
MATERNAL MORTALITY – A PUBLIC HEALTH PROBLEM

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Abstract

Maternal mortality is an important indicator which reflects the health status of a community. It can be calculated by maternal mortality ratio (MMR), maternal mortality rate (MMRate), and adult life time risk of maternal death. MMR estimates are based on varieties of methods that include household surveys, sisterhood methods, reproductive-age mortality studies (RAMOS), verbal autopsies and censuses. Main causes of maternal mortality are hemorrhage, infection, unsafe abortion, hypertensive disorder of pregnancy and obstructed labour. Factors of maternal mortality have been conceptualized by three delays model. Estimates of maternal mortality ratio (MMR) trend between 1990 and 2010 (over 20 years period) suggest a global reduction (47%), with a greater reduction in developing countries (47%) including Bangladesh than in developed countries (39%). However, to meet the challenge of Fifth Millennium Development Goal (MDG5 i.e. to ensure 75% reduction of MMR by the year 2015), the annual rate of MMR decline and increase of skilled attendant at birth need to be still faster.

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Introduction

Mothers are important constitute of a population and maternal mortality is the culmination of a series of detrimental events in a woman's life.¹ Maternal mortality ratio (MMR) represents the status of health care services and social wellbeing of a country.² Since the launching of the Safe Motherhood Initiative in 1987, there has been a worldwide effort to reduce maternal mortality and to identify its determinants. These efforts have been directed by the outputs of a number of international conferences over the past decade such as the International Conference on Population and Development in 1994, and the Fourth World Conference on Women in 1995. The declaration of the Fifth Millennium Development Goals (MDG-5) aiming at reducing by three-quarters the MMR by 2015 has also increased the demand for measuring maternal mortality at national and subnational levels.³

Globally, there were an estimated 287 000 maternal deaths in 2010, yielding a MMR of 210 maternal deaths

per 100 000 live births. The global adult lifetime risk of maternal mortality (i.e. the probability that a 15-year-old woman will die eventually from a maternal cause) is 1 in 180. The MMR in developing regions (240/100 000 live births) was 15 times higher than in developed regions (16/100 000 live births). Sub-Saharan Africa had the highest MMR (500 maternal deaths per 100 000 live births) while Eastern Asia had the lowest (37 maternal deaths per 100 000 live births) among MDG developing regions. However, Bangladesh contributes 3% of all global maternal deaths.⁴

There is a greater disparity in levels of maternal mortality than in any other public health indicator between developed and developing countries. While in the developing countries including Bangladesh significant progress has been made in reducing infant mortality, the same is not true for maternal mortality. Although the actions needed to reduce maternal mortality have been in place in most developing

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countries, 1 woman in 50 is still dying as a result of pregnancy-related complications and the figure rises to 1 in 10 in many parts of Africa. By contrast, the figure for developed countries may be as low as 1 in 8,000.⁵

Mothers in the developing countries are born as undervalued, neglected girls and grow as exploited, uneducated children. In Africa, 1 in every 25 girls reaching menarche, die as a result of pregnancy or childbirth and in South Asia, women face a lifetime risk of maternal mortality of 1 in 38.¹ However both in developed and developing countries, not all maternal deaths are reported and, thus, national mortality ratios obtained by analysis of death registrations are often under-estimated.^{6,7}

The main causes of maternal mortality are severe bleeding, infection, unsafe abortion, eclampsia, hypertensive disorders of pregnancy and obstructed labor.⁸ Very little scientifically based information is available on cause-specific mortality rates for many developing countries.⁹ Most of the information comes from the verbal autopsy (VA), used to obtain causes of death by interviewing lay respondents on the signs and symptoms experienced by the deceased before death.¹⁰⁻¹⁴

High rate of maternal mortality is a burden to society as well as to a country. Women are the main investors in social networks and these may break down when a woman dies in her productive life.¹⁵ The government of the world (both developed and developing) committed in the UN General Assembly in the year 2000 to work together in achieving MDGs, a set of realistic and achievable targets for better health of its population.¹⁶ MDG-5 (i.e. to reduce MMR by 75% within 2015) still remains a big challenge particularly for developing countries including Bangladesh.^{17,18} According to UN data,⁴ Bangladesh although obtained a significant reduction in MMR, however increasing skilled attendant at birth remained as low as 27% against the targeted goal of 50% by 2010.¹⁹ To achieve desired target of reducing maternal mortality, the annual rate of increasing skilled attendant at birth needs to be faster.

