
**Understanding Perinatal Mortality**

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Abstract

Various assessments of health are used to promote comprehensive, formulated worldwide policies for improvement of delivery of care. Perinatal mortality is one measure of global perinatal health. In this review, we clarify the definition of perinatal mortality and discuss the recent trends, backgrounds, contributing factors, and practical management strategies. The wide differences in perinatal mortality between developing and developed countries are well recognized. Of equal concern are the potentially avoidable perinatal deaths that occur in developed countries; the varying perinatal mortality rates between developed countries indicate that they are not yet at an irreducible minimum. To that effect, international health policies should include the unique circumstances of developed countries, and effective practices should be better shared amongst developed countries. The international goal for improving the perinatal mortality rate, in addition to improving public health and access to good care for all pregnant women, is to develop a unified and multifaceted approach as considerably more can be achieved.
Introduction

Each year almost nine million children under five years of age (the under five mortality), and more than half a million women in pregnancy and childbirth die worldwide; in 2004 the under five mortality accounted for 18% of total world deaths. These statistics prompted the United Nations’ (UN) World Health Organization (WHO) to declare their Millennium Development Goals (MDG) 4 and 5 for 2015 to reduce the under five and maternal mortality of 1990 by two thirds and three-quarters, respectively. These MDGs include perinatal mortality since 40% of the under five deaths, or 3.7 million out of some 130 million births yearly, occur in the neonatal period (0–27 days after birth). Furthermore, three-quarters of these deaths take place in the early neonatal period (first 7 days after birth), which is included in estimates of perinatal mortality (Fig. 1). Maternal mortality will not be addressed in this overview, although it is frequently included when reviewing perinatal mortality.

In discussing perinatal and neonatal mortalities, it is important to recognize the differences between developing and developed countries. Both neonatal death and stillbirth rates are more than 10 times higher in developing than developed countries. The causes of these high rates in the developing world are undoubtedly related to the low standards of public health. In developed countries these issues around public health
have been largely resolved, so attention must be directed towards improved evidence-based obstetric practice and its association with pregnancy-related mortality.

As examples, we have selected three different developed countries, Japan, Canada, and the United Kingdom (UK), as whole or individual jurisdictions. Japan has one of the lowest perinatal mortality rates in the world due to large improvements in recent decades. In the other countries, rates have remained the same over the past 10 years, and consequently world ranking has slipped.

**What is perinatal mortality?**

The WHO defines perinatal mortality as the number of stillbirths that occur after 22 completed weeks (154 days) of pregnancy plus the number of deaths in the first seven full days of life (early neonatal deaths) per 1,000 total births. The WHO further defines stillbirth as the death of a fetus without the possibility of resuscitation with a birth weight of 500 g or more at more than 22 completed weeks of gestation (Table 1). Stillbirth definitions based on gestational age and weight often result in inaccuracies. For instance, in low income countries, where access to prenatal care and ultrasound is limited, correct gestational ages for many women are unknown, and the rate of intrauterine fetal growth restriction (IUGR) is high, leading to inappropriately low
weight for gestational age. Therefore, the distinction between a stillbirth and a miscarriage, which is pivotal when determining perinatal mortality rates, is subjective. To improve the accuracy of data collection and allow meaningful analyses, the routine recording of appropriate information must be implemented.

It is unfortunate that each country, and often each set of statistics, has adopted different definitions of the ‘perinatal period.’ This undeniably causes problems when comparing data between, and even within, countries. In the UK, the perinatal period extends from 24 weeks, whereas it begins at 22 weeks gestational age according to the Ministry of Health, Labour and Welfare in Japan. According to the Organisation of Economic Co-operation and Development (OECD), perinatal mortality should be defined as ‘the ratio of early neonatal deaths plus fetal deaths of minimum gestation period 28 weeks or minimum fetal weight of 1000g, expressed per 1,000 births’ when making comparisons between countries. In the future, a common definition must be used to understand the trends of perinatal mortality and the critical implications of this issue on national and world health policies.

