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Mortality from ischaemic heart disease by country, region, and age: Statistics from World Health Organisation and United Nations ☆

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ABSTRACT

Background: Ischaemic heart disease (IHD) is the leading cause of death worldwide. The World Health Organisation (WHO) collects mortality data coded using the International Statistical Classification of Diseases (ICD) code.
Methods: We analysed IHD deaths world-wide between 1995 and 2009 and used the UN population database to calculate age-specific and directly and indirectly age-standardised IHD mortality rates by country and region.
Results: IHD is the single largest cause of death worldwide, causing 7,249,000 deaths in 2008, 12.7% of total global mortality. There is more than 20-fold variation in IHD mortality rates between countries. Highest IHD mortality rates are in Eastern Europe and Central Asian countries; lowest rates in high income countries. For the working-age population, IHD mortality rates are markedly higher in low-and-middle income countries than in high income countries.
Over the last 25 years, age-standardised IHD mortality has fallen by more than half in high income countries, but the trend is flat or increasing in some low-and-middle income countries. Low-and-middle income countries now account for more than 80% of global IHD deaths.
Conclusions: The global burden of IHD deaths has shifted to low-and-middle income countries as lifestyles approach those of high income countries. In high income countries, population ageing maintains IHD as the leading cause of death. Nevertheless, the progressive decline in age-standardised IHD mortality in high income countries shows that increasing IHD mortality is not inevitable. The 20-fold mortality difference between countries, and the temporal trends, may hold vital clues for handling IHD epidemic which is migratory, and still burgeoning.

1. Introduction

Ischaemic heart disease (IHD) is the leading cause of death worldwide [1–4], placing a major economic and resource burden on health and public health systems. High income countries have seen declines in mortality rates from IHD [5–10], but elsewhere the picture is less favourable, with continued high IHD mortality [11]. Reliable information describing time-trends in IHD mortality is essential to understand and monitor the disease [12]. In this article we provide an overview of the global epidemiology of IHD mortality using data submitted by individual member states to the World Health Organisation. The data cover the period 1995 to 2009, and are more complete for some countries than for others. We have analysed the data to allow identification of country-specific and broad regional trends.

We present absolute IHD burden, along with directly and indirectly standardised IHD mortality rates. Absolute burden reflects the total number of deaths a health system has to deal with, which will tend to be larger in more populous countries. Standardised rates are preferable for comparing countries because they remove the effects of population size and age structure. The most comprehensive standardisation is direct standardisation (Fig. 1), which requires age-specific data for both the number of deaths in each country and its population size. In many countries age-specific data on deaths from IHD are not available, but the UN does provide modelled estimates of age-specific population counts for all countries. Indirect standardisation (Fig. 2) divides the deaths observed in a country, by the deaths expected if that country had the same age-specific death rates as a population group chosen to be the standard for comparison. We present indirectly standardised ratios for countries where direct standardisation is not possible due to lack of age-specific death data.

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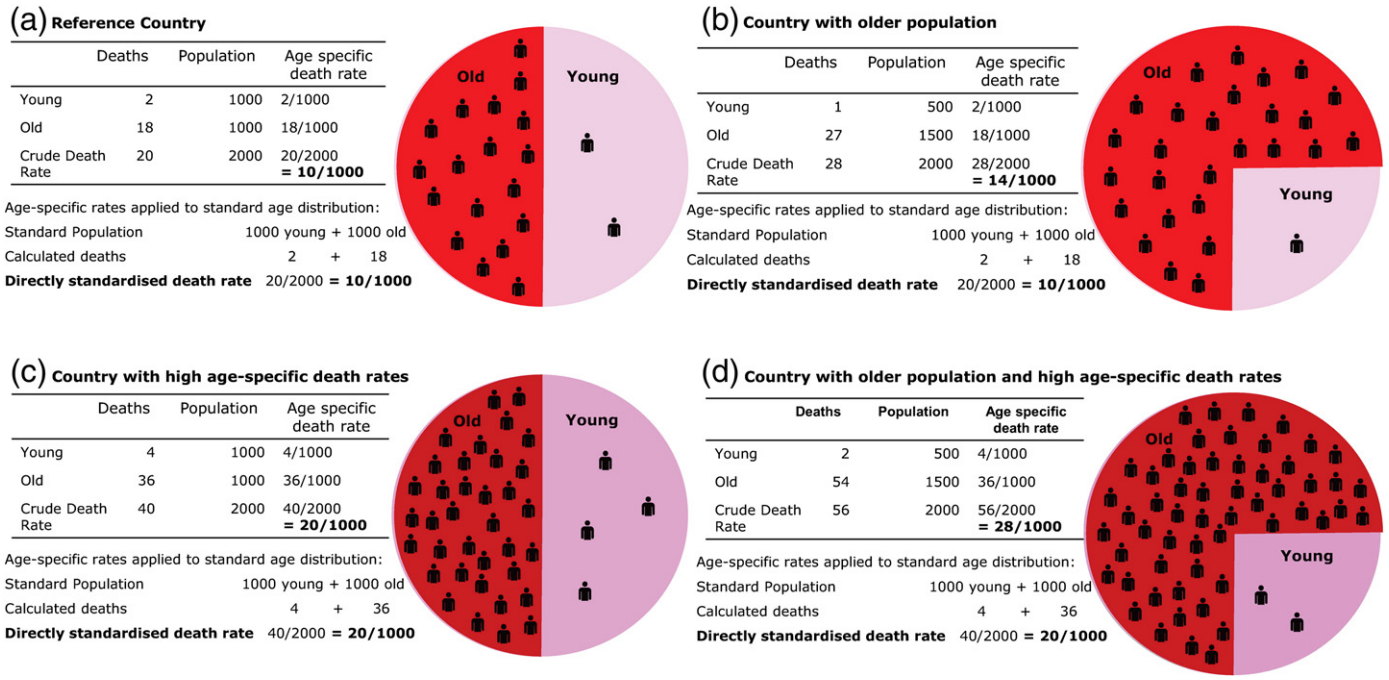

