

Maternal and Perinatal Mortality in the 21st Century

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ABSTRACT

The maternal mortality ratio measures how safe it is to become pregnant and give birth in a geographic area or a population. The total number of maternal deaths observed annually fell from 526,000 in 1980 to 358,000 in 2008, a 34% decline over this period. Similarly, the global MMR declined from 422 in 1980 to 320 in 1990 and was 250 per 100,000 live births in 2008, a decline of 34% over the entire period and an average annual decline of 2.3%.

More specifically, in 1990 around 58% of maternal deaths worldwide occurred in Asia and 36% in sub-Saharan Africa. In contrast, in 2008, 57% of global maternal deaths occurred in sub-Saharan Africa and 39% in Asia. In Europe, the main causes of death from any known direct obstetric complication remains bleeding (13%), thromboembolic events (10.1%), complication-associated birth, hypertensive disease of pregnancy (9.2%), and amniotic fluid embolism (10.6%).

Preterm birth is the most common cause of perinatal mortality (PNM) causing almost 30% of neonatal deaths, while birth defects cause about 21% of neonatal deaths. The PNM rate refers to the number of perinatal deaths per 1,000 total births. Perinatal mortality rate may be below 10 for certain developed countries and more than 10 times higher in developing countries. Perinatal health in Europe has improved dramatically in recent decades. In 1975, neonatal mortality ranged from 7 to 27 per 1,000 live births in the countries that now make up the EU. By 2005, it had declined to 8 per 1,000 live births.

We need to bring together data from civil registration, medical birth registers, hospital discharge systems in order to have European Surveys which present exciting research possibilities.

Keywords: Maternal mortality, Perinatal mortality, Pregnancy.

How to cite this article: Antsaklis A. Maternal and Perinatal Mortality in the 21st Century. Donald School J Ultrasound Obstet Gynecol 2016;10(2):143-146.

Source of support: Nil

Conflict of interest: None

Maternal mortality rate (MMR) is the number of women who die from pregnancy-related causes during pregnancy or within 42 days of pregnancy termination per 100,000 live births.

The maternal mortality ratio measures how safe it is to become pregnant and give birth in a geographic area or

a population. Maternal mortality rate during pregnancy and childbirth is considered a major indicator of the quality of health service. Every minute, a women dies in childbirth and for every woman who dies, as many as 30 others suffer chronic illness disability such as obstetric fistula. The total number of maternal deaths observed annually fell from 526,000 in 1980 to 358,000 in 2008, a 34% decline over this period. Similarly, the global MMR declined from 422 in 1980 to 320 in 1990 and was 250 per 100,000 live births in 2008, a decline of 34% over the entire period and an average annual decline of 2.3%.

The yearly rate of decline of the global MMR since 1990 was 1.3%. During 1990–2008, rates of yearly decline of MMR varied between countries from 8.8% in the Maldives to an increase of 5.5% in Zimbabwe. At the regional level, declines in the total number of maternal deaths during this time period were observed for all regions except sub-Saharan Africa and Oceania. As a result of these divergent patterns, the largest share of the burden of maternal deaths shifted from Asia to sub-Saharan Africa. More specifically, in 1990 around 58% of maternal deaths worldwide occurred in Asia and 36% in sub-Saharan Africa. In contrast, in 2008, 57% of global maternal deaths occurred in sub-Saharan Africa and 39% in Asia.

Although these estimates suggest progress in reducing maternal mortality at the global level, the decline is not rapid enough to achieve the Millennium Development Goal (MDG) 5 target. Also, there are considerable regional disparities in reduction of maternal mortality.

Almost all maternal deaths (95%) occur in Africa and Asia. More than 50% of all maternal deaths were in only six countries in 2008 (India, Nigeria, Pakistan, Afghanistan, Ethiopia, and Congo). In the absence of human immunodeficiency virus (HIV), there would have been 281,500 maternal deaths worldwide in 2008. In sub-Saharan Africa, a woman in her lifetime faces a 1 in 16 chance of dying during pregnancy or childbirth as compared with 1 in 2,800 risk in the developed world.

The MMR in the European Union (EU) region is lower than other regions. The average MMR in the Europe and Central Asia region is 58 deaths per 100,000 (from 3/100,000 in Slovenia to 210/100,000 in Kazakhstan), compared with 444 deaths per 100,000 in East Asia and Pacific, 567 in South Asia, and 916 in sub-Saharan Africa. There is no doubt that maternal mortality and morbidity during pregnancy and childbirth is considered a major indicator of the quality of health service. In the

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EU, every year more than 5,000,000 women give birth, another 2,000,000 have failed pregnancies, spontaneous and induced abortions, as well as ectopic pregnancies. Maternal deaths during pregnancy each year in the EU account between 355 and 1,000.

