A Brief on the Interim Estimation Methodology for Generating National-Level Maternal Mortality Ratios

In response to the need for recent estimates of maternal mortality ratio (MMR) to monitor the country's performance in meeting the Millennium Development Goal (MDG) on improving maternal health, the Technical Working Group on Mortality Statistics (TWGMS) formulated an indirect estimation procedure based on Boerma's prescribed method for developing countries,[1] which considers the level of maternal mortality in relation to general levels of mortality and fertility.

The procedure adopted in the estimation of MMR is as follows:

For establishing the trend since 1970 and baseline estimates based on 1990 and 2000:

- The level of completeness of birth registration for the years 1970, 1980, 1990, and 2000 were estimated using the P/F ratio method for true cohorts as prescribed in the United Nations Manual X.[2]

- The general fertility rates (GFRs) were then calculated using the corrected births and the female population in the reproductive age group (15 to 49 years) for 1970, 1980, 1990, and 2000.

- The general mortality rate for females aged 15 to 49 years was estimated from the existing female life tables for 1970, 1980, 1990, and 2000.

For estimating MMR for 2001 to 2010:

- Female life expectancy and GFRs for 2001 to 2010 was estimated using straight line extrapolation of the female life expectancy and GFR for 1990 and 2000 consistent with the observed trends since 1970.

- General mortality rate for females aged 15-49 years for 2001 to 2010 was estimated using the 2001 to 2010 female life expectancy to locate the corresponding age-specific female death rates from the 1982 United Nations model life tables and the 2000-based projected female population.

- Maternal mortality rates were then calculated based on different assumptions on the proportion of maternal deaths to total female deaths in the reproductive age group (PMDF) based on Boerma's linear regression results, the unadjusted PMDF for 1970 to 2006 from the vital registration system, and the lower and upper 95 percent confidence limits of 128 and 196 MMR according to the 2006 Family Planning Survey (FPS).

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[1] Boerma, J. Ties. 1987. Levels of maternal mortality in developing countries. *Studies in Family Planning*. 18 (4), 213-221.

[2] United Nations. 1983. *Manual X: Indirect Techniques for Demographic Estimation* (United Nations publication, Sales No. E.83.XIII.2).

- The corresponding maternal mortality ratios were then computed by applying Boerma's formula for each of the assumed PMDFs:

$$\text{Maternal mortality ratio} = \frac{\text{Maternal mortality rate}}{\text{General fertility rate}}$$

The TWG on Mortality Statistics recommended the final PMDF range of 7 to 12 percent based on the following premises:

- This range is closest to the PMDF from the latest survey estimates of MMR from the 2006 FPS. The MMR estimates from the FPS, with a point estimate of 162 and a 95 percent confidence interval of 128 to 196 for the period 2000 to 2006 centering on 2003, are generally considered as reliable estimates given the much larger sample size employed in the survey compared with earlier surveys.

- It is consistent with most of the observed PMDFs from the vital registration system.

- It also agrees with the general findings from Boerma's linear regression analysis.