**What is the history of perinatal mortality in developed countries?**

Perinatal mortality in selected developed countries has decreased over the last few
decades (Fig. 2). A caution in interpreting the data is warranted as the definitions of perinatal mortality vary across countries and therefore the data may not be strictly comparable. From 1950 to the 1970s, a decrease in neonatal mortality was mainly responsible for the decline in perinatal mortality. Since then, a decline in stillbirths has been the major contributing factor. These improvements are the result of changes in obstetric care, maternal health, and infant nutrition. Neonatology has evolved over the last century from simple, empirical care to modern, evidence-based medicine. In the 1950s, the medical care of newborn infants was transferred from obstetricians to paediatricians, and in the 1960s, the speciality of neonatology was developed. The introduction of penicillin in 1944 markedly reduced mortality from neonatal sepsis. Kernicterus, due to bilirubin deposition in the brain from rhesus disease, was first described in 1938, and is now almost completely prevented by phototherapy, exchange transfusions and prophylaxis with anti-D immunoglobulin. Respiratory distress syndrome has decreased by 95% since the 1950s due to the development of surfactant replacement therapy, antenatal corticosteroids and respiratory support including oxygen therapy, mechanical ventilators and the ability to monitor vital signs and blood gases. The introduction of incubators, improved nutrition for preterm and low birthweight infants, and neonatal intensive care units (NICU) has also proved invaluable.
What are the causes of perinatal mortality?

1. Stillbirths

Ninety-eight percent of stillbirths occur in developing countries. The 2004 world perinatal mortality rate was 43 per 1,000 live births (6.3 million); more than half of these were stillbirths. The highest stillbirth rates, 41 per 1,000 total births, were in Middle Africa; these statistics are a stark contrast to the 3–5 stillbirths per 1,000 total births recorded in developed countries.

The primary causes of stillbirth in developing countries are maternal infections including viral infections, hypertensive disease, pre-eclampsia, poor nutritional status, poverty, un-established prenatal care, fetal asphyxia induced by prolonged labour, and the insufficiency or inadequacy of medical skills and facilities.

The causes of stillbirth in developed countries are significantly different due to the wealth of the economy, quality of life, medical facilities, and education. Contributing factors in developed countries include hypertension and preeclampsia, autoimmune disease, infections (15–24%), malformations or genetic abnormalities (7–20%), placental abruption (15–20%), other placental problems (15–20%), umbilical cord abnormalities (3–10%), blood loss, smoking, obesity, and diabetes.
2. Early neonatal deaths

In developing countries the WHO reported 60.5% of early neonatal deaths were due to prematurity, 22.5% to asphyxia and birth trauma, 12.7% to congenital anomalies, 1.4% to infection, and the rest to unknown causes. Developed countries have higher proportions of congenital malformations because they have lower proportions of infection and intrapartum causes.

Beyond these, lifestyle, income, employment, social and emotional environment, ethnicity and maternal age are all factors that influence the perinatal mortality rate. Maternal age at first pregnancy has risen in developed countries; however, pregnancy at an older age is known to increase the risk of maternal complications (antepartum haemorrhage, diabetes mellitus/gestational diabetes, hypertension/eclampsia, prolonged labour, abnormality of reproductive organs), preterm birth, low birth weight, and congenital anomalies. In the UK according to the 2007 perinatal mortality report, women aged 30-34 years had the lowest stillbirth and neonatal mortality, while these rates were highest in the extremes of age: teenagers and women over 40. In addition, women of black and Asian origin had two times higher rates of stillbirth and neonatal mortality than white women. Hence, increased risk is likely to be associated with genetics, social deprivation and poor access to perinatal care.
Unfortunately, largely conscious lifestyle choices in developed countries have adversely influenced the perinatal mortality rate. Maternal smoking during pregnancy increases the risk of preterm birth, IUGR, stillbirth, and sudden infant death syndrome. Maternal exposures to alcohol, caffeine, recreational and medicinal drugs, air pollution and even electromagnetic radiation are significantly correlated with perinatal mortality. Good public health information in these countries must include the risks of delayed childbearing and the benefits of a healthy lifestyle.

**How can we improve the perinatal mortality rate?**

1. **Autopsy**

   It is discouraging that the incidence of stillbirths in singleton pregnancies has remained the same since the 1990s in the UK and other countries. It is likely that the quality of research into the causes of stillbirth has been adversely affected by a fall in the number of post mortem examinations. For developed countries the autopsy rate varies from 40-80% whereas in many developing countries, autopsy is not performed for any stillbirth.

   The main sources of valuable information about stillbirth come from autopsy. Autopsy findings have been reported to change the clinical diagnosis of the cause of
fetal death or yield additional findings in 22 to 76% of cases. This new information often influences management of future pregnancies. A study including 1,477 stillbirths reported that autopsy findings identified the cause of death in 46% of cases and yielded new information in 51%. This new information changed the estimated recurrence risk in 40% of cases, and changed recommendations for preconceptional care, prenatal diagnostic procedures, prenatal management, and neonatal management. In 2009, the American College of Obstetricians and Gynecologists issued new guidelines designed to urge parents to allow an autopsy for stillbirth, to ensure the autopsies are performed uniformly, better and to the same set of standards across jurisdictions.