The total number of maternal deaths officially reported by country and by year varied from zero in Slovenia and Malta in 2004, to 5.5 in both France and the UK in 2003. Among the countries reporting data, the highest ratio was observed in Estonia with 29.6/100,000 live births compared with zero in Malta.

There are two important parameters which contribute to the existence of statistical errors after collection of data related to maternal mortality. In most countries, maternal deaths from causes related directly or indirectly to gestation and birth are not recorded. Data provide information only on methods of delivery and mortality rate.

Reduction of maternal mortality is one of the major goals of several recent international conferences and has been included within the MDGs. However, because measuring maternal mortality is difficult and complex, reliable estimates of the dimensions of the problem are not generally available and assessing progress toward the goal is difficult. Maternal mortality and morbidity is not measured well mainly because there is no international agreement about its definition and thus about methods for estimating its prevalence.

In recent years, new ways of measuring maternal mortality have been developed. Today, there is more information available than there was a few years ago. Problems of underreporting and misclassification are endemic to all methods, and estimations of the bases on household surveys are subject to wide margins of uncertainty because of sample size issues. For these reasons, it is difficult to compare data obtained from different sources and to assess the overall magnitude of the problem.¹

In France in 1992, maternal mortality was almost double the EU average (12.9/100,000). The recorded MMR has increased since 1990 and this increase may be related to improved reporting. In Eastern European countries such as Estonia, Latvia, the MMR was particularly high. And in Hungary, the MMR declined noticeably since 1990 from 18.2 to less than 10 per 100,000 live births. Although notable progress has occurred in some countries, an unacceptable number of women, especially in Africa and Asia, continue to die in childbirth. Despite many efforts to improve the situation, progress is uneven and in some countries, backsliding. This stalled progress has many causes. National commitment has been lacking in some countries and women's needs are still not high on the list of priorities in many communities.

The HIV epidemic, especially in countries of the third world, has made matters worse, complicating pregnancy

outcome, poverty conflicts, maternal disasters, and other emergencies, further burdening the situation in many countries.

In reality, all women face risks, and an estimated 15% of births are complicated by a potentially fetal condition that may appear with no warning. It is often difficult to determine in which months complications will develop. However, while many obstetric complications are neither predictable, nor preventable, almost all are treatable. This is why skilled attendance at delivery is so important.

The strategies proposed by the United Nations Population Fund (UNFPA) to reduce maternal mortality are as follows:

- Universal access to contraceptives
- Skilled attendance at births
- Emergency obstetric care for all those women who develop complications

Nearly two-thirds of maternal deaths worldwide are due to five direct causes. The most common causes are postpartum bleeding (15%), obstructive labor (6%), pregnancy-induced hypertension (10%), sepsis (8%), and complications from unsafe abortions (15%).²

However, a growing proportion of deaths are attributed to indirect nonobstetric conditions such as infectious disease (HIV, malaria, hepatitis, chronic diseases of heart, lung, liver, and multiple problems faced by pregnant women in emergency situations). Investigating risk factors for maternal mortality, it has been suggested that two-thirds of maternal mortality cases were potentially avoidable, requiring either earlier diagnosis of the problem or improved treatment and intervention.

In Europe, the main causes of death from any known direct obstetric complication remains bleeding (13%), thromboembolic events (10.1%), complication-associated birth, hypertensive disease of pregnancy (9.2%), and amniotic fluid embolism (10.6%).

According to the UNFPA, four elements are essential to maternal death prevention:

- Prenatal care (at least four automated visits to check and monitor the health of mother and fetus)
- Skilled birth attendance with emergency backup such as doctors, nurses, or midwives
- Emergency obstetric care to address the major causes of maternal death
- Postnatal care which is the 6 weeks after birth and during this time, checking for bleeding, sepsis, and hypertensive disorders.

PERINATAL MORTALITY (PNM)

The World Health Organization defines PNM as the number of stillbirths and deaths in the first week of life per 1,000 births. The perinatal period commences at

22 completed weeks (154 days) of gestation and ends 7 completed days after birth, but other definitions have been used.³

Preterm birth is the most common cause of PNM causing almost 30% of neonatal deaths, while birth defects cause about 21% of neonatal deaths.⁴

Stillbirths or fetal death encompasses any death of a fetus after 20 weeks of gestation or 500 gm. In some definitions of the PNM early fetal mortality (gestation weeks 20–27) is not included and the PNM may only include late fetal death and neonatal death. Fetal death can also be denoted as death prior to labor (antepartum death) and death during labor (intrapartum death).

