Maternal Mortality Measures

Among the main measures of the risk of maternal mortality are three which are interrelated: the maternal mortality rate, the maternal mortality ratio, and the lifetime risk of a maternal death.

A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy. Death can stem from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Maternal deaths fall into two groups, direct and indirect. Direct obstetric deaths result from obstetric complications of the pregnant state (pregnancy, labor and the puerperium), from interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above. Examples of direct causes are hemorrhage, infection or sepsis, unsafe abortion, eclampsia, or obstructed labor. Indirect obstetric deaths result from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by the physiologic effects of pregnancy. Examples of indirect causes are malaria, HIV/AIDS, anemia or cardiovascular disease.

Definitions and Calculations
The maternal mortality rate (MMRate) is the number of maternal deaths per 1000 women of reproductive age (15 to 49 years). The MMRate gives a better idea of the burden of maternal deaths in a given population since it includes both pregnant and non-pregnant women.

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\text{Number of maternal deaths occurring in reference period (usually 1 year)} \times \frac{1,000}{\text{Number of women aged 15 to 49 years in population in reference period}}
\]

The maternal mortality ratio (MMRatio) is defined as the number of maternal deaths per 100,000 live births. It shares the same numerator at the MMRate but the denominator is births rather than childbearing aged women and the constant is 100,000, rather than 1000.

\[
\text{Number of maternal deaths occurring in reference period (usually 1 year)} \times \frac{100,000}{\text{Number of live births occurring within the reference period}}
\]

The lifetime risk of a maternal death (LTR) is the risk of a maternal death over the reproductive lifespan of a population of women given the current number of births (Total Fertility Rate) and the MMRatio.

\[
\text{LTR} = 1 - (1 - \text{MMRatio})^{\text{TFR}}
\]
As shown below, when the MMRatio is 800 deaths per 100,000 live births and the total fertility rate (TFR) is 6.0 births per woman, the LTR is 0.0471. That is a woman has a 1 in 21 chance of dying during her reproductive life time from maternal causes.

The MMRatio is the most frequently used measure of maternal mortality. The figure to the left underscores the relationship between pregnancy exposure and lifetime risk of a maternal death. A high TFR and a high MMRatio heighten the chances of dying in maternity.

Preventing unintended pregnancies, especially those women may seek to terminate with unsafe abortions, will directly reduce the MMRate and the Lifetime Risk of a Maternal Death. Improving obstetric care will directly reduce the MMRatio.

The main sources of data for calculating these three maternal mortality measures are vital registration, service statistics and population-based surveys. However, maternal deaths are seriously undercounted by vital registration systems in many low-income settings, usually where the risk of maternal mortality is also highest.

As seen in the map below, the highest MMRatios are in sub-Saharan Africa.

**2008 Maternal Mortality Ratios around the World**

**Sources**