around 1950. Hobcraft (1978) points out the paucity of reliable information for any period before the 1971 census. Life expectancy peaked around 1997 and then began to decline.

Arriaga 1968; UN#55; UNDYHS; WDI 2002

Bicego, George Tracy. 1990. Trends, Age Patterns, and Determinants of Childhood Mortality in Haiti. Unpublished PhD dissertation, Johns Hopkins University.

Hobcraft, John. 1978. *The Demographic Situation in Haiti*. Santiago de Chile.

Millsbaugh, Arthur A. 1931. *Haiti under American Control 1915-1930*. Westport, Conn., 1970 reprint.

Rousseau, J. A. 1985. *La mortalité infantile et juvénile en Haïti*. Voorburg.

Williams, Stephen J. 1981. "Population Dynamics and Health in Haiti," *Social and Economic Studies* 30: 140-56.

## **Honduras**

Although there are few reliable estimates of age-specific mortality as late as the 1970s, Honduran gains in survival appear to have begun in the 1930s or 1940s from a 1930 level of some 33.9 years. Hill (1980) notices rapid progress in the period 1950-1961, while estimates of life expectancy in the early 1950s, such as Camisa and Rincón's (1981) at 42.2 years, give a level that suggests earlier progress.

- Arriaga 1968; UN#55; UNDYHS; WDI 2002
- Barahona Lopez, Fidel. 1989. "Niveles y tendencias de la mortalidad infantil en Honduras," in Manuel Flores and Gabriel Bidegain, eds., *La Mortalidad infantil en Honduras: perspectivas y politicas*. Tegucigalpa, pp. 21-48.
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- Hill, Kenneth. 1980. *Fertility and Mortality Changes in Honduras, 1950-1974*. Washington.
- Suazo, Margarita, and Rodolfo Aplicano. 1984. *Population and Socioeconomic Development in Honduras*. Chicago.

### **Jamaica**

Life expectancy began a sustained rise in the 1920s from a 1921 level of 37 years (Riley, 2005). From the mid 1920s into the 1950s Jamaica had a particularly rapid pace of gain.

UNDYHS; WDI 2002

- Cumper, G[eorge] E. 1983. "Jamaica: A Case Study in Health Development," *Social Science & Medicine* 17: 1983-93.
- Riley, James C. 2005. *Poverty and Life Expectancy: The Jamaica Paradox*. Cambridge.
- Roberts, G[eorge]W. 1979. *The Population of Jamaica*. Cambridge, reprint of 1957 edition with a new introduction by the author.
- Tekse, Kalman. 1974. *Population and Vital Statistics: Jamaica, 1832-1964: A Historical Perspective*. Kingston.

### **Mexico**

McCaa (2000) reports a gain in life expectancy of "as much as 5 or 10 years" during the nineteenth century, rising to perhaps 30 years around 1900 from a level at or below 20 years in 1800. Alba (1982) argues that "health conditions began to improve after 1860," which is also the decade cited by Cook and Borah (1974-79). Arriaga (1968) suggests gains from the latter 1890s. Estimates from Mier y Terán and Collver, reported by Pérez Brignoli (1989) and Camposortega (1992), are consistent with this interpretation, although these series do not begin until 1895-1900. But the series estimated by Bravo Becherelle, Jimenez Reyes, and Jimenez Reyes (1958), which opens in 1893, shows life expectancy at birth between 23.3 and 29.5 years in the period 1893-1900, which may be too low to accommodate sustained gains from an earlier period. These estimates suggest that gains began instead in the 1900s. It is difficult to narrow these estimates down further than to say that life expectancy began to rise between the 1860s and the 1900s. Improvements in survival were interrupted during 1910-20 by civil war and the influenza epidemic, but resumed in the 1920s and came at a fast pace between 1925 and 1960.

Arriaga 1968; Pérez Brignoli 1989; UN#55; UNDY1967; WDI 2002

- Alba, Francisco. 1982. *The Population of Mexico: Trends, Issues, and Policies*. New Brunswick.

- Arriaga, Eduardo E. 1988. "Problemas relacionados con la medición de la mortalidad," in Mario Bronfman and José Gómez de León, eds., *La mortalidad en México: Niveles, tendencias y determinantes*. Mexico City, pp. 143-64.
- Benítez Zenteno, Raúl, and Gustavo Cabrera Acevedo. 1967. *Tablas abreviadas de mortalidad de la población de México 1930, 1940, 1950, 1960*. Mexico City.
- Bradshaw, Benjamin S. 1991. "Mortality in Mexico," in Ira Rosenwaike, ed., *Mortality of Hispanic Populations: Mexicans, Puerto Ricans, and Cubans in the United States and in the Home Countries*. New York, pp. 15-30.
- Bravo Becherelle, M. A. and R. Jiménez Reyes. 1958. "Tablas de vida para México 1893 a 1956," *Revista del Instituto de Salubridad y Enfermedades Tropicales* 18: 81-136.
- Camposortega Cruz, Sergio. 1992. *Análisis demográfico de la mortalidad en México, 1940-1980*. Mexico City.
- Camposortega, Sergio. 1990. "La Mortalidad en los años ochenta," *Revista Mexicana de Sociología* 52: 83-110.
- Cook, Sherburne F. and Woodrow Borah. 1971-79. *Essays in Population History: Mexico and the Caribbean*. 3 vols. Berkeley.
- Feliciano, Zadia M. 2000. "Mexico's Demographic Transformation: From 1900 to 1990," in Michael R. Haines and Richard H. Steckel, eds., *A Population History of North America*. Cambridge, pp. 601-30.
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- McCaa, Robert. 2000. "The Peopling of Mexico from Origins to Revolution," in Michael R. Haines and Richard H. Steckel, eds., *A Population History of North America*. Cambridge, pp. 241-304.
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- Rabell, Cecilia A. and Marta Mier y Terán. 1986. "Mortality Decline in Mexico from 1940 to 1980," in Harald Hansluwka et al., eds., *New Developments in the Analysis of Mortality and Causes of Death*. Bangkok, pp. 437-69.

## Nicaragua

Life expectancy began to rise in the 1930s or 1940s, more probably the 1930s. The 1921 level has been estimated at 24.4 years.

Arriaga 1968; UN#55; UNDYHS; WDI 2002

Donahue, John M. 1986. *The Nicaraguan Revolution in Health: From Somoza to the Sandinistas*. South Hadley, MA.

Fox, Robert W. and Jerrold W. Huguet. 1976. *Demographic Trends and Urbanization in Nicaragua*. [Washington].

Macció, Guillermo. 1967. *Nicaragua, proyecciones de población por sexo y grupos de edad, 1950-1978*. Santiago de Chile.

Nicaragua. 1943. *Indíces demográficos de Nicaragua, 1933-1942: Estudios especiales*. [Managua].

## **Panama**

Chamberlain (1929) shows that the crude death rate in Panama City and Colon fell sharply from 1909 to the 1920s, as it did also in the Canal Zone, inhabited mostly by workers from the US and the West Indies. National estimates, available from 1930, show life expectancy at 35.9 years and rising, and infant mortality in decline from the 1920s. Even though only about 20 percent of the population lived in the two leading cities, it is plausible to infer that a sustained rise in life expectancy began in the 1910s.

Arriaga 1968; UNDYHS; WDI 2002

Chamberlain, Weston P. 1929. *Twenty-five Years of American Medical Activity on the Isthmus of Panama, 1904-1929: A Triumph of Preventive Medicine*. Mount Hope, C.Z.

McLaren, J. P. 1972. *A Brief History of Sanitation in the Canal Zone, 1513-1972: Environmental Health*. n.p.

## **Paraguay**

Life expectancy in 1899 is estimated at 26.1 years. Survival began to improve in the 1920s or 1930s (Arriaga, 1968), but life expectancy probably did not reach the level estimated by the UN for the early 1950s of 62.7 years.

Arriaga 1968; UN#55; UNDYHS; WDI 2002

## **Peru**

Arriaga (1966) estimates life expectancy and infant mortality in 1940 at 36.4 years and 196.1 per 1000, respectively. Both suggest the possibility of prior gains, so that survival is estimated to have improved from the 1930s or 1940s.

UN#55; UNDYHS; WDI 2002

Arriaga, Eduardo E. 1966. "New Abridged Life Tables for Peru: 1940, 1950-51, and 1961," *Demography* 3: 218-37.

Peru. 1973. Oficina nacional de estadística y censos, *Estudio sobre la población peruana: Características y evolución*. Lima.

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## **Puerto Rico**

After a long period of quite modest gains, life expectancy rose sharply in the 1900s from a beginning level of 30.4 to 32.1 years, changed little in the 1910s and 1920s, and then again rose sharply from the 1930s (Vázquez, 1961, 1963, 1964, and 1988; Rivera de Morales, 1970; Morales del Valle and Carnivali, 1984).

- Morales del Valle, Zoraida. 1991. "Mortality in Puerto Rico," in Ira Rosenwaike, ed., *Mortality of Hispanic Populations: Mexicans, Puerto Ricans, and Cubans in the United States and in the Home Countries*. New York, pp. 31-53.
- Morales del Valle, Zoraida, and Judith Carnivali. 1984. *Cambios en la mortalidad de Puerto Rico mediante el análisis de la tablas de vida: 1765-1980*. San Juan.
- Rivera de Morales, Nidia. 1970. *Mortalidad en Puerto Rico: 1888-1967*. Unpublished typescript.
- Vázquez, José L. 1964. *The Demographic Evolution of Puerto Rico*. Unpublished PhD dissertation, University of Chicago.
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- Vazquez, José L., Nidia R. Morales, and Jose L. Janer. 1963. *Tablas de vida abredadas para Puerto Rico 1894-1958-61*. San Juan.

## Suriname

Using crude death rates, Lamur (1973) and Boldewijn, Lamur, and Lamur (1977) locate the beginning of gains in life expectancy in the 1920s, albeit apparently using official mortality statistics, which are probably incomplete and understated (Oostburg, 1992). Official sources suggest an uneven picture since 1960 with successive years without improvement.

UN#55; UNDYHS; WDI 2002

- Antonius, Ronnie. 2001. *The Historical Development of the Health System in Suriname, Health Care Reform: Policy Content and Process in the Caribbean*. Study No. 3. Ed. by Mary Hadley. London.
- Boldewijn, H. A. C., H. E. Lamur, and R. A. Lamur. 1977. "Life Table for Suriname, 1964-1970," *Nieuwe West-Indische Gids* 52: 51-57.
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- Oostburg, Baltus F. J. 1992. *Health Situation in Suriname*. Paramaribo.
- Suriname. 1999. Algemeen Bureau de Statistiek, *Demografische data tot en met 1997*. Paramaribo.

## Trinidad and Tobago

Life expectancy apparently jumped upward after slavery was abolished, in the 1830s, but the health transition and its sustained gains did not begin until later. Harewood (1975) and Abdulah (1985) trace the beginning decline in mortality to the 1920s when life

expectancy was some 39.4 years, although Harewood also finds some modest decline in crude death rates between 1900 and 1920.