In the present article, the global and regional estimates and trends of maternal mortality has been reviewed to understand the causes and factors related to maternal mortality and the challenge facing the developing world in particular in achieving MDG 5 by 2015.

Maternal Mortality and its estimation: methods used

In the International Statistical Classification of Diseases, Tenth Revision, 1992 (ICD-10), WHO defines maternal death as: The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.²⁰

The tragedy is that these women die during normal life enhancing process of procreation and not from disease.²¹⁻²³

The number of maternal deaths in a population is essentially the product of two factors: the risk of mortality associated with a single pregnancy or a single live birth, and the number of pregnancies or births that are experienced by women of reproductive age. In addition to the MMR (maternal mortality ratio) and the MMRate (maternal mortality rate), it is possible to calculate the adult lifetime risk of maternal mortality for women in the population.^{24,25}

Although widely-used standardized definitions of maternal mortality exist, it is difficult to measure accurately the levels of maternal mortality in a population – for several reasons. First, it is challenging to identify maternal deaths precisely – particularly in settings where routine recording of deaths is not complete within civil registration systems. Second, even if such a death were recorded, the woman's pregnancy status may not have been known and the death would, therefore, not have been reported as a maternal death. Third, in most developing-country settings where medical certification of cause of death does not exist, accurate attribution of female deaths as maternal death is difficult. In the absence of complete and accurate civil registration systems, MMR estimates are based upon a variety of methods namely household surveys, sisterhood methods, reproductive-age mortality studies (RAMOS), verbal autopsies, and censuses.²⁶⁻²⁸

MMR trends between 1990-2010

Maternal mortality remains a major challenge to health systems worldwide. Reliable information about the rates and trends in maternal mortality is essential for resource mobilization, planning and assessment of progress towards MDG 5, the target for which is a 75% reduction in the maternal mortality ratio by 2015.²⁹

Between 1990 and 2010 (20 years period), there had been a 47% reduction in MMR worldwide, while the figure for developed and developing countries are 39% and 47% respectively (Fig 1).⁴ The decline in MMR in developing regions were more than that of the developed regions. It is important to note that it is easier to reduce the MMR when levels are high than when they are low.³⁰

Eastern Asia ranked highest (69%) in reducing MMR between 1990 and 2010 followed by Northern Africa (66%), Southern Asia (64%), Sub-Saharan Africa (41%), Latin America and the Caribbean (41%), Oceania (38%) and finally Caucasus and Central Asia (35%) (Fig 2).

Notably, 10 countries have already experienced 75% reduction in MMR between 1990 and 2010, much earlier than the target year of 2015 (Fig 3).⁴ However, there will remain big challenge in increasing skilled attendant at birth. Further, for some countries in Southern Africa, MMR increased from the year 1990 to 2000, mainly as result of the HIV epidemic. However, MMR started to decline when antiretroviral therapy became more and more available.³¹

The Government of Bangladesh is also committed to achieving its targets for MDG 5; reducing the maternal mortality ratio (MMR) and increasing skilled attendance at birth to improve maternal health.³² According to a WHO estimate,⁴ trend in decline in MMR between 1990 and 2010, in Bangladesh was highly satisfactorily (70%) with expectation to reach the target (75% reduction) by 2015 (Fig 4). Unfortunately however, the rate of skilled birth attendants of delivery remained as low as 27% against a targeted goal of 50% during the period.¹⁹ In Bangladesh, 85% of births

