Infant mortality is not an adequate summary measure of population health

C D Mathers, J A Salomon, C J L Murray

Measuring the quantity of interest

The acronym for healthy life expectancy was changed from DALE to HALE in the World Health Report 2001. The World Health Organisation (WHO) annually reports infant mortality rates (IMR), child mortality rates, adult mortality rates, average life expectancies, and healthy life expectancies for all 191 member states. IMR correlates highly with HALE across these 191 member states in 2000 ($r=0.93$). Reidpath and Allotey argue that IMR is an acceptable proxy measure of population health because of this high correlation.

Inspection of the country specific estimates of HALE and IMR reveals that, despite the high correlation, there are substantial variations both in adult mortality and in the average loss of full health at any given level of IMR. In the nine countries with an IMR in the range of 6–7 per 1000, for example, there is a range of 71 to 80 in life expectancy at birth and a range of 10% to 15% in the proportion of total life expectancy lost through living in years of less than full health. As a more specific example, females in India and Zimbabwe both had IMRs close to 63 per 1000 in the year 2000, but the life expectancies at birth for these two populations were 46.0, and 62.7 years, respectively.

Correlation of variables in itself is no argument to use one as a proxy for the other in scientific analyses. For example, breast cancer mortality rates in women correlate highly with age ($r=0.95$ for Australia, New Zealand, and Japan using five year age groups). Should we stop monitoring breast cancer mortality and monitor female age instead to determine if prevention programmes are effective? Healthy life expectancy has a correlation of 0.76 with average telephone lines per capita across 164 countries. At what level of correlation should we cease to measure healthy life expectancy and focus instead on telephone lines? For that matter, female IMR correlates very highly with male IMR across the 191 WHO member states in 2000 ($r=0.996$); by the argument of Reidpath and Allotey, we could use male IMR as a good indicator for women's health.

Although there may be a high correlation between infant mortality and other components of health cross sectionally, time trends may differ substantially, and this is of great importance for the evaluation of health systems and policy. In Australia, the Aboriginal IMR has declined 50% faster than non-Aboriginal IMR over the past 20 years, at the same time that the gap in total life expectancy at birth has widened from 16 years to 20 years. In sub-Saharan Africa, infant mortality rates have declined by 17% over the past decade, whereas adult mortality (the probability of dying between ages 15 and 60) has increased by 37% reflecting the devastating impact of the AIDS epidemic. Clearly IMR is not an adequate summary measure for monitoring trends and differentials in population health.

Good science entails measuring the quantity of interest rather than using a proxy with an additional error term that is unknown (until we measure the quantity of interest rather than using a proxy with an additional error term that is unknown (until we measure the quantity of interest rather than using a proxy with an additional error term that is unknown (until we measure). Without measuring the quantity of interest for monitoring trends and differentials in population health, supported by more detailed estimates of mortality and burden of disease by age, sex, and cause. Over time, successive reporting on healthy life expectancy will provide evidence of progress towards achieving global goals for improving health, fatal and non-fatal, for people of all ages.

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Authors' affiliations

C D Mathers, J A Salomon, C J L Murray, Evidence and Information for Policy, World Health Organisation, 1211 Geneva 27, Switzerland

Correspondence to: Dr C D Mathers; matherscd@who.int

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