UNDYHS; WDI 2002

Abdulah, Norma, ed. n.d. *Trinidad and Tobago 1985: A Demographic Analysis*. n.p.

Gulliford, M. C. 1996. "Epidemiological Transition in Trinidad and Tobago, West Indies 1953-1992," *International Journal of Epidemiology* 25: 357-65.

Harewood, Jack. n.d. Papers on the Population of Trinidad and Tobago. Unpublished typescripts. n.p.

Harewood, Jack. 1975. *The Population of Trinidad and Tobago*. Paris.

John, A. Meredith. 1988. "Plantation Slave Mortality in Trinidad," *Population Studies* 42: 161-82.

John, A. Meredith. 1988. *The Plantation Slaves of Trinidad, 1783-1816: A Mathematical and Demographic Enquiry*. Cambridge.

Pemberton, Rita A. 1998. The Battle vs. Disease: Public Health in Trinidad and Tobago, 1898-1939. Unpublished paper. Paramaribo.

Roberts, G[eorge]W. 1951-52. "A Life Table for a West Indian Slave Population," *Population Studies* 5: 238--43.

Trinidad and Tobago. various years. Central Statistical Office, *Population and Vital Statistics Report*. Port of Spain.

## Uruguay

Official estimates of the crude death rate (Narancio, Capurro Calamet, and Ruano Fournier, 1939; Rial, 1980) suggest an already low level in the 1870s and a significant decline during the 1890s, but then little change thereafter until the 1930s. But Migliónico's (2001a) reconstructed life tables, which are based on official statistics for mortality by age and estimates of the population at risk between census years, indicate that persistent gains began in the early 1920s from an unusually high beginning level of some 50 years.

UNDYHS; WDI 2002

Bidegain, Gabriel and N'Zinga Ludyinduladio. 1985? *Evaluación de las tables de mortalidad del Uruguay y comparación a las tables modelos de Princeton y de la O.C.D.E.* Montevideo.

Migliónico, Américo. 2001b. *La Mortalidad en Uruguay en el siglo XX: Cambios, impacto, perspectivas*. Montevideo.

Migliónico, Américo. 2001a. *Tablas abreviadas de mortalidad por sexo y edad: Total del país, 1908 a 1999*. Montevideo.

Narancio, Edmundo M., Federico Capurro Calamet, and Agustín Ruano Fournier. 1939. *Historia y análisis estadístico de la población del Uruguay*. Montevideo.

Pereira, Juan José and Raúl Trajtenberg. 1966. *Evolución de la población total y activa en el Uruguay 1908-1957*. Montevideo.

Rial, Juan. 1980. *Estadísticas históricas de Uruguay, 1850-1930*. Montevideo.

Rial, Juan. 1983. *Población y desarrollo de un pequeño país: Uruguay 1830-1930*. n.p.

- United States. 1944. Bureau of the Census, *Uruguay, Summary of Biostatistics*. Washington.
- Uruguay. 1989. Dirección general de estadística y censos, *Uruguay: estimaciones y proyecciones de población por edad y sexo total del país 1950-2025*. Montevideo.

## United States

It is difficult to find a trend in white or non white mortality in the period 1800-1860 (McClelland and Zeckhauser, 1982), chiefly because data are sparse and difficult to interpret. Haines (1999) finds no consistent decline in US mortality until after 1870 or around 1880 (Haines, 1994). His estimates show gains onward from 1850, when life expectancy was 38.3 years, with a dip from 1870 to 1880 (Haines, 1998). Like England and Wales, the US was undergoing urbanization in this period and death rates in cities were higher than in rural areas. Thus it is possible that sustained gains began earlier. Until more is known, however, it will be wise to accept Haines' judgment and locate the beginning of the health transition in the 1880s. Among non whites life expectancy apparently declined in the 1890s and early 1900s (Ewbank, 1987; and United States, [www.cdc.gov/nchs](http://www.cdc.gov/nchs)).

## HMD

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- Haines, Michael R. 1998. "Estimated Life Tables for the United States, 1850-1910," *Historical Methods* 31: 149-69.
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- Haines, Michael R. 2001. "The Urban Mortality Transition in the United States, 1800-1940," National Bureau of Economic Research Historical Paper No. 134. Cambridge MA. Also in *Annales de démographie historique*, 33-64.
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- Haines, Michael R., Lee A. Craig, and Thomas Weiss. 2000. "Development, Health, Nutrition, and Mortality: The Case of the 'Antebellum Puzzle' in the United States." National Bureau of Economic Research Historical Paper No. 130. Cambridge, MA.
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- Preston, Samuel H., Irma T. Elo, Mark E. Hill, and Ira Rosenwaike. 2003. *The Demography of African Americans 1930-1990*. Dordrecht.

Preston, Samuel H. and Michael R. Haines. 1991. *Fatal Years: Child Mortality in Late Nineteenth-Century America*. Princeton.

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United States. No date. National Center for Health Statistics, *National Vital Statistics Reports* at [www.cdc.gov/nchs](http://www.cdc.gov/nchs).

*Vital Statistics of the United States*. Various years. Washington.

## Venezuela

Arriaga's (1968) estimates indicate that gains in life expectancy and reductions in infant mortality began in the 1920s or 1930s, and this agrees with the estimates of crude death rates provided by Chen and Picouet (1979). The 1926 life expectancy level was about 32.2 years. Gains were particularly fast in the 1940s and 1950s.

Arriaga 1968; UN#55; UNDYHS; WDI 2002

Aguilera, Jesús A. 1980. *La población de Venezuela: Dinámica histórica, socioeconómica, y geográfica*. 2<sup>nd</sup> ed. Caracas.

Archila, Ricardo. 1956. *Historia de la sanidad en Venezuela*. 2 vols. Caracas.

Avilán Rovira, José Miguel et al. "Evolución de las condiciones de salud (1936-1985): Indicadores de salud y bienestar," in *VII Congreso Venezolano de salud pública*. 7 vols. Caracas, I, 95-231.

Bidegain, Gabriel, Zoraida G. de Suárez, and Jean Papail. 1986. *Evolución del nivel y las causas de mortalidad en Venezuela en el periodo 1959-1978*. Caracas.

Chen, Chi-Yi and Michel Picouet. 1979. *Dinámica de la población: Caso de Venezuela*. Caracas.

Escalona, Luis A. 1976. "Tablas de mortalidad de Venezuela," *Estadística venezolana* No. 7: 9-21.

## ASIA

### Afghanistan

There is little solid information for any period. Berke (1946) reports new activity in public health and medical training in the late 1920s and 1930s, but does not link that to survival. The UN (UN#55) estimated life expectancy in 1950 at 30 years (which leaves some possible room for earlier improvement) and rising. Survival presumably began to improve in the late 1940s or 1950s. Both UN and WDI 2002 estimates suggest continued gains to 2000, with the UN being more optimistic. It is difficult to reconcile these estimates with events in Afghanistan, especially war and migration. More realistically, Khalidi (1989) reports uneven change.

UN#55; UNDYHS; WDI 2002

Berke, Zuhdi. 1946. "La santé publique et l'hygiène en Afghanistan," *Afghanistan* 1:1-9.

Hobbs, Frank. 1988. *Afghanistan: A Demographic Profile*. Washington, DC.

Khalidi, Noor Ahmad. 1989. *Demographic Profile of Afghanistan*. Canberra.

Spitler, James F. and Nancy B. Frank. 1978. *Afghanistan, a Demographic Uncertainty*. Washington.

Trussell, James and Eleanor Brown. 1979. "A Close Look at the Demography of Afghanistan," *Demography*, 16: 137-56.

### Bahrain

Little direct evidence is available even into the 1970s. Oil exports, begun in 1933, and other indications of economic development suggest that both overall and infant mortality may have declined from about 1940. This is in agreement with UN estimates of life expectancy, which start in 1950-55 at 51.0 years, suggesting earlier gains.

UNDYHS; UNSDiv; WDI 2002

*Infant and Childhood Mortality in Western Asia*. 1989. Baghdad.

*The Population of Bahrain: Trends and Prospects*. 1979. n.p.

### Bangladesh

See also India and Pakistan.

Ahmed (1963) gives life expectancy estimates for Bengal and East Pakistan from 1871-81, which suggest that most of the area of present-day Bangladesh participated, albeit marginally, in the reductions in mortality reported for the British colony of India as a whole from the 1920s. Life expectancy in the period 1921-31 is estimated at 24.9 years. There is little direct information on mortality between the 1950s and the 1970s.

UN#55; UNDYHS; WDI 2002

Ahmed, A.S.M. Mohiuddin. 1963. *The Population of Pakistan: Past and Present*. Unpublished PhD dissertation. Duke University.

- Ahmed, Ashraf Uddin. 1986. *Analysis of Mortality Trends and Patterns in Bangladesh*. Bangkok.
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- Begum, Sharifa. 1979. *Birth Rate and Death Rate in Bangladesh, 1951-74*. Dacca.
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## **Cambodia**

According to Siampos (1970), Cambodia's health transition began in the second half of the 1940s, though there may have been some earlier gains. Siampos estimates life expectancy in the 1940s at 35 years, which is apparently an informed guess. By 1967 life expectancy had risen to about 45.4 years, but by 1977, amidst war and mass killings by the regime, it had dropped to about 31.2. In the later 1970s and early 1980s there was a quick recovery to the life expectancy level of the 1960s, but since then only a few years have been added.

UN#55; UNDYHS; WDI 2002

Siampos, George S. 1970. "The Population of Cambodia, 1945-1980," *Milbank Memorial Fund Quarterly* 48: 317-60.

## **China**

For two reasons it seems necessary to conclude that China's health transition began in the 1920s, was interrupted by war and civil war in the late 1930s and 1940s, and resumed when the Maoists came to power in 1949. First, although estimates of life expectancy for the period 1925-1936 vary from 24.2 to 35 years (Brass, 1986; Caldwell et al., 1986; Jiang, 1986; Chen, 1946; Notestein and Chiao, 1937; Wang, 1986; and Zheng, 1986), all show an increase between then and the early 1950s. Second, several authorities (Chen, 1989; Hillier and Jewell, 1983; Campbell, 1997; and Yip, 1995) adduce concrete reasons why survivorship improved in the 1920s and 1930s in the spread of public health ideas and practice, and the development of urban health facilities (on which see also Hayford, 1990). (However, Banister (1987) describes the decades before 1949 as marred by war, poor sanitation, polluted water, minimal control of epidemic disease, and ineffective smallpox immunization, and Chen (1946), assessing the period 1917-1944, expects gains in infant mortality and life expectancy in the future.)

UN#55; WDI 2002

Adlakha, Arjun and Judith Banister. 1995. "Demographic Perspective on China and India," *Journal of Biosocial Science* 27: 163-78.