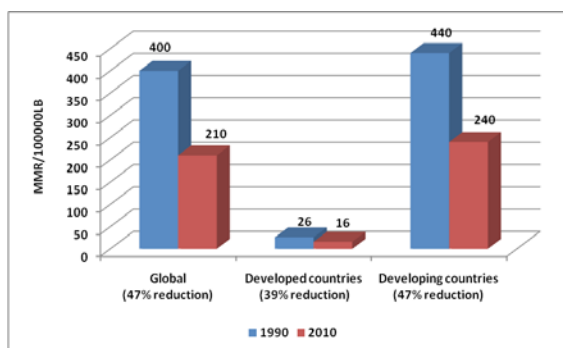


Fig-1. Global reduction of MMR in developed and developing countries based on WHO estimates⁴

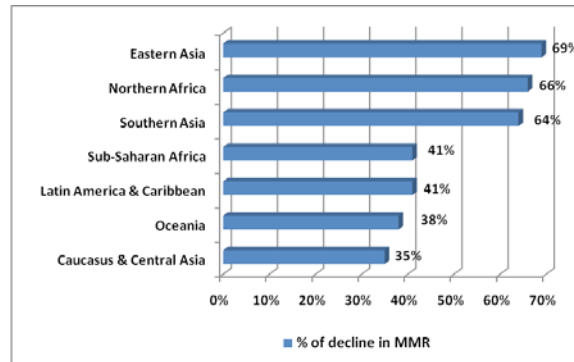


Fig-2. Region wise decline in MMR between 1990 - 2010

still takes place at home. Only one in five mothers and neonates receive postnatal care from a medically trained provider within 42 days after birth.³³

Causes of maternal mortality

Evidence suggests that the direct consequences of pregnancy and childbirth continue to account for most maternal deaths in developing countries. To obtain reliable information on the individual medical causes of maternal mortality is however extremely difficult, especially for deaths that occur at home. In a systematic review of the causes of maternal mortality WHO showed severe bleeding, hypertensive diseases and infections as the dominant causes.⁵

In another systematic review of causes of maternal deaths WHO found wide regional variation,³⁴ for example haemorrhage was the leading cause of death in Africa (33.9%) and in Asia (30.8%), hypertensive disorders in Latin America and the Caribbean (25.7%), abortion in Latin America and the Caribbean (12%), which however was as high as 30% in some countries of this region.

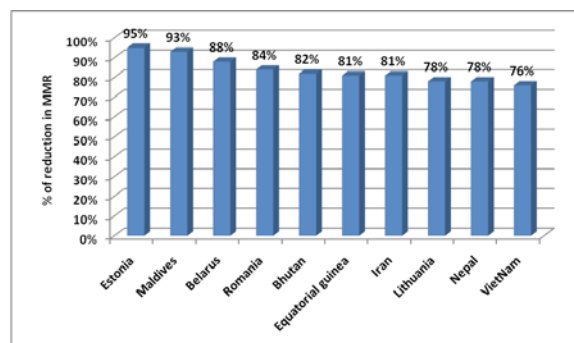


Fig-3. Region experiencing 75% reduction in MMR by 2010

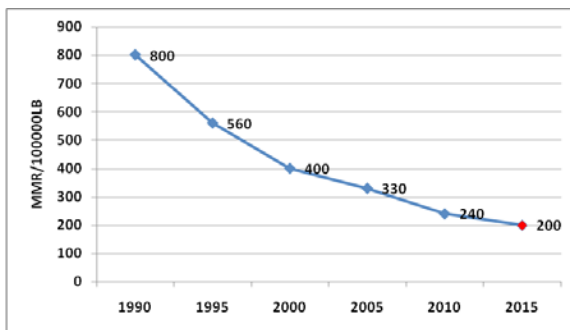


Fig-4. Over 20 years trend of MMR in Bangladesh with target in 2015

There is hardly any systematic review or study about the causes of maternal deaths in Bangladesh. A study conducted by ICDDR'B at Matlab seems to be reflective of general scenario in Bangladesh. This study reviewed the major causes of maternal death, using a combination of record review and field interviews. The major causes of maternal mortality were haemorrhage (20%), complications of abortion (18%), eclampsia (12%), violence and injuries (9%), concomitant medical causes (9%), postpartum sepsis (7%), and obstructed labour (6.5%). Deaths caused by postpartum haemorrhage were positively associated with both maternal age and parity, whereas those caused by eclampsia and injuries were more common among young and low-parity women.³⁵

