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## Measures of Mortality Maternal and adult mortality

For an improved version of this topic, see Third Edition (2012) of the book Medical Biostatistics, which has a large number of new topics and expanded discussion. This book available at <http://www.crcpress.com/product/isbn/9781439884140> (list price US\$129.95) or go to [amazon.com](http://amazon.com) for discounted price

Adapted from Medical Biostatistics, Second Edition ([MedicalBiostatistics.synthasite.com](http://MedicalBiostatistics.synthasite.com)) by A. Indrayan ([indrayan.weebly.com](http://indrayan.weebly.com))  
Chapman & Hall/ CRC Press, 2008 US\$99.95  
Available at [CRC Press](http://CRC Press)

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### *Maternal Mortality*

This is measured as follows.

$$\text{Maternal mortality ratio (MMR)} = \frac{\text{maternal deaths}}{\text{live births}} * 1000 \quad (1)$$

A death is called maternal when its cause is related to or aggravated by pregnancy or its management. For practical reasons, the WHO definition includes only the maternal deaths that occur either during pregnancy or within 42 days after the termination of pregnancy. The cause may be direct, such as hemorrhage, sepsis, eclampsia, and abortion, or indirect such as heart diseases in pregnancy and hepatitis. But accidental or incidental deaths are excluded.

The denominator in formula (1) is live births, but maternal mortality can also occur at the time of stillbirth or abortion. Although data on stillbirths may be available, it is extremely difficult to obtain a count of abortions even in the best of conditions. Because the denominator is not the group at risk for the event in the numerator, MMR is called a ratio and not a rate. Sometimes the multiplier used is 100,000 and not 1000. Where possible, multiple births are counted as one in the denominator.

Maternal deaths in developing countries are now receiving more attention. Many of these countries do not have a sufficiently strong system to monitor every maternal death. Some deaths escape attention. Thus the reported rate is low compared with actual rate. WHO and the UNICEF made joint efforts to arrive at more realistic estimates of MMR in all countries. They used surrogates such as proportion of births with different types of birth attendants and general fertility rate to arrive at these estimates. Data on these surrogates are easily available and are more accurate. According to these estimates, the minimum MMR in the year 2000 was nearly zero in Iceland, and the maximum was 2000 in Sierra Leone per 100,000 live births.

### **Adult Mortality**

Child mortality is a big concern for some populations, but others who have low child mortality shift focus to adult mortality. Since geriatric mortality does not contribute much to adverse health, adult mortality counts deaths between the age of 15 and 60 years, and ignores deaths at age 60 years and beyond. Thus,

$$\text{Adult mortality rate} = \frac{\text{probability of death between age 15 and 60 years per 1000 population of this age.}}{\text{population of this age.}}$$

This is obtained through a life table.

Adult mortality is generally higher in males than females. This differential is attributed to greater exposure of males to hazards of work, stress and strains, and also to their biological vulnerability. Adult mortality rate in males in Austria is 114 per thousand and in females less than half, only 55, in the year 2004. In the U.S., these are 137 and 51 respectively. HIV affected countries have very high adult mortality rate.

Trend in adult mortality in some developing countries since 1970 (Table 1) shows that this has considerably improved in last 40 years.

**Table 1 Trend in Probability of Death per 1000 in Males and Females of Age 15–59 Years in Countries of South-East Asia Region– 1970, 1990 and 2010**

| Country     | Females |      |      | Males |      |      |
|-------------|---------|------|------|-------|------|------|
|             | 1970    | 1990 | 2010 | 1970  | 1990 | 2010 |
| Bangladesh  | 308     | 192  | 121  | 306   | 231  | 172  |
| Bhutan      | 357     | 208  | 129  | 335   | 246  | 185  |
| DPR Korea   | 215     | 159  | 141  | 300   | 232  | 223  |
| India       | 358     | 225  | 145  | 330   | 266  | 228  |
| Maldives    | 349     | 229  | 76   | 279   | 212  | 107  |
| Myanmar     | 250     | 210  | 165  | 331   | 318  | 272  |
| Nepal       | 282     | 212  | 118  | 301   | 260  | 179  |
| Sri Lanka   | 156     | 98   | 68   | 211   | 217  | 192  |
| Thailand    | 190     | 106  | 100  | 265   | 198  | 200  |
| Timor-Leste | 265     | 197  | 171  | 338   | 305  | 275  |

Source: Rajaratnam et al. 2010