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- Banister, Judith, and Kenneth Hill. 2004. "Mortality in China 1964-2000," *Population Studies* 58: 55-75.
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- Chen, C. C. 1989. *Medicine in Rural China: A Personal Account*. Berkeley.
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- Coale, Ansley J. 1984. *Rapid Population Change in China, 1952-1982*. Washington.
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- Lee, James and Wang Feng. 1999. "Malthusian Models and Chinese Realities: The Chinese Demographic System 1700-2000," *Population and Development Review* 25: 33-65.
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- Sheng, Hao Hong. 1994. "Mortality Levels, Trends and Differentials in China," in Kuttan Mahadevan et al., eds., *Differential Development and Demographic Dilemma: Perspectives from China and India*. Delhi, pp. 225-49.
- Wang, Weizhi. 1986. "A Preliminary Analysis of the Death Rate in China," in Chengrui Li, ed., *A Census of One Billion People*. Hong Kong, pp. 599-613.
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- Yip, Ka-che. 1995. *Health and National Reconstruction in Nationalist China: The Development of Modern Health Services, 1928-1937*. Ann Arbor.

Zheng, Liu. 1986. *Mortality Patterns and Trends of Population in China*. Bangkok.

## Cyprus

St John-Jones' (1983) estimates indicate that life expectancy began to rise in the 1890s or 1900s from an 1890s level of some 38.5 years. Progress came rapidly in the decade after World War II.

UNDYHS; WDI 2002

St John-Jones, L.W. 1983. *The Population of Cyprus: Demographic Trends and Socio-economic Influences*. Hounslow.

## India

See also Bangladesh and Pakistan.

Up to 1947 the Indian data include present-day Bangladesh and Pakistan. Work by a number of scholars, beginning with Das Gupta (1971), Visaria and Visaria (1982), and Bhat (1987), has corrected official estimates of life expectancy. According to Das Gupta, Bhat, and the official estimates, life expectancy began to rise in the 1920s. Das Gupta's estimates show a continuing increase in the 1930s and 1940s, but both Bhat and the official series suggest instead that life expectancy stabilized in the 1930s and 1940s and then resumed rising. In any case life expectancy began to rise in the 1920s from an initial level of some 24.9 years.

UN#55; UNDYHS; WDI 2002

Agarwala, S. N. 1973. *India's Population Problems*. Bombay.

Bhasin, Veena. 1994. *People, Health and Disease: The Indian Scenario*. Delhi.

Bhat, Mari Padaru. 1987. *Mortality in India: Levels, Trends and Patterns*. Unpublished PhD dissertation, University of Pennsylvania.

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## Indonesia

Boomgaard (1989) suggests that the crude death rate in Java declined between 1820-1850 and 1850-1880 amidst waning smallpox mortality, and that mortality around 1800 may have been higher still. But this trend does not seem to have continued. Likewise estimating crude death rates, most authorities suggest that mortality began to decline in Java and Indonesia in the 1920s, although weakly and more noticeably in cities and some regions than in either Java or Indonesia as a whole (Gooszen, 1999; Boomgaard and Gooszen, 1991; Gardiner and Oey, 1987; Cho, 1980; Breman, 1963). This interpretation is accepted. However, Utomo and Iskandar (1986) and Soeradji and Ismail (1986) reject this view, dating gains from the early 1950s. There is general agreement that mortality rose during the Japanese occupation (1942-1945) and the Indonesian war for independence (1945-1949).

UN#55; UNDYHS; WDI 2002

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## Iran

The UN estimate of life expectancy (42.4 years) in the early 1950s is high enough to suggest that improvements began in the 1930s or 1940s. But there is little information upon which to build estimates before the 1966 census, the first of good quality. Propaganda from promoters of the Pahlavi dynasty ("Health," 2004) reports without

elaboration or citation that life expectancy was 25 years in 1926, when the Pahlavis took power. That is a suspect source, but the level is plausible. Afkhami (2003) reports that attempts at public health improvements were ineffective until the 1920s, following the establishment of a Pasteur Institute in 1921. Aghajanian (1988) argues that there was little decline in mortality after the 1979 revolution, and fears that mortality may have increased.

UN#55; UNDYHS; WDI 2002

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## **Iraq**

The UN estimate of life expectancy (42.7 years) for the early 1950s is high enough to suggest that improvements began in the 1930s or 1940s. Survival deteriorated sharply during and after the Persian Gulf War, and had not, by 2000, recovered the prewar levels.

UN#55; UNDYHS; WDI 2002

## **Japan**

Some authorities (including Janretta and Preston, 1991; and Macfarlane, 1997) report that Japanese life expectancy was atypically high across the preindustrial era. Hayami (2001), exploring CDRs in a group of towns, finds a trend decline across the period 1670-1860. Thus it is uncertain whether the comparatively high life expectancy reported for the 1860s was a longstanding or a newer feature of experience. On the assumption that it was longstanding, life expectancy began to rise at some point between the 1870s and the 1890s, more probably in the 1890s. The pace of gains remained quite slow until 1925-1935. World War II led to severely high mortality, but the Japanese recovered quickly in the immediate postwar years, passed Sweden around 1978 as the world leader in life expectancy, and kept that lead to the end of the century.

HMD

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## **Jordan**

Winckler (1997) suggests that mortality in the Middle East in general declined from the second half of nineteenth century as famine and epidemics were brought under control. Because the first reliable information derives from the 1961 census, there is no evidence to confirm the suggestion of early decline. Nevertheless the levels of life expectancy (48.2 years) derived from that census and of infant mortality drawn from fertility and demographic and health surveys, especially Blacker, Hill, and Moser (1983), suggest that survival improvements began in the 1930s.

UN#55; UNDYHS; WDI 2002

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## **Korea**

Kim and Kim (2004) and Kim (1990) trace the decline in mortality to around 1900; Kwon (1977) dates it from the 1910s and associates it with declines in Japan and Taiwan; Lee (1980) traces it to the period 1910-1915; Lee (1985) and Chang (1967) prefer the 1920s as the beginning point, and Ishi (1972) the 1930s. Kwon's estimates have been used; they show that the pace of gain was initially slow from a beginning level of 23.5 years. The health transition was interrupted in 1943-1945 and 1950-1952 and then, at the conclusion of the Korean War, bifurcated into separate paths for the north and south. *Health Statistics* (1987) provides official estimates for North Korea. Early postwar estimates do not always differentiate between the two countries.

UN#55; UNDYHS; WDI 2002

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## **Kuwait**

Hill (1975) implies that life expectancy was about 26 years in Kuwait at Lorimer's 1908 survey and in general in the period before sustained gains in survival began. The UN life expectancy estimate for the early 1950s, at 55.8 years, is high enough to indicate that gains may have begun in the 1930s, but Hill seems to locate the beginning of gains in the period since 1945.

UN#55; UNDYHS; WDI 2002

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## **Laos**

Robinson (1989) reports an estimate of the crude death rate in 1911 of 35 per 1000. By 1949 life expectancy was about 38 years, or perhaps only about 34 years by 1955 (Halpern, 1961), either estimate indicating interim improvement. The UN estimate of life expectancy in the early 1950s (37.8 years) also suggests earlier gains, beginning perhaps in the 1930s or 1940s. Laos improved these levels little until the late 1970s.

UN#55; UNDYHS; WDI 2002

Halpern, Joel Martin. 1961. Population Statistics and Associated Data. Unpublished typescript.

Robinson, Warren C. 1989. "Population Trends and Policies in Laos (Lao People's Democratic Republic) and Cambodia (Democratic Kampuchea)," *International Population Congress New Delhi 1989*. 3 vols. Liège, I, 143-53.

## **Lebanon**

The UN estimate for life expectancy in the early 1950s, at 54 years, is high enough to indicate that improvements began in the 1930s or 1940s.

UN#55; UNDYHS; WDI 2002

## **Malaysia**

Saw (1988) and Fernandez, Hawley, and Pridaza (1976) find the mortality decline in progress by the 1930s. Manderson shows that crude death rates declined after about 1911 in the Straits Settlement. (British Malaya included the Straits Settlement of Penang, Province Wellesley, Singapore and Malacca, the Federated Malay States, the Unfederated Malay States, and Brunei. As of 1911 the Straits Settlement accounted for 24.9 percent of the total population in the Malay states.) In Peninsula Malaysia (the Federated Malay States) the crude death rate declined after 1911.

UN#55; WDI 2002

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Saw, Swee-Hock. 1988. *The Population of Peninsula Malaysia*. Singapore.

### **Mongolia**

UN estimates of life expectancy in the early 1950s are high enough, at 42.2 to 45 years, to suggest that gains began in the 1940s or 1950s.

UN#55; UNDYHS; WDI 2002

### **Myanmar**

UN estimates imply that life expectancy began to rise in the 1930s or 1940s. But Horwood's (1956) estimates for the early 1950s (life expectancy of 31 to 32 years), his description of health conditions, and Richell's (1992) appraisal of infant mortality suggest that gains may not have begun before the 1950s.

UN#55; UNDY1967; UNDYHS; WDI 2002

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Richell, Judith. 1992. "Ephemeral Lives: The Unremitting Infant Mortality of Colonial Burma, 1891-1941," in Valerie Fildes, Lara Marks, and Hilarid Marland, eds., *Women and Children First: International Maternal and Infant Welfare 1870-1945*. London, pp. 133-53.

### **Nepal**

Although population growth at an average annual rate of 1.2 percent in the 1930s suggests the possibility of gains in survival before World War II, it is likelier that life expectancy began to improve in the late 1940s or 1950s. UN estimates place life expectancy in the early 1950s within the range of 33.1 to 36.3 years.

UN#55; UNDYHS; WDI 2002

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## Oman

Descriptions of conditions in the 1920s, 1930s, and 1940s (Harrison, 1940; O'Shea, 1947; Phillips, 1966) suggest poor hygiene, few medical resources, and economic wretchedness. A UN investigation (1978) reported the crude death rate in the mid 1950s to have been about 60 per 1000, an exceptionally high level and at odds with the UN estimate of life expectancy in the early 1950s at 36.4 years. Oil exploration began in the mid 1950s and the first strike came in 1963. British aid from 1959 contributed to development in health and education. There is an apparent conflict between descriptions of circumstances in the 1920s, 1930s and 1940s, and estimates of infant and child mortality and life expectancy in the 1950s and 1960s, in that the descriptions suggest conditions ill calculated to have allowed infant mortality as low as 231 per 1000 in the early 1950s, or a life expectancy as high as 40.3 years in 1960 (WDI 2002). Hill and Chen (1996) report exceptionally rapid improvement in life expectancy and infant mortality after 1970. Gains in life expectancy and infant mortality began between the 1940s and 1970s.

UNDYHS; WDI 2002

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Hill, Allan G. and Lincoln C. Chen. 1996. *Oman's Leap to Good Health: A Summary of Rapid Health Transition in the Sultanate of Oman*. Muscat.

Hill, A. G. , A. Z. Muyeed, and J. A. al-Lawati. 2000. *The Mortality and Health Transition in Oman: Patterns and Processes*. Muscat, the results of a UNICEF sponsored study, which may be found at [www.unicef.org/evaldatabase/index\\_14179.html](http://www.unicef.org/evaldatabase/index_14179.html).

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## Pakistan

See also India and Bangladesh.