The PNM rate refers to the number of perinatal deaths per 1,000 total births. It is usually reported on an annual basis and is a major marker to assess the quality of obstetric services. Comparisons between different rates may be hampered by varying definitions, registration bias, and differences in the underlying risks of the populations. Perinatal mortality rate may be below 10 for certain developed countries and more than 10 times higher in developing countries. Perinatal health in Europe has improved dramatically in recent decades. In 1975, neonatal mortality ranged from 7 to 27 per 1,000 live births in the countries that now make up the EU. By 2005, it had declined to 8 per 1,000 live births.⁵

Despite the good news, pregnancy and childbirth still involve risk, and mothers in Europe die during childbirth (5–15/100,000). Despite the decline in infant mortality, there is still a significant burden of death and disability. Around 25,000 babies are stillborn every year in EU and another 25,000 die before their first birthday. More than 40,000 of the survivors (8/1,000) have a severe sensory or motor impairment and a further 90,000 have major congenital anomalies.⁶

For developing countries where the survival rate of preterm newborns is very low, the numerator for PMR includes all fetal deaths with gestational age of 28 weeks and all neonatal deaths within 7 days of life. For developed countries, fetal deaths as low as 20 weeks of gestation and neonatal deaths up to 28 days after birth will be counted for the estimation of PMR.⁷

Every year more than 7 million perinatal deaths occur worldwide. About 99% of these perinatal deaths occur in low- and middle-income countries. Unfortunately, approximately half of those perinatal deaths usually occur at home, unnamed and unrecorded and thus unaccounted for.⁸ For about a decade, ten countries accounted for 75% of all neonatal deaths. The top five countries were India (27%), China (10%), Pakistan (7%), Nigeria (6%), and Ethiopia (4%). In the past decade, however, China dropped from second to fourth and Nigeria moved to second-highest.⁹

Because more than three-quarters of infant deaths occur during the first 28 days of life, reducing neonatal deaths in high infant mortality countries is taken as the major target of the MDG 4. The importance of perinatal death reduction is also emphasized by describing its association with maternal mortality. Previous reports have shown that for every maternal death, there are 10 perinatal deaths.¹⁰ Furthermore, because of the strong linkage of perinatal deaths with maternal deaths, about two-thirds of the causes of maternal deaths are also cause for perinatal deaths.¹¹

In 2008, the global estimation for the major causes of neonatal deaths were preterm birth (29%), infections (25%), and complications of asphyxia (22%). But in sub-Saharan Africa, the leading causes was asphyxia as the consequence of poor obstetric care.¹²

In order to provide better prenatal monitoring and to improve prenatal monitoring across Europe, it is imperative to establish new international monitoring protocols through which we can organize new strategies that target care of both the pregnant women and the fetuses. The last years, this effort has been implemented in Europe with the program EURO-PERISTAT, involving 25 countries of the EU including Norway. The results of the EURO-PERISTAT project with SCPE, EUROCAT, EURONEOSTAT with data from 2004 were reported in the European Perinatal Health Report in 2008.¹³

Surveying prenatal mortality may be possible in the European continent. However, it seems that efforts to collect records and analyze prenatal and perinatal cases are subjected to statistical errors due to

- Different laws regarding resuscitation of the newborn when infants are marginally viable, therefore lower survival rates are expected in countries with more flexible laws.
- Different criteria of recording fetal deaths. In Germany, Austria, Poland, all deaths are recorded when the fetus weighs more than 500 gm. In Sweden and Luxembourg, all deaths are recorded when the fetus passed the 28-week gestation and in Hungary, the 24th week of gestation.
- Inclusion of pregnancy termination in fetal deaths

Another very important issue is that the lower limits of registration of stillbirths are not similar in every country but in most of them the lowest barrier is between 22 and 24 weeks. Fetal mortality rates and stillbirths range from 3/1,000 in Spain, Slovak Republic, Germany, Sweden, and Luxembourg to 7.0 and 9.1/1,000 in the Netherlands and France respectively. Fetal mortality was significantly higher in multiple pregnancies in comparison to singleton from the newest data on prenatal health care in pregnant women (2008).

It is obvious that the prevalence of fetal and neonatal mortality varies widely between different countries of the EU. The lowest rates of fetal mortality are observed in

Slovakia and France (2/1,000) and the highest in Lithuania (4.6/1,000). Survival rates in infants having Apgar score less than 6 are not recorded in many European countries. The recording of fetal and neonatal deaths due to congenital abnormalities is incomplete and may not be comparable across countries because in some countries pregnancy termination is allowed after the 22nd week of pregnancy.

The EuroPeristat study is the first substantial aggregate study led by EU countries to evaluate the causes that lead to maternal and perinatal mortality and morbidity. Despite the fact that it illustrates many points at which the registration services in different countries are significantly heterogeneous, it can become the beginning for the establishment of centrally controlled systems that allow logging in the future to analyze the data with lowest statistical error.

We need to bring together data from civil registration, medical birth registers, hospital discharge systems in order to have European Surveys which present exciting research possibilities.

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