Annex: Technical Notes

Sex-specific estimates

For this round, the United Nations Inter-agency Group for Child Mortality Estimation (IGME) has for the first time produced sex-specific estimates of the under-five mortality rate (U5MR). In many countries, fewer sources have provided data by sex than data for both sexes combined. At its June 2012 meeting, the Technical Advisory Group endorsed the methods developed by C. Sawyer (refer to the PLOS Medicine Collection), with two modifications: 1) no weights were applied to the data; and 2) when both indirect estimates from the summary birth history and direct estimates from the full birth history were available for the same survey, only the direct estimates were included. The IGME, in producing this round of sex ratio estimates, sometimes selected a different curve fitting method for a country than that selected by Sawyer in the article. Also, in a few cases the Loess was fitted to a 5-year moving average of vital registration data points, and for a few countries the median sex ratio of U5MR was used rather than the average.

Uncertainty intervals

The IGME also constructed uncertainty intervals of estimates of the under-five mortality rate for this round using a bootstrap procedure. In this approach, data are sampled based on a probability model for the data, which accounts for potential biases in trends and levels of under-five mortality rate data. The IGME estimated the mean and variability in biases in levels and trends, as well as additional error variance in the observations for each source type. Based on this knowledge, for each country, the IGME obtained (bootstrapped) a large number of "new" data sets that "could have been observed" by sampling "new" data series around the current IGME estimates. The Loess smoother was then fitted to each bootstrapped data set. The result is a large number of under-five mortality rate curves or trajectories. The set of "bootstrapped" trajectories illustrate the uncertainty associated with the original estimates. Associated 90% uncertainty bounds for the under-five mortality rate are obtained by selecting the 5th and 95th percentiles of the bootstrapped trajectories. The trajectories are also used to produce uncertainty intervals for estimates of the infant mortality rate, number of deaths and the annual rate of reduction.

Other changes

In order to develop more recent estimates, the IGME has made a slight adjustment to recalculate direct estimates from all available Demographic and Health Surveys for calendar year periods, using single calendar years for reference periods shortly before the survey and then gradually increasing the number of years for reference periods further in the past.

Moreover, R. Silva recommended in his paper (also found in the PLOS Medicine Collection) that when a full birth history is available, direct estimates from that full birth history should be used when trying to infer the overall pattern of under-five mortality change over time because indirect estimates can be useful but are unlikely to provide deeper insights and more reliable estimates than direct estimates in such cases. The IGME decided to adopt this recommendation and excluded indirect estimates from curve-fitting when direct estimates are available from the same survey with a full birth history.