Robinson (1967) reports that mortality began to decline around 1900, with an interruption in the 1940s, and Afzal (1974) accepts this chronology. Ahmed (1963) estimates life expectancy in Pakistan in the decade 1941-1951, a period of recurrent crises, at only 22.8 years, but finds that mortality declined from 1921. Irfan (1986) and Rukanuddin and Farooqui (1988) agree. Ahmed's estimates of life expectancy in Punjab for the period 1871-1931 usually surpass those for British India while his estimates for Bengal usually fall short, but estimates for just the territory of Pakistan as of 2000 have not yet been produced. (In 1947 Punjab was divided with West Punjab going to Pakistan.)

In the absence of contrary information, it seems best to associate Pakistan with British India, and to conclude that life expectancy began to rise and infant mortality to fall in the 1920s.

UN#55; UNDYHS; WDI 2002

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Robinson, Warren C. 1967. "Recent Mortality Trends in Pakistan," in Warren C.

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Rukanuddin, Abdul Razzaque and M. Naseem Iqbal Farooqui. 1988. *The State of Population in Pakistan, 1987*. Islamabad.

## Philippines

Several authorities describe the period 1875-1905 as one of recurrent crises caused by epidemics and war, and this picture is affirmed by CDR estimates in Smith (1975). Population growth resumed around 1905. There is also some consensus that mortality declined from the 1930s, albeit slowly for some years (Aromin, 1961; Concepcion, 1978; Madigan, 1965; Zablan, 1994). But the levels of life expectancy suggested for the 1930s, at 40 to 46 years, are high enough to leave room for earlier decline. Fliieger (1982) suggests decline from early in the twentieth century, by implication around 1910, which agrees with estimates assembled by Concepcion and Kintanar (1974). Zablan's series of crude death rates shows decline after the late 1910s except for the period 1942-45. Hence the beginning of rising life expectancy cannot be dated more precisely than the 1910s to the 1930s.

UNDY1967; UNDYHS; WDI 2002

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## **Qatar**

The UN estimate for the early 1950s, at 48 years, suggests that survival gains for the overall population and for infants began in the 1930s or 1940s. But there is very little in descriptions of the region to suggest how this may have happened.

UNDYHS; WDI 2002

### **Saudi Arabia**

UN estimates of life expectancy in the early 1950s, 34.7 to 39.9 years, suggest that gains in general and infant survival began in the 1940s or 1950s. Chu, Djazar, and Adham (1963) report some public health improvements as early as the 1930s.

UN#55; UNDYHS; WDI 2002

Chu, C. K., S. K. Djazar, and M. H. Adham. 1963. *Report on a Health Survey of Saudi Arabia*. Alexandria.

World Health Organization. 1963. *Report on a Health Survey of Saudi Arabia from 10<sup>th</sup> November 1962 to 31<sup>st</sup> January 1963*. Alexandria.

### **Singapore**

Crude death rates are available for the Straits Settlement from 1878. Those show a high and variable level of mortality peaking in 1901-1905 at 47.1 deaths per 1000, above the average for 1878-1900 of 34.6 (Cheng, 1979; Saw, 1999; Manderson, 1987). Thus there was sustained decline in mortality from 1906-1910, but the crude death rate did not drop below the 1878-1900 average until the early 1920s. Sustained gains in life expectancy may be said to have begun in the 1900s (Cheng, 1979) or the 1920s (Ho, 1979), but the beginning level of life expectancy is unknown.

UN#55; UNDYHS; WDI 2002

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### **Sri Lanka**

Meegama (1979 and 1981) traces the beginning of gains in life expectancy to the late nineteenth century, Sarkar (1957) and Roche (1976) to the early 1900s, Ramachandran (1959) to 1923, and Gunatilleke (1985) to the 1930s. United Nations (1976) and Langford and Storey (1993) locate the beginning "after 1921" but in the 1920s, which is the interpretation accepted. Especially rapid progress came in the late 1940s and 1950s.

UNDYHS; WDI 2002

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## Syria

Winckler (1999) associates the beginning of survival gains with the French mandate after World War I. Although there is little information for the period before 1950, UN estimates of life expectancy (43.8 to 46 years) and infant mortality (160 per 1000) for the early 1950s and descriptive accounts of the development of hospital and public health facilities in the earlier period (Blecher, 2002) both suggest that gains in survival for the general population began in the 1930s.

UN#55; UNDYHS; WDI 2002

Blecher, Robert Ian. 2002. *The Medicalization of Sovereignty: Medicine, Public Health, and Political Authority in Syria, 1861-1936*. Unpublished PhD dissertation, Stanford University.

Farag, Mahmoud. "Mortality Level and Differentials Associated with Socio-Economic Development in Syria," in Cairo Demographic Centre Research Monograph Series No. 8, *Mortality Trends and Differentials in Some African and Asian Countries*. Cairo, pp. 317-351.

Thavarajah, A. and M. N. Hallak. 1970. "Fertility, Mortality and Population Growth in Syria," in Cairo Demographic Centre, *Demographic Measures and Population Growth in Arab Countries*. Cairo, pp. 195-222.

Winckler, Onn. 1999. *Demographic Developments and Population Policies in Ba'thist Syria*. Brighton.

## Taiwan

Mizraee (1979) locates the beginning of "steady and continuous" decline in infant and overall mortality in 1920, and Liu (2000) accepts Mizraee's estimates. Taiwan was a Japanese colony when its mortality decline began, and Japanese public health programs appear to have stimulated the decline. The life expectancy level in 1911-1920 was about 30.8 years.

Barclay, George W. 1954. *Colonial Development and Population in Taiwan*. Princeton.

Liu, Shi-yung. 2000. *Medical Reform in Colonial Taiwan*. Unpublished PhD dissertation, University of Pittsburgh.

Liu, Ts'ui-jung and Shi-yung Liu. 2001. "Disease and Mortality in the History of Taiwan," in Ts'ui-jung Liu et al., eds., *Asian Population History*. Oxford, pp. 248-69.

Mirzaee, Mohammed. 1979. *Trends and Determinants of Mortality in Taiwan, 1895-1975*. Unpublished PhD dissertation, University of Pennsylvania.

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## Thailand

Chamrathirong (1981), Arnold, Retherford, and Wanglee (1977), Bourgeois-Pichat (1974), Rungpitarangsi (1974), and Thomlinson (1971) agree that mortality decline began in the late 1940s when DDT was used to combat malaria. However, the life expectancy estimated for the period immediately before these gains began, 38.3 to 40.3 years, is surprisingly high for a country at the beginning of a health transition. Gains in overall and infant survival more probably began in the 1930s but were temporarily reversed in the early 1940s. That would still be consistent with Bourgeois-Pichat's estimates of the crude death rate (an average of 29.2 in the 1930s) because, as he argues, fertility was significantly higher than mortality and the population was growing, so that the average age of the population was declining. And it would be consistent with Manarungsan's (1989) CDR series as well, in which the average in the 1930s was 24.4 deaths per 1000..

UN#55; UNDY1967; UNDYHS; WDI 2002

Arnold, Fred, et al. 1980. *Fertility and Mortality Changes in Thailand, 1950-1975*. Washington.

Arnold, Fred, Robert D. Retherford, and Anuri Wanglee. 1977. *The Demographic Situation in Thailand*. Honolulu.

Bourgeois-Pichat, Jean. 1974. "An Attempt to Appraise the Accuracy of Demographic Statistics for an Under-developed Country: Thailand," in *Perspective on Thai Population*. Bangkok, pp. 1-31.

Chamrathirong, Aphichat. 1981. *Mortality Trends and Differentials in Thailand: 1950-1975*. Bangkok.

Chamrathirong, Aphichat, and Chintana Pejaranonda. 1986. "Levels, Trends and Differentials of Mortality in Thailand," in Harald Hansluwka et al., *New Developments in the Analysis of Mortality and Causes of Death*. Bangkok, pp. 527-41.

Cochrane, Susan H. 1979. *The Population of Thailand: Its Growth and Welfare*. Washington, D.C.

Manarungsan, Sompop. 1989. *Economic Development of Thailand, 1850-1950: Response to the Challenge of the World Economy*. Bangkok.

*The Population of Thailand*. 1974. Bangkok.

Porapakham, Yawarat. 1986. *Levels and Trends of Mortality in Thailand*. Bangkok.

Rungpitarangsi, Benjawan. 1974. *Mortality Trends in Thailand: Estimates for the Period 1937-1970*. Bangkok.

Thomlinson, Ralph. 1971. *Thailand's Population: Facts, Trends, Problems, Policies*. Bangkok.

Vallin, Jacques. 1976. "La population de la Thaïlande," *Population* 31: 153-75.

## Turkey

*Population of Turkey* (1995) locates the beginning of gains in life expectancy in the 1920s; Shorter and Macura (1982) prefer before 1935 as the point of initiation. The health transition is estimated to have begun in the 1920s or 1930s, but the beginning level is unknown.

UN#55; UNDYHS; WDI 2002

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- Behar, L. 1977. "Les tables de mortalité de la Turquie," in *L'analyse démographique et ses applications*. Paris, pp. 129-39.
- Bulutoglu, Yakut. 1970. *La structure par âge et la mortalité de la population de la Turquie: Essai d'analyse démographique*. Paris.
- Demeny, Paul, and Frederic C. Shorter. 1968. *Estimating Turkish Mortality, Fertility and Age Structure*. Istanbul.
- Panzac, Daniel. 1996. *Population et santé dans l'Empire ottoman (XVIIIe - XXe siècles)*. Istanbul.
- The Population of Turkey, 1923-1994: Demographic Structure and Development*. 1995. Ankara.
- Shorter, Frederic and Miroslav Macura. 1982. *Trends in Fertility and Mortality in Turkey, 1935-1975*. Washington.

### **United Arab Emirates**

The UN estimate of life expectancy in the early 1950s, at 48 years, suggests that gains in survival began in the 1940s, or perhaps earlier.

UNDYHS; WDI 2002

- Rosling, Hans. 1999. *Health Development in the United Arab Emirates from a Global Perspective*. Abu Dhabi.

### **Vietnam**

Feeney and Xenos (1993) argue that information is too poor to decide how much mortality has declined or when. But other authorities make suggestions: Banister (1985) finds the major transformation in health in Vietnam in the period from the 1950s to the 1980s, wars with France and the United States notwithstanding. Barbieri et al. (1995) observe rapid but irregular declines in mortality between the colonial period and the late 1970s. Bryant (1998) reports few positive steps in public health during the French colonial period, but Gendreau's (1997) estimates of life expectancy for 1900 and 1930 indicate an interim gain of about 10 years. Vietnam's health transition began in the 1920s or 1930s but has been interrupted by Japanese occupation during World War II, a serious famine at the end of that war, during certain parts of the wars with France and the United States, and during the late 1950s famine.

