

mainly done by women. Because women live longer than men, lack of a spousal caregiver is especially likely to be a problem for older women. Both men and women have fewer children on whom they can call for informal caregiving, because of the worldwide decline in fertility rates. An increasing proportion of older men in Europe and North America have spent much or all of their adult lives apart from their biological children. Lower fertility rates, delayed marriage, and increasing divorce rates mean that people approaching old age may be less likely to have close ties with daughters and daughters-in-law—the adults who have in the past been the most common caregivers apart from spouses. Adult women who in the past have provided uncompensated care (and much other essential volunteer work) are now more likely than in the past to be working for pay and thus have fewer hours to devote to the unpaid roles.

These broad demographic and economic trends do not dictate particular social adaptations or policy responses, of course. One can imagine many different responses to the challenges of caring for the disabled—increased reliance on home health agencies and assisted living communities, “naturally occurring retirement communities” in which neighbors fulfill many of the roles once reserved for close kin; private or even publicly financed direct payments to compensate formerly unpaid family caregivers (a reform that has proved very popular in Germany). These and other responses to the challenge of long-term care are being tested in aging countries, and continued experimentation will no doubt be needed.

THE EPIDEMIOLOGIC TRANSITION—CHANGES IN THE BURDEN OF DISEASE AND RISK FACTORS

The secular improvements in ages at death have been accompanied by changes in causes of death. In the broadest terms, the proportion of deaths due to infectious disease and conditions associated with pregnancy and delivery has fallen, and the proportion due to chronic, noncommunicable diseases, such as heart and cerebrovascular diseases, diabetes, cancers, and age-related neurodegenerative diseases such as Alzheimer’s and Parkinson’s diseases, has increased steadily and is expected to continue to increase. **Figure 93e-5** shows results from an international comparative project that drew on a wide variety

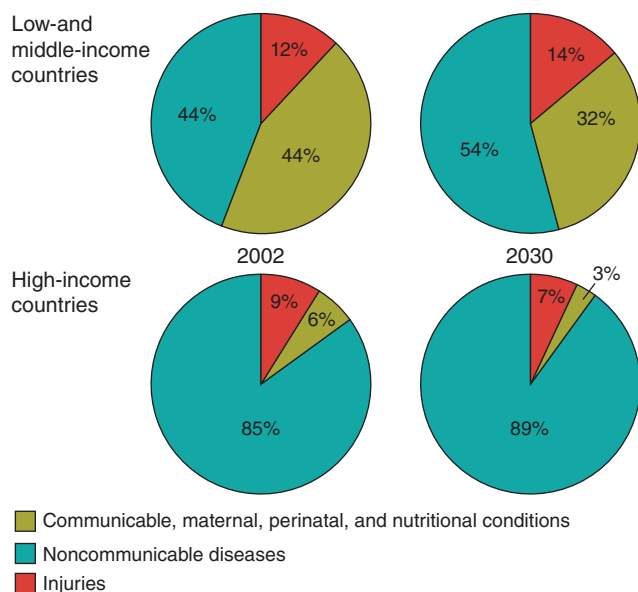


FIGURE 93e-5 Leading causes of burden of illness in world regions 2002 and projected for 2030. (Adapted from CD Mathers, D Loncar. *PLoS Med* 3:e442, 2006.)

TABLE 93e-3 RANKING OF DISEASES AND CONDITIONS CAUSING THE GREATEST BURDEN OF DISEASE WORLDWIDE IN 1990 AND 2010

	1990	2010
1	Lower respiratory infections	Ischemic heart disease
2	Diarrheal diseases	Lower respiratory infections
3	Preterm birth complications	Cerebrovascular disease
4	Ischemic heart disease	Diarrheal diseases
5	Cerebrovascular disease	HIV/AIDS
6	COPD	Low back pain
7	Malaria	Malaria
8	Tuberculosis	Preterm birth complications
9	Protein energy malnutrition	COPD
10	Neonatal encephalopathy	Road injury

Note: “Burden of disease” takes into account years of life lost due to death from this cause and also a weighted estimate for years spent with disability, pain, or impairments due to the condition. These estimates were aggregated from many different national reporting systems and special surveys or surveillance systems, with adjustments for incomplete coverage and different reporting schemes as part of the Global Burden of Disease Study 2010 updating previous global estimates.

Abbreviation: COPD, chronic obstructive pulmonary disease.

Source: CJL Murray et al. *Lancet* 380:2197, 2013, Fig. 5.

of data sources to provide estimates of the global burden of disease at the beginning of this century, with projections to future years based on recent trends in disease prevalence and demographic rates. Burden of disease in these pie charts is a composite measure, one that takes into account both the number of deaths due to a particular disease or condition and the timing of such deaths—an infant death represents a loss of more potential life-years lived than does the death of a very old person. Nor is death the only outcome that matters; most diseases or conditions cause significant disability and suffering even when nonfatal, so this measure of burden captures nonfatal outcomes using statistical weighting. As **Table 93e-3** shows, the “modern plagues” of chronic noncommunicable diseases are already among the leading causes of premature death and disability even in low-income countries. This is due to a mix of factors—lower fertility rates mean fewer infants and children at prime ages of susceptibility to infections; more people reaching older ages when chronic disease incidence is high; and often changing incidence rates due to increased exposure to tobacco, Western diets, and inactivity. Noncommunicable diseases, once thought of as “diseases of affluence,” are projected to account for more than half of the disease burden even in low- and middle-income countries by the year 2030 (Fig. 93e-5).

SUMMARY

Population aging is a global phenomenon with profound short- and long-term implications for health and long-term care needs, and indeed for the economic and social well-being of nations. The timing and context of aging vary across and within world regions and countries; the industrialized nations became wealthy before they aged significantly, while many of the low-resource regions will age before they reach high-income levels. The variation at both the population level and individual levels indicates that there is much flexibility in successful aging, but meeting the challenges will require advance planning and preparation. The extent to which research can find solutions that reduce physical and cognitive disability at older ages will determine how countries cope with this fundamental transformation.