Fig. 1. (a) A standard population of 2000 people, distributed equally amongst "young" (under 60 years) and "old" (60 years and older) groups which have different death rates. This distribution of ages will be used as the "standard" in the other panels. (b) A country with the same age-specific risks, but whose population is older. Crude death rate is higher because a greater proportion of people are in the high-risk age group. However, age-standardisation prevents the ageing artefact by reconstituting a population of the "standard" age distribution, to obtain the same standardised death rate as (a). (c) A country which, compared with (a), has double the death rate at each age group. Crude death rates, and age-standardised death rates are doubled (d) A country with double the age-specific mortality and an older population. Crude mortality is very much higher but age-standardised mortality, which reconstitutes a standard distribution of ages, is only twice that of panel (a).

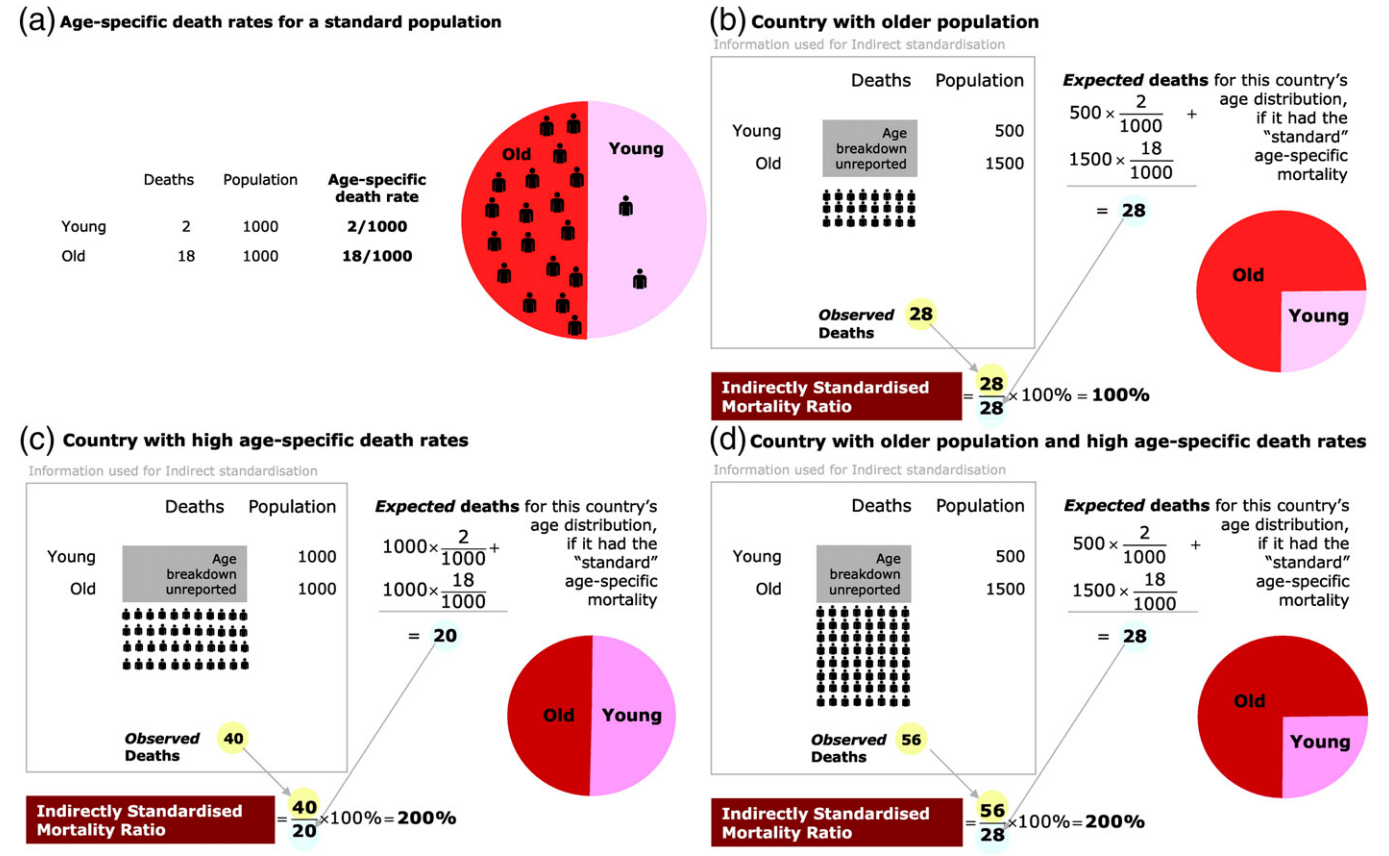

Fig. 2. If a country reports age-specific population but only total IHD deaths (without an age breakdown), it is not possible to calculate directly standardised mortality rates. Instead, by making the assumption that the age relationship of mortality is a scaled-up or scaled-down version of that of a standard population, it is possible to calculate an indirectly standardised mortality ratio expressing the country's mortality relative to that of the standard population. Panels (b), (c) and (d) calculate the indirectly standardised mortality ratio for the same country data as the corresponding panels in Figure 1, but with the age breakdown of deaths concealed.