UN#55; UNDYHS; WDI 2002

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- Barbieri, Magali et al. 1995. "La situation démographique du Viêt Nam," *Population* 50: 621-51.
- Bryant, John. 1998. "Communism, Poverty, and Demographic Change in North Vietnam," *Population and Development Review* 24: 235-69.
- Charbit, Yves and Catherine Scornet, eds. 2002. *Société et politiques de population au Viêt-Nam*. Paris.
- Feeney, Griffith, and Peter Xenos. 1993. *The Demographic Situation in Vietnam: Past, Present, Prospect*. Honolulu.
- Gendreau, Francis, Vincent Fauveau, and Dang Thu. 1997. *Démographie de la péninsule indochinoise*. Paris.
- Gubry, Patrick, ed. 2000. *Population et développement au Viêt-nam*. Paris.
- Jones, Gavin W., and Stewart E. Fraser. 1984. "Population Trends and Policies in Vietnam," in Gavin W. Jones, ed., *Demographic Transition in Asia*. Singapore, pp. 201-28.
- Lâm, Thanh Liêm. 1991. *La population du Vietnam: Problèmes et perspectives*. Paris.
- McMichael, Joan K., ed. 1980. *Health Care for the People: Studies from Vietnam*. Boston.
- McMichael, Joan K., ed. 1976. *Health in the Third World: Studies from Vietnam*. Nottingham.
- Merli, M. Giovanna. 1988. "Mortality in Vietnam, 1979-1989," *Demography* 35: 345-60. *Public Health in the Democratic Republic of Vietnam, 1945-1965*. 1965. (Hanoi.

## Yemen

UN estimates of life expectancy in the early 1950s, in the low 30s, suggest that gains in survival began in the 1940s or 1950s.

UN#55; UNDYHS; WDI 2002

United Nations. 2002. Economic and Social Commission for Western Asia, *Women and Men in Yemen: A Statistical Portrait*. New York.

## EUROPE

### Albania

Gjonça (2001) suggests that survival gains began before 1930, and that the widely used estimate of life expectancy in 1938 of 38.3 years is too high because deaths were underreported. Estry-Behar and Behar (1976) locate improvements in the public health infrastructure in the 1940s. Different sources differ slightly about levels in 1950 and thereafter; Meksi and Della Zuanna (1994) judge that official estimates for 1950 are too high by as much as 4 to 6 years. Survival began to improve in the 1920s or 1930s.

UNDYHS; UNSD Div; WDI 2002

Estry-Behar, Madeleine and Abraham Behar. 1976. *Santé publique et médecine préventive en république populaire d'Albanie*. [Paris].

Gjonça, Arjan. 2001. *Communism, Health and Lifestyle: The Paradox of Mortality Transition in Albania, 1950-1990*. Westport, Conn.

Gjonça, Arjan, Chris Wilson, and Jane Falkingham. 1997. "Paradoxes of Health Transition in Europe's Poorest Country: Albania 1950-90," *Population and Development Review* 23: 585-609.

Meksi, Ermelinda and Gianpiero Dalla Zuanna. 1994. "La mortalité générale en Albanie (1950-1990)," *Population* 49: 607-35.

Meksi, Ermelinda and Pietro Isquinita. 1991. "Aspects de l'évolution démographique en Albanie," *Population* 46: 679-92.

Misja, Vladimir and Ylli Vejsiu. 1985. *Demographic Development in the People's Socialist Republic of Albania*. Tirana.

### Austria

Andorka, Horská, and Head-König (1997-98) trace mortality decline in the Austrian portion of the Austro-Hungarian Empire from the 1820s, when "le recul de la mortalité s'accélère". But crude death rates (Mitchell EHS 1981) do not show a decline until the 1880s or 1890s. Estimates of life expectancy for 1865-1875 and 1901-1905 (Helczmanovszki, 1973 and UNDYHS), 31.7 and 40.1 years respectively, also show that improvement began between those dates. For the Austrian part of the Empire and perhaps also for German-speaking parts of the Empire, the health transition began in the 1880s or 1890s.

HMD; Mitchell EHS 1981; UNDYHS; WDI 2002

Andorka, Rudolf, Pavla Horská, and Anne-Lise Head-König. 1997-99. "L'Europe centrale," in Jean-Pierre Bardet and Jacques Dupâquier, eds., *Histoire des populations de l'Europe*. 3 vols. Paris, II, 427-61.

Bolognese-Leuchtenmüller, Brigit. 1978. *Bevölkerungsentwicklung und Berufsstruktur, Gesundheits- und Fürsorgewesen in Österreich 1750-1918*. Munich.

Helczmanovszki, Heimold. 1973. "Die Entwicklung der Bevölkerung Österreichs in den letzten hundert Jahren nach den wichtigsten demographischen Komponenten," in Heimold Helczmanovszki, ed., *Beiträge zur Bevölkerungs- und Sozialgeschichte Österreichs*. Vienna, pp. 113-65.

Klein, Kurt. 1973. "Zur Entwicklung der Bevölkerung und der Sozialstruktur in Österreich," in Heimold Helczmanovszki, ed., *Beiträge zur Bevölkerungs- und Sozialgeschichte Österreichs*. Vienna, pp. 47-112.

## Belgium

Devos' (2003) crude death rate series suggests gains from 1818 that were, however, reversed in the 1830s. The age-specific death rate series, which begins in 1843, suggests a very slow pace of gain up to about 1880 of one year per decade (Devos, 2003). Masuy-Stroobant (1983) reports that gains were underway by 1847-56, the period for which Quetelet offered an estimate of 38.1 years. Although Devos prefers to date the health transition in Belgium from the late eighteenth century, the picture is confused enough that I prefer the 1840s. It will be important to discover whether urbanization affected these national estimates, and whether Belgium, like England and Wales, enjoyed gains that are concealed by rising urbanization and higher death rates in cities.

Mitchell EHS 1981; WDI 2002

André, Robert, and José Pereira-Roque. 1974. *La démographie de la Belgique au XIXe siècle*. Brussels.

Bouckaert, A. 1982. *La santé des Belges*. Louvain-la-Neuve.

Delanghe, Luc. 1972. *Differentiële sterfte in België: Een sociale demografische analyse*. Leuven.

Devos, Isabelle. 2003. *Allemaal Beestjes: Mortaliteit en morbiditeit in Vlaanderen, 18de-20ste eeuw*. Unpublished PhD dissertation, University of Gent. 2 vols.

Honggokoeaemo, Suharno, and Herman van de Voorde. 1981. "Evolutie van de mortaliteit en van de levensverwachting van de Belgische bevolking van 1890 tot 1970," *Archives belges de médecine sociale, hygiène, médecine du travail et médecine légale* 39: 205-33.

Leclerc, J.-M.-J. 1890-96. "Tables de mortalité ou de survie et table de population pour la Belgique, dressées au moyen des statistiques officielles de 1880 à 1890," *Bulletin de la commission centrale de statistique* 17: 1-95.

Leclerc, J.-M.-J. 1902-06. "Tables de mortalité ou de survie, loi et table de population pour la Belgique, dressées au moyen des statistiques officielles de 1890 à 1900," *Bulletin de la commission centrale de statistique* 19: 1-130.

Masuy-Stroobant, Godelieve. 1983. *Les déterminants individuels et régionaux de la mortalité infantile: la Belgique d'hier et d'aujourd'hui*. Louvain-la-Neuve.

Poulain, Michel and Dominique Tabutin. 1977. "Mortalité aux jeunes âges en Belgique de 1840 à 1970," *Population et famille* 42: 49-86.

Quetelet, A. 1851. "Nouvelles tables de mortalité pour la Belgique," *Bulletin de la commission centrale de statistique*. 4: 1-22.

Trausch, Gérard. 1997. *La mortalité au Luxembourg 1901-1995*. Luxembourg.

Veys, D. 1983. *Cohort Survival in Belgium in the Past 150 Years: Data and Life Table Results, Shortly Commented*. Leuven.

## Bulgaria

Official estimates of life expectancy suggest an already high level in 1899-1902 of 40.2 years, but no sustained rise until the 1920s (Totev, 1985, UNDYHS, and Cockerham, 1999). Life expectancy reached some 71 years in the mid 1960s, and changed little thereafter with females tending to gain one or two years and males to lose one or two years. The official estimates deserve scrutiny because they suggest a baseline population with unexpectedly good survival without corresponding advantages, which may be due to the underregistration of deaths.

HMD; UNDY1967; UNDYHS; UNSDiv; WDI 2002

Cockerham, William C. 1999. *Health and Social Change in Russia and Eastern Europe*. New York.

Totev, Anastas. 1985. "Za prodalzhitelnostta na zhivota na naselenieto na Balgariya," *Naselenie* 3: 3-11.

Vallin, Jacques. 1989. "La mortalité en Europe de 1720 à 1914: tendances à long terme et changements de structure par sexe et par age," *Annales de démographie historique*, 31-54.

## Czech Republic

Estimates of life expectancy reported by Srb (1962-63) and UNDY1967 plus crude death rates from Chesnais (1992) indicate that sustained gains began in the Czech and Slovak lands in the 1890s from a beginning level in Czech lands of 35 years.

Chesnais 1992; Mitchell, EHS 1981; UNDY1967; UNSDiv

Horska, Pavla. 1967. "L'état actuel des recherches sur l'évolution de la population dans les pays tchèques aux XVIIIe et XIXe siècles," *Annales de démographie historique*, 173-95.

Srb, Vladimír. 1962-63. "Population Development and Population Policy in Czechoslovakia," *Population Studies* 16: 147-59.

## Denmark

On the basis of crude death rates (Andersen, 1979a, 1979b, and 1984; Johansen, 2002; Andreev, 2002), Denmark's health transition began in the 1770s when, judging from the CDR, life expectancy was about 33 years. Gains were more rapid from the 1770s to the 1820s, then slower from the 1820s to the 1890s, then more rapid again. In recent decades Denmark has had one of the slower paces of gain among countries in Western Europe.

HMD

Andersen, Otto. 1984. "The Decline in Danish Mortality before 1850 and its Economic and Social Background," in Tommy Bengtsson, Gunnar Fridlitzius, and Rolf Ohlsson, eds., *Pre-Industrial Population Change: The Mortality Decline and Short-Term Population Movements*. Stockholm, pp. 115-26.

- Andersen, Otto. 1979a. "Denmark," in W. R. Lee, ed., *European Demography and Economic Growth*. London, pp. 79-122.
- Andersen, Otto. 1979b. "The Development of Danish Mortality 1735-1850," *Scandinavian Population Studies* 5: 9-21.
- Andersen, Otto. 1973. "Dødelighedsforholdene i Danmark, 1735-1839," *Nationaløkonomisk Tidsskrift* 111: 277-305.
- Andreev, Kirill F. 2002. *Evolution of the Danish Population from 1835 to 2000*. Odense, accompanied by a CD-ROM with additional data.
- Johansen, Hans Chr. 2002. *Danish Population History 1600-1939*. Odense.
- Matthiessen, P. C. 1970. *Some Aspects of the Demographic Transition in Denmark*. Copenhagen.

## **Estonia**

Mazur (1969) reports an estimate of life expectancy c. 1900 of 43.1 years, and Krumins (1994) gives one for the early 1920s of 51.7 years. Life expectancy evidently began to improve at some point between the 1890s and 1920s.