Delay in maternal mortality

Factors that contribute to a higher risk of maternal mortality include such factors as biomedical, reproductive, health service, socioeconomic and cultural factors and have been conceptualized in the 'Three Delays Model'. This 'Three Delays Model' identified individual decision making, access to affordable services, and the provision of skilled personnel as the main factors which can delay access to effective interventions to prevent maternal mortality.^{36,37} The first delay is on the part of the mother, family, or community not recognizing a life-threatening condition. Because most deaths occur during labor or in the first 24 hours postpartum, recognizing an emergency is not easy. Most births occur at home with unskilled attendants, and it takes skill to predict or prevent bad outcomes and medical knowledge to diagnose and immediately act on complications. By the time the lay midwife or family realizes that there is a problem, it is too late. The

second delay is in reaching a health-care facility, and may be due to road conditions, lack of transportation, or location. Many villages do not have access to paved roads and many families do not have access to vehicles. Public transportation may be the main transportation method. This means it may take hours or days to reach a health-care facility. Women with life-threatening conditions often do not make it to the facility in time. The third delay occurs at the healthcare facility. Upon arrival, women receive inadequate care or inefficient treatment. Resource-poor nations with fragile health-care facilities may not have the technology or services necessary to provide critical care to hemorrhaging, infected or convulsive patients. Omissions in treatment, incorrect treatment, and a lack of supplies contribute to maternal mortality.³⁸ Cham *et al* utilized 'The Three Delay' framework in a study to identify contribution of three delays in Gambia which was mentioned as for i) seeking medical care (22%), ii) reaching an appropriate medical facility (84%) and iii) receiving required care at health facility (97%). Furthermore, 22% had all three phases of delay, 66% were subjected to two phases of delay and 9% had only one phase of delay.³⁹

Timing of maternal mortality

Most maternal deaths seem to occur between the third trimester and the first week after the end of pregnancy. Mortality can be extremely high on the first and second days after birth.¹⁷ A study of Pradhan *et al* in Nepal found that mortality due to pregnancy was 37 times higher than non pregnant mortality within first week of delivery and it was 5 times higher during 2-6 weeks of delivery.⁴⁰

In Bangladesh, mortality was also highest on the first day after pregnancy. Pregnancies ending in abortions and stillbirths accounted for 50% of deaths in women within 6 weeks of the end of pregnancy, and mortality after these outcomes was between two and four times as high as mortality after a livebirth.⁴¹ In Matlab, Bangladesh, data shown that 20% of all maternal deaths occurred during pregnancy, 44% during labour and the two days following delivery, and 6% during the remaining postpartum period.³⁵

Factors related to maternal mortality

The younger the women are married, the more likely they will have 'not fully developed pelvis' and therefore will be at risk of forming obstructed labour. Changing

the tradition of early marriage proved difficult, despite the legal sanctions. Where daughters are seen as a financial burden for their parents, early marriage makes economic sense. Early marriage also helps maintain male control over female sexuality and supports higher fertility. Risk of death increase as parity increase. Awareness campaign aiming at lowering fertility may ultimately affect the magnitude of maternal mortality.⁴²

Conclusion

Maternal mortality is still a major challenge to the health system worldwide. Systematic review of the ratio and trends in maternal mortality is essential for planning, resource mobilization and assessment of progress towards MDG-5, the target for 75% reduction in MMR by 2015. Estimates of ratio and trend of MMR over a 20 years' period (1990 - 2010) suggest a global reduction with a greater reduction in developing countries including Bangladesh, than in developed countries. There has been considerable progress with regard to MMR, but still much to do to increase skilled attendant at birth. Awareness campaign aiming at lowering fertility and increasing skilled attendant at birth may help to reach the target of MDG-5 in time.

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