UNDYHS; UNSDiv; WDI 2002

- Krumins, Juris. 1994. "Changing Mortality Patterns in Latvia, Lithuania, and Estonia," in Wolfgang Lutz, Sergei Scherbov, and Andreis Volkov, eds., *Demographic Trends and Patterns in the Soviet Union before 1991*. New York, pp. 403-19.
- Mazur, D. Peter. 1969. "Expectancy of Life at Birth in 36 Nationalities of the Soviet Union: 1958-60," *Population Studies* 23: 225-46.

## **Finland**

Persistent gains in life expectancy began in the 1870s, just after the 1868 crisis, and were particularly rapid between the 1910s and the early 1950s (Kannisto, Nieminen, and Turpeinen, 1999). The beginning level was some 32.1 years. Jutikkala (1945) and Turpeinen (1975a) provide crude death rates from 1722; Turpeinen and Kannisto (1997) report the main mortality crises and show life expectancy from 1751-60 by sex.

HMD

- Jutikkala, Eino. 1945. *Die Bevölkerung Finnlands in den Jahren 1721-49*, Annales Academiae Scientiarum Fennicae, Series B, vol. 55. Helsinki.
- Kannisto, Väinö and Mauri Nieminen. 1996. *Revised Life Tables for Finland 1881-1990*. Helsinki.
- Kannisto, Väinö, Mauri Nieminen, and Oiva Turpeinen. 1999. "Finnish Life Tables since 1751," *Demographic Research* 1, [www.demographic-research.org/Volumes/Vol1/1](http://www.demographic-research.org/Volumes/Vol1/1).
- Pitkänen, Kari. 1979. "The Changing Features of Mortality in Finland in the 18<sup>th</sup> and 19<sup>th</sup> Centuries," *Scandinavian Population Studies* 5: 74-82.
- Pitkänen, Kari and Mikko Laakso. 1999. "The Reliability of Finnish Mortality Statistics: A Historical Review," in Juha Alho, ed., *Statistics, Registries, and Science: Experiences from Finland*. Helsinki, pp. 15-37.

- Turpeinen, Oiva. 1979. "Fertility and Mortality in Finland since 1750," *Population Studies* 33: 101-14.
- Turpeinen, Oiva and Väinö Kannisto. 1997. *Abridged Life Tables for Finland 1751-1880*. Helsinki.

## France

Crude death rate and life expectancy estimates for the eighteenth century, constructed from parish records, show that life expectancy began to rise in the 1790s (Blayo, 1975) from a beginning level of 28.1 years. From the 1820s to the 1870s there was little change in national levels owing to urbanization, but it seems likely that death rates continued to decline, at least in rural areas (Meslé and Vallin, 1989; Trausch, 1997; HMD).

### HMD

- Blayo, Yves. 1975. "La mortalité en France de 1740 à 1829," *Population*, Special Number 30: (Nov.): 123-42.
- Delaporte, Pierre. 1938. "Evolution de la mortalité française depuis un siècle: Tables de mortalité et de survie de generations," *Journal de la société de statistique de Paris* 79: 181-206.
- Dupâquier, Jacques et al. 1988. *Histoire de la population française*. 4 vols. Paris.
- France. n.d. *Annuaire statistique de la France 1966*. Paris.
- Meslé France, and Jacques Vallin. 1989. "Reconstitution de tables annuelles de mortalité pour la France au XIXe siècle," *Population* 44: 1121-58.
- Trausch, Gérard. 1997. *La mortalité au Luxembourg 1901-1995*. Luxembourg.

## Germany

Life expectancy began to rise in the 1870s from a beginning level in the range 36.7 to 38.4 years and amidst unusually marked regional differences in survival (Imhof, 1994).

### HMD; UNDY1967

- Haines, Michael R., and Hallie J. Kintner. 1993. "The Mortality Transition in Germany, 1869-1935," *International Population Conference Montréal 1993*. 4 vols. Liège, I, 399-417.
- Imhof, Arthur E., ed. 1994. *Lebenserwartungen in Deutschland, Norwegen und Schweden im 19. und 20. Jahrhundert*. Berlin.
- Hubert, Michel. 1995. *L'Allemagne en mutation: Histoire de la population allemande depuis 1815*. Paris.
- Lee, Robert. 1979. "Germany," in W. R. Lee, ed., *European Demography and Economic Growth*. London, pp. 144-95.
- Lee, W. Robert. 1984. "Mortality Levels and Agrarian Reform in Early 19<sup>th</sup> Century Prussia: Some Regional Evidence," in Tommy Bengtsson, Gunnar Fridlitzius, and Rolf Ohlsson, eds., *Pre-Industrial Population Change: The Mortality Decline and Short-Term Population Movements*. Stockholm, pp. 161-90.

## Greece

Valaoras (1960) and Siampos (1989) offer estimates of life expectancy and infant mortality that suggest improvement from the 1870s along a smooth curvilinear path. But Chenais' (1992) series of crude death rates for 1860-1890 does not indicate improvement. Various other sources (Greece, *Life-Tables for Greece*, 1964; UNDY1967; France, *Annuaire statistique*, 1966) report estimates for the 1920s at 44.6 to 50.0 years, high enough to suggest that life expectancy may have begun to rise during the 1900s or 1910s.

Chesnais 1992; Mitchell EHS 1981; UNDY1967; UNDYHS; UNSDiv; WDI 2002  
Dellaportas, G. J. 1970. Certain Aspects of Infant Mortality in Greece, Unpublished Doctor of Public Health Dissertation, Johns Hopkins University.  
France. n.d. *Annuaire statistique de la France 1966*. Paris, in the international section.  
Greece. 1964. Ethnike Statistike Hyperesia tes Hellados, *Life-Tables for Greece*. Athens.  
Philalithis, Anastas E. 1989. "Can Social Medicine within a National Health System Supersede Traditional Public Health? The Case of Greece," in Pierre Duplessis et al., eds., *Public Health and Industrialized Countries*. Quebec, pp. 289-312.  
Siampos, George. 1989. *Mortality Decline and Longevity in Greece* (in Greek). Athens.  
Valaoras, Vasilios G. 1960. "A Reconstruction of the Demographic History of Modern Greece," *Milbank Memorial Fund Quarterly* 38: 115-39.

## Hungary

The crude death rates series reported by Andorka, Horska, and Head-König (1997-98) and Hungary (1992) indicate that gains may have begun in the 1880s, but were certainly underway in the 1890s in the area of present-day Hungary and the Hungarian portion of the Hapsburg Empire. Life expectancy estimates are available from 1900-1901 (Pallós, 1971; Hungary, 1992), and those indicate continued gains, which were most rapid in the period from the early 1920s into the 1950s.

UNDY1967; WDI 2002  
Andorka, Rudolf, Pavla Horska, and Anne-Lise Head-König. 1997-98. "L'Europe centrale," in Jean-Pierre Bardet and Jacques Dupâquier, eds., *Histoire des populations de l'Europe*. 3 vols. Paris, II, 427-61.  
Hungary. 1992. Hungarian Central Statistical Office, *Time Series of Historical Statistics, 1867-1992*. Budapest.  
Pallós, Emil. 1971. *Magyarország Halandósági táblái 1900/01-től 1967/68-ig*. Budapest.

## Iceland

Both crude death rates and life expectancy estimates indicate that overall survival began a sustained increase in the 1870s from a beginning level of 32.3 years. The most rapid gains occurred between 1885 and 1950 (Gardarsdóttir, 2002; Gardarsdóttir, n.d.; Jónsson and Magnússon, 1997; and Hansen, [1980]).

WDI 2002

- Gardarsdóttir, Ólöf. 2002. *Saving the Child: Regional, Cultural and Social Aspects of the Infant Mortality Decline in Iceland, 1770-1920*. Umeå.
- Hansen, Hans-Oluf. [1980]. "Some Age Structural Consequences of Mortality Variations in Pre-Transitional Iceland and Sweden," in Hubert Charbonneau and André Larose, eds., *The Great Mortalities: Methodological Studies of Demographic Crises in the Past*. Liège, pp. 113-32.
- Jónsson, Guomundur and Magnús S. Magnússon, eds. 1997. *Hagskinna: Sögulegar hagtölur um Ísland* (Icelandic Historical Statistics). Reykjavík.
- Tomasson, Richard F. 1977. "A Millennium of Misery: The Demography of the Icelanders," *Population Studies* 31: 405-27.
- Also, Ólöf Gardarsdóttir, n.d., provided a spreadsheet containing additional estimates.

## **Ireland**

Official sources indicate that Ireland had unusually low infant mortality, around 100 per 1000 live births, and low crude death rates, 17-20 per 1000, from the 1860s to the end of the century. But those sources appear to understate deaths owing to underregistration. According to the official statistics, Ireland's health transition began in the 1900s. In a literature review Kennedy and Clarkson (1993) suggest that mortality was higher in the pre-famine period (1820s into 1840s) than in the eighteenth century, that life expectancy rose sluggishly beginning in the latter three decades of the nineteenth century, and that infant mortality did not decline until the early twentieth century. But Boyle and Ó Gráda (1986) offer estimates for the period 1821-1841 and for the famine that suggest that survival in Ireland nearly matched that in England and that mortality declined between 1821-1841 and late century. Thus Ireland's life expectancy gains may have begun as early as the 1820s or as late as the 1890s.

- Chenais 1992; Mitchell EHS 1981; UNDY1967; WDI 2002
- Boyle, Phelim P. and Cormac Ó Gráda. 1986. "Fertility Trends, Excess Mortality, and the Great Irish Famine," *Demography* 23: 543-62.
- Kennedy, Liám and Leslie A. Clarkson. 1993. "Birth, Death and Exile: Irish Population History, 1700-1921," in B. J. Graham and L. J. Proudfoot, eds., *An Historical Geography of Ireland*. London, pp. 158-84.
- Ó Gráda, Cormac. 1979. "The Population of Ireland 1700-1900: A Survey," *Annales de démographie historique*, 281-99.
- Vaughan, W.E. and A.J. Fitzpatrick, eds. 1978. *Irish Historical Statistics: Population, 1821-1971*. Dublin.

## **Italy**

Crude death rate estimates for individual provinces (Del Panta et al., 1996; Del Panta, 1997) show earlier turning points in some northern provinces, but these do not characterize the country as a whole. In northern Italy, according to Galloway (1994), and in the country as a whole, life expectancy began to rise in the 1870s or 1880s (HMD; Del Panta, 1979), and maintained a rapid pace of gains for many decades. In 1881-1882 life expectancy was some 35.4 years.

HMD; UNDY1967; WDI 2002

- Breschi, Marco. 1990. *La Popolazione della Toscana dal 1640 al 1940: Un'ipotesi di ricostruzione*. Florence.
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## **Latvia**

Krumins (1994) estimates life expectancy as high as 45 years already in the 1890s, but this may be flawed by the underestimation of mortality. Life expectancy probably began to improve between the 1890s and the 1920s.

UNDYHS; WDI 2002

- Krumins, Juris. 1994. "Changing Mortality Patterns in Latvia, Lithuania, and Estonia," in Wolfgang Lutz, Sergei Scherbov, and Andreis Volkov, eds., *Demographic Trends and Patterns in the Soviet Union before 1991*. New York, pp. 403-19.

## **Lithuania**

Mazur reports life expectancy around 1900 at 41.7 years and Krumins (1994) reports a figure for the mid 1920s of 50.5 years; both estimates suggest improvement beginning in the period from the 1890s to the 1920s. *General Demography of Poland* (1921), reporting crude death rates for parts of pre-partition Poland, indicates that mortality declined from the 1890s or 1900s.

UNDYHS; WDI 2002

*General Demography of Poland*. 1921. Geneva.

Krumins, Juris. 1994. "Changing Mortality Patterns in Latvia, Lithuania, and Estonia," in Wolfgang Lutz, Sergei Scherbov, and Andreis Volkov, eds., *Demographic Trends and Patterns in the Soviet Union before 1991*. New York, pp. 403-19.

Mazur, D. Peter. 1969. "Expectancy of Life at Birth in 36 Nationalities of the Soviet Union: 1958-60," *Population Studies* 23: 225-46.

## **Luxembourg**

Life expectancy began to rise before the beginning of the official data series given by Trausch (1997), probably in the 1870s or 1880s.

Gérard Trausch. 1997. *La mortalité au Luxembourg 1901-1995*. Luxembourg.

## **Netherlands**

Philips (1980) reports that mortality declined from 1871-75; Van Poppel and Mandemakers (1997) find that mortality began to decline for ages 1-4 years around 1860 and for infants after 1875, although there was another peak in 1880; Van Poppel, Tabeau, and Willekens (1996) identify the mid 1870s as the beginning point for gains in survival; Tabeau, van Poppel, and Willekens (1994) show that changes in life expectancy and infant mortality were quite small until the 1880s. Sustained gains in life expectancy began, albeit hesitantly, in the 1860s or 1870s.

UNDY1967; HMD

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- Wolleswinkel-Van den Bosch, Judith H., Frans W. A. van Poppel, C. W. N. Looman, and Johan P. Mackenbach. 2001. "The Role of Cultural and Economic Determinants in Mortality Decline in the Netherlands, 1875/1879-1920/1924: A Regional Analysis," *Social Science & Medicine* 53: 1439-53.
- Frans van Poppel also supplied me with a copy of their dataset of population estimates for 1850-1996.

## Norway

Pitkänen (2002) locates the beginning of persistent gains in life expectancy in the period just after the Napoleonic wars, which would mean the late 1810s, and attributes the early gains to lower mortality chiefly among infants and children aged 1-4 years. Initially sharp gains in survival, according to Brunborg (1976, series M) from about 40 years in 1800 to about 48 in the 1820s, were followed by a lengthy period with little in the way of further gains until the 1890s, then rapid improvement from the 1890s to the 1950s. Norway's population was not heavily urbanized, but urbanization and higher mortality in the towns (Hubbard, 2002) may account for the lengthy period with little gain. (HMD and Mamelund and Borgan, 1996, also provide life expectancy series for, respectively, 1846-2000 and 1846-1994.)

## HMD

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- Brunborg, Helge. 1976. *The Inverse Projection Method Applied To Norway, 1735-1974*, Unpublished typescript.
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- Hubbard, William H. 2002. "Death and Disease in Urban Norway: The Mortality Transition in Kristiania, Bergen, and Trondheim in the Second Half of the Nineteenth Century," in William H. Hubbard et al., *Historical Studies in Mortality Decline*. Oslo, pp. 23-42.
- Imhof, Arthur E., ed. 1994. *Lebenserwartungen in Deutschland, Norwegen und Schweden im 19. und 20. Jahrhundert*. Berlin.
- Mamelund, Sverre-Erik and Jens-Kristian Borgan. 1996. *Kohort- og periodedødelighet i Norge 1846-1994*. Oslo.
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Thorvaldsen, Gunnar. 2002. "Rural Infant Mortality in Nineteenth Century Norway," in William H. Hubbard et al., *Historical Studies in Mortality Decline*. Oslo, pp. 43-77.

## **Poland**

Dealing with areas of pre-partition Poland, *General Demography of Poland* (1921) reports crude death rates declining from the 1860s to the 1870s but does not examine the reliability of these estimates. The crude death rates reported by Wladimir, Dupâquier, and Gieysztor (1997-98) suggest that mortality declined sharply from the 1880s, which is potentially consistent with estimates of life expectancy for 1931 (49.8 years) and 1948 (59.1 years), and that has been accepted as the initial decade of gains.

Mitchell EHS 1981; UNDY1967; UNSDiv; WDI 2002

Berelowitch, Wladimir, Jacques Dupâquier, and Irena Gieysztor. 1997-99. "L'Europe orientale," in Jean-Pierre Bardet and Jacques Dupâquier, eds., *Histoire des populations de l'Europe*. 3 vols. Paris, II, 487-512.

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Pressat, Roland. 1968. "Données récentes sur la mortalité en Pologne," *Population* 23: 134-41.

## **Portugal**

Morgado (1979) dates mortality decline from the late nineteenth century. Official crude death rates for the period 1886-1909 from Morgado (1979) and Mitchell (EHS 1981) indicate some improvement in survival in the 1890s, but do not show an ongoing trend. Gains in life expectancy that are more evident began in the 1920s and speeded up in the 1930s, according to official estimates of life expectancy. No estimate could be found for the beginning level of life expectancy.

Mitchell EHS 1981; UNDY1967; UNDYHS; UNSDiv; WDI 2002

Morgado, Nuno Alves. 1979. "Portugal," in W. R. Lee, ed., *European Demography and Economic Growth*. London, pp. 319-39.

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## **Romania**

Based on crude death rates (Chesnais, 1992; Manuila, 1992), life expectancy began to rise in the 1910s or 1920s, by the early 1930s reaching 42.0 years (UNDY1967).

- Chesnais, 1992; Mitchell EHS 1981; UNDY1967; UNSDiv; WDI 2002
- Dolea, C., E. Nolte, and M. McKee. 2002. "Changing Life Expectancy in Romania after the Transition," *Journal of Epidemiology & Community Health* 56: 444-49.
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### **Russia/USSR**

Blum (1994) traces the beginning of gains in life expectancy to the early twentieth century, but Patterson (1995) finds evidence of a "modest decline" in crude death rates and in infant mortality in the 1890s, after the 1892 famine. Patterson's view agrees with the scheme of life expectancy reported by Adamets (2002), with official crude death rates for European Russia (Heer, 1968), and with Biraben's (1958) estimates of crude death rates for the territory of the USSR. Life expectancy in European Russia was about 31 years in 1897, and in the Soviet Union, including the Asian Republics, about 34 years in 1923. Infant mortality was 300 to 330 in 1897. Russia/the Soviet Union experienced an unusually large number of setbacks (during World War I, the influenza epidemic of 1918-1919 aggravated by war, the 1933 famine, and World War II) and therefore slow and more irregular gains. Adamets reports only a small differential between male and female life expectancy in the period up to 1905, but a widening differential by the 1920s. By about 1960 that differential had reached 10 years, and life expectancy had leveled out at about 68 years (HMD).

HMD; UNDY1967; UNDYHS; WDI 2002

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- Blum, Alain. 1994. *Naître, vivre et mourir en URSS, 1917-1991*. Paris.
- Blum, Alain and Alain Monnier. 1989. "Recent Mortality Trends in the USSR: New Evidence," *Population Studies* 43: 211-41.
- Blum, Alain and Irina Troitskaja. 1996. "La mortalité en Russie aux XVIIIe et XIXe siècles: Estimations locales à partir des *Revizii*," *Population* 51: 303-28.
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- Lorimer, Frank. 1946. *The Population of the Soviet Union: History and Prospects*. Geneva.
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- Patterson, K. David. 1995. "Mortality in Late Tsarist Russia: A Reconnaissance," *Social History of Medicine* 8: 179-210.
- Shkolnikov, Vladimir, France Meslé, and Jacques Vallin. 1995. "La crise sanitaire en Russie. I. Tendances récentes de l'espérance de vie et des causes de décès de 1970 à 1993," *Population* 50: 907-42.
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- Visknevsky, Anatoly. 1998-99. "Demographic Changes in Russia -- Past and Future," *Yearbook of Population Research in Finland* 35: 39-57.
- Wheatcroft, S. G. 1976. Population Dynamic and Factors Affecting It, in the Soviet Union in the 1920s and 1930s. Unpublished typescript in two parts.

### **Slovak Republic**

Separate estimates for the Slovak lands are unavailable until the 1920s, but Srb's (1962-63) estimates for the combined Czech and Slovak lands indicate that life expectancy began to rise in the 1890s, and that picture is consistent with life expectancy levels reported for the 1920s and thereafter.

- Chesnais 1992; Mitchell EHS 1981; UNDY1967; UNSD Div; WDI 2002
- Cockerham, William C. 1999. *Health and Social Change in Russia and Eastern Europe*. New York.
- Srb, Vladimír. 1962-63. "Population Development and Population Policy in Czechoslovakia," *Population Studies* 16: 147-59.

## Spain

Although some authorities have suggested later beginning points (e.g., Puyol Antolín, 1988; and Cohen Anselem, 1996), both Nadal's crude death rates series and Dopico's reconstructions (Dopico and Rowland, 1990; Dopico, 1987 and 1995) of life expectancy show that overall survival began to rise in Spain in the 1890s.

UNDY1967; UNDYHS; WDI 2002

Cachinero-Sánchez, Benito. 1985. "Estimating Levels of Adult Mortality in Eighteenth-Century Spain," *Historical Methods* 18: 63-70.

Cohen Anselem, Arón. 1996. "La mortalidad de los niños," in José María Borrás Llop, ed., *Historia de la infancia en la España contemporánea, 1834-1936*. Madrid, pp. 109-48.

Dopico, Fausto. 1995. "Censos, movimiento natural e saldos migratorios: Unha nova estimación da natalidade, a mortalidade e a emigración españolas no último cuarto do século XIX," *Estudios migratorios* No. 1: 102-119.

Dopico, Fausto. 1987. "Regional Mortality Tables for Spain in the 1860s," *Historical Methods* 20: 173-79.

Dopico, Fausto and David Sven Reher. 1998. *El declive de la mortalidad en España, 1860-1930*. Zaragoza.

Dopico, Fausto and Robert Rowland. 1990. "Demografía del censo de Floridablanca: Una aproximación," *Revista de historia económica* 8: 591-618.

Nadal, Jordi. 1984. *La población española (Siglos XVI a XX)*. Rev. ed. Barcelona.

Reher, David S. and Alberto Sanz-Gimeno. 2000. "Mortality and Economic Development over the Course of Modernization: An Analysis of Short-run Fluctuations in Spain, 1850-1990," *Population Studies* 54: 135-52.

## Sweden

Hofsten and Lundström (1976) trace the beginning of gains in life expectancy to the 1780s. Since they published, additional estimates of life expectancy have become available, to replace crude death rates. Those estimates are variable so that it is difficult to fix a starting point, but the 1790s seem to be a better decade in which to locate the beginning of Sweden's health transition.

HMD; WDI 2002

Brändström, Anders et al. 1994. "Lebenserwartung in Schweden 1750-1900," in Arthur E. Imhof, ed., *Lebenserwartungen in Deutschland, Norwegen und Schweden im 19. und 20. Jahrhundert*. Berlin, pp. 335-363.

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Hofsten, Erland and Hans Lundström. 1976. *Swedish Population History: Main Trends from 1750 to 1970*. Stockholm.

Sundbärg, Gustav. 1970. *Bevölkerungsstatistik Schwedens 1750-1900*. Stockholm, reprint.

Sundin, Jan. 1995. "Culture, Class and Infant Mortality during the Swedish Mortality Transition, 1750-1850," *Social Science History* 19: 117-45.  
Sweden. 1969. *Historisk statistik för Sverige*. 3 vols. Stockholm.

### **Switzerland**

Life expectancy began to rise in the 1870s almost simultaneously with the initiation of sustained decline in infant mortality, which Viazzo (1997) dates from 1873. Calot (1998) shows that the risk of dying dropped initially for ages 0 to 40 years, and slightly for 40 to 50, but not at higher ages.

HMD; UNDY1967; WDI 2002

Calot, Gérard. 1998. *Two Centuries of Swiss Demographic History*. Neuchâtel.  
Mattmüller, Markus. 1987. *Bevölkerungsgeschichte der Schweiz*. Basel.

### **Ukraine**

Mazur (1969) reports life expectancy around 1900 at 36.6 years. That plus the estimates from Meslé and Vallin (2003) suggest that life expectancy began to improve in the period from the 1890s to the 1920s.

UNDY1967; WDI 2002

Mazur, D. Peter. 1969. "Expectancy of Life at Birth in 36 Nationalities of the Soviet Union: 1958-60," *Population Studies* 23: 225-46.

Meslé, France and Jacques Vallin. 2003. *Mortalité et causes de décès en Ukraine au XXe siècle*. Paris.

Vallin, Jacques, France Meslé, Serguei Adamets, and Serhii Pyrozhev. 2002. "A New Estimate of Ukrainian Population Losses during the Crises of the 1930s and 1940s," *Population Studies* 56: 249-64.

### **United Kingdom**

Scholarly attention has been lavished on the reconstruction of mortality in Great Britain, and especially in England, into the medieval past, but it cannot yet be said that a final version of mortality history has been reached. The Cambridge Group --Wrigley and Schofield (1989), Wrigley et al. (1997), Schofield (2000)-- present reconstructions for England in the period 1541-1871, which are widely accepted and used. But questions about them, including the ones posed by Razzell (1993) about undercounting of infant deaths, remain difficult to answer in a definitive way.

Hinde (2003) offers three possible dates for the beginning of life expectancy gains in England: the late 17<sup>th</sup> century, the mid 18<sup>th</sup> century, and (based on crude death rates) the last two decades of the 18<sup>th</sup> century. The Wrigley and Schofield series shows life expectancy gains from the first decade of the nineteenth century, and that periodization is used for England and, because of England's size, the UK. Those gains appear to have been interrupted between the 1820s and the 1870s in England, and then England and

Wales, by a period of stable survival. But as Woods (1985) showed, survival continued to improve separately in rural and urban areas, and it was the higher death rates of cities and urbanization that created the appearance of stable survival. In Scotland life expectancy gains may already have been underway in the 1860s, when serial estimates of life expectancy begin, in that Flinn (1976) gives an estimate for 1793 of 35.5 years or, excluding the far north where the sources are most unreliable, 39.4 years. By 1861-1870 life expectancy, at 42.1 years, was higher than in England and Wales. Until more has been learned about survival in Scotland before the 1860s, however, it will be more prudent to locate the beginning of its persistent gains in life expectancy in the 1870s.

HMD; Mitchell EHS 1981; UNDY1967; UNDYHS

Bell, Frances and Robert Millward. 1998. "Public Health Expenditures and Mortality in England and Wales, 1870-1914," *Continuity and Change* 13: 221-49.

England and Wales. 1989. Office of Population Censuses and Surveys, *Mortality Statistics 1841-1985: Serial Tables*. London.

Flinn, Michael, ed. 1976. *Scottish Population History from the 17<sup>th</sup> Century to the 1930s*. Cambridge.

Great Britain. Various years. Office for National Statistics, *Annual Abstract of Statistics*. London.

Great Britain. 2003. Office for National Statistics, *Twentieth Century Mortality: 100 Years of Mortality Data in England and Wales by Age, Sex, Year and Underlying Cause*. London, CD-ROM.

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Hinde, Andrew. 2003. *England's Population: A History since the Domesday Survey*. London.

Razzell, Peter. 1993. "The Growth of Population in Eighteenth Century England: A Critical Reappraisal," *Journal of Economic History* 53: 743-71.

Reves, Randall. 1985. "Declining Fertility in England and Wales as a Major Cause of the Twentieth Century Decline in Mortality," *American Journal of Epidemiology* 122: 112-26.

Schofield, Roger. 2000. "Short-run and Secular Demographic Response to Fluctuations in the Standard of Living in England, 1540-1834," in Tommy Bengtsson and Osamu Saito, eds., *Population and Economy: From Hunger to Modern Economic Growth*. Oxford, pp. 49-71.

Woods, Robert. 1985. "The Effects of Population Redistribution on the Level of Mortality in Nineteenth-Century England and Wales," *Journal of Economic History* 45: 645-51.

Woods, Robert and Nicola Shelton. 1997. *An Atlas of Victorian Mortality*. Liverpool.

Wrigley, E.A. et al. 1997. *English Population History from Family Reconstitution, 1580-1837*. Cambridge.

Wrigley, E. A. and R.S. Schofield. 1989. *The Population History of England, 1541-1871: A Reconstruction*. Cambridge.

## **Yugoslavia**

Chesnais' (1992) crude death rate series suggests that overall mortality began to decline in Yugoslavia between the 1900s and the 1920s.

Chesnais 1992; UNDY1967; UNDYHS

Hadzivukovic, Stevan. 1989. "La population de la Yougoslavie: Structure, développement et perspective," *Population* 44: 1189-1212.

## OCEANIA

### Australia

The earliest national estimates, for 1875 and 1885, exclude the indigenous population. They show life expectancy rising from an already high level (Caldwell, 1987; McDonald, Ruzicka, and Pine, 1987; Young and Ruzicka, 1982). Earlier estimates for New South Wales alone for 1860 and 1868 suggest that life expectancy may have begun rising earlier. But crude death rates available for New South Wales for 1825-1859 and for the country as a whole from 1860 (Young, 1980) suggest decline from the 1870s. The Australian population was made up chiefly of young adult immigrants in the early decades of European settlement. Since the population was aging by the 1860s, it remains possible that life expectancy gains began in the 1860s. Given this uncertainty Australia's health transition began in the 1860s or 1870s. In the indigenous population life expectancy levels remain much lower (Kinfu and Taylor, 2002).

Mitchell HIS 1995; UNDY1967; UNDYHS; WDI 2002

Booth, Heather. 2003. "The Changing Dimensions of Mortality," in Siew-Ean Khoo and Peter McDonald, eds., *The Transformation of Australia's Population: 1970-2030*. Sydney, pp. 104-28.

Caldwell, J.C. 1987. "Population," in Wray Vamplew, ed., *Australians: Historical Statistics*. Cambridge, pp. 23-41.

D'Espaignet, Edouard T. et al. 1991. *Trends in Australian Mortality 1921-1988*. Canberra.

Kinfu, Y. and J. Taylor. 2002. "Estimating the Components of Indigenous Population Change, 1996-2001, Centre for Aboriginal Economic Policy Research, Australian National University, Discussion Paper 240/2002, at [www.anmu.edu.au/caepr/Publications/DP/2002\\_DP240.pdf](http://www.anmu.edu.au/caepr/Publications/DP/2002_DP240.pdf). Accessed March 18, 2004.

McDonald, Peter, Lado Ruzicka, and Patricia Pyne. 1987. "Marriage, Fertility and Mortality," pp. 42-61 in Wray Vamplew, ed., *Australians: Historical Statistics*. Cambridge, pp. 42-61.

Najman, Jake M. 2000. "The Demography of Death: Patterns of Australian Mortality," in Allan Kellehear, ed., *Death & Dying in Australia*. Oxford, pp. 17-39.

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Young, C.M. and L.T. Ruzicka. 1982. "Mortality," in *Population of Australia*. 2 vols. New York, I, 160-82.

### Fiji

For the Fijian and Indo-Fijian populations together, life expectancy began to rise in the 1920s (Balkaran, Taylor, and Naroba, 1990; Biunaiwai, Bavadra, and Olokowski, 1982). The decline had begun earlier among Indians alone (Lal, 2000; Lukere, 1997).

UNDYHS; UNSDiv; WDI 2002

Balkaran, Sundat, Richard Taylor, and Vilimaina L. Naroba. 1990. "Mortality Trends and Differentials in Fiji," in Rajesh Chandra and Jenny Bryant, eds., *Population of Fiji*. Noumea, pp. 65-91.

Biumaiwai, M., T. Bavadra, and T. Olokowski. 1982 *Population, Morbidity and Mortality in Fiji during the Last 100 Years*. Suva.

Lal, Brij V. et al. 2000. *Chalo Jahaji: On a Journey through Indenture in Fiji*. Suva.

Lukere, Victoria. 1997. Mothers of the Taukei: Fijian Women and the 'Decrease of the Race'. Unpublished PhD thesis, Australian National University.

Manning, Grant B. 1985. The Mortality Transformation in Fiji: A Geographic Appraisal. Unpublished PhD dissertation, University of Hawaii.

McArthur, Norma. 1967. *The Populations of the Pacific Islands*. 2 vols. Canberra, vol. 2, part 6.

Robertson, Annette F. S. 1990-91. "Morbidity and Mortality," in A.A.J. Jansen, S. Parkinson, and A. F. S. Robertson, eds., *Food and Nutrition in Fiji: A Historical Review*. 2 vols. Suva, II, 1-68.

## **Madagascar**

Life expectancy began to rise in the 1940s or 1950s.

UN#55; WDI 2002

## **Mauritius**

Life expectancy began to rise slowly in the 1920s and then jumped up sharply from the late 1940s amidst use of DDT for malaria eradication. Its level in the 1920s was about 31.2 years.

UN#55; WDI 2002

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## **New Zealand**

For Europeans New Zealand's health transition appears to have been in progress in the 1870s, when life expectancy was 51.8 to 53.1 years. For that reason the transition is estimated to have begun in the 1860s or 1870s, the European population having surpassed the indigenous Maori population around 1858.

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## **Papua New Guinea**

Van de Kaa (1971) estimates life expectancy in 1946 at 31.5 years, a level high enough to allow for earlier gains. But most authorities suggest that survival for infants and in the general population began to improve only in the period after World War II.

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### **Solomon Islands**

The UN estimate of life expectancy in the early 1950s, 44.0 years, is high enough to suggest that gains in life expectancy and infant mortality began as least as early as the 1940s.

UNDYHS; WDI 2002