2. Classification of stillbirth

A crucial step towards the reduction of perinatal mortality involves the development of an accurate classification system for stillbirths (and neonatal deaths) based on the underlying cause of death and other relevant information. This will allow a better understanding of the aetiology and patterns of causation of stillbirth. The International Classification of Diseases (ICD) coding system is the international standard diagnostic classification for epidemiological analyses using routinely collected data from death certificates and hospital medical records. However, it has proven inadequate for the
classification of stillbirths since there is not a separate category for stillbirths and consequently loses data in relation to extremely low birth weight (ELBW) babies. This would be significant in developing countries because of the high rates of IUGR. Numerous other systems have evolved but their performance varies depending on the categories included and their ease of use. Suboptimal classification systems result in a loss of important information and a high proportion of unexplained deaths as they may ignore categories such as, again, IUGR and placental disease. For example, the conventional Wigglesworth classification left unexplained 66.2% of 2,625 stillbirths in the UK from 1997-2003; 57.7% of these were identified as IUGR when classified using the relevant condition at birth (ReCoDe) system.

Classification systems may vary considerably in developing versus developed country settings due to dissimilar recording of data or the type of data available. For instance, information about the placenta is more readily available and is recorded more often in developed countries; whereas data might be sparser in developing countries such that greater reliance is placed on maternal history and information relating to intrapartum events.

Efforts toward a unified classification system have been made. For instance, the development of a meaningful clinical audit and classification of stillbirths was
addressed in the UK in 2003 with the inception of the Confidential Enquiry into Maternal and Child Health (CEMACH). From 2004, CEMACH has collected epidemiological and clinical data on each in utero death from 22 weeks of gestation and each live birth resulting in a neonatal death via the Perinatal Death Notification (PDN) form.

3. Induction of labour

Up to 10% of pregnancies continue beyond 42 weeks, and it is recognised that such “postterm” or “postdates” pregnancies are associated with an increased risk of perinatal death. Hence a policy of labour induction for all women beyond 41 weeks can decrease perinatal mortality. At this time, elective deliveries may be scheduled when the risks of intrauterine complications outweigh the risks of delivery. A meta-analysis of twelve randomized control trials of 5939 women in ten different countries found induction of labour beyond 41 weeks was associated with a reduction in perinatal death when compared to expectant management (relative risk [RR] 0.30; 95% confidence interval [CI] 0.09–0.99; 12 trials).

Multiple studies have shown that the risk of perinatal mortality increases with the length of gestation from 37 weeks onwards, but evidence associating elective delivery
around term with decreased numbers of stillbirths and reduced neonatal mortality is limited. Three small trials have compared elective induction of labour at 38–40 weeks with expectant management, but none had a sample size large enough to examine the effect on perinatal mortality. Larger scale epidemiological studies indicate that delivery at term may confer benefits on perinatal outcome. When the effects of the routine induction of women at high risk for stillbirth were modelled, a program of fetal assessment was shown to prevent deaths. However, this analysis assumed that a test with high specificity and sensitivity for stillbirth was available. There are no data to suggest that any of the present tests of fetal wellbeing at term have a good enough predictive value. In fact, methods of antepartum surveillance have been largely ineffective in identifying babies at highest risk for death.

In the absence of effective ways of predicting poor outcome, population wide intervention might be considered. In the UK population database study, delivery at 38 weeks was associated with the lowest cumulative risk of perinatal death. In the United States, it was estimated that delivery of all women at 39 weeks could prevent 2 fetal deaths per 1000 living foetuses or 6,000 intrauterine fetal demises annually. This impact is considerable; it far exceeds any other strategy implemented for stillbirth reduction thus far. However, the routine induction of all women would be needed to prevent each
loss; this would result in large numbers of elective deliveries and an increase in the rate of caesarean section due to immature cervix. Further research into the risks and benefits of elective delivery at term is required to evaluate whether the potential benefits on perinatal mortality can be realized without increasing maternal and neonatal complications.

4. The role of antenatal corticosteroids in preterm birth

Up to 500,000 neonatal deaths each year can be prevented by the administration of antenatal corticosteroids to women at risk for preterm birth. Corticosteroids accelerate the production of surfactant activity and reduce respiratory morbidity, intraventricular hemorrhage, and neonatal death. A single course of antenatal corticosteroids administered to women within 7 days of giving birth prematurely was associated with accelerated fetal lung maturation and an overall reduction in neonatal deaths (RR 0.69, 95% CI 0.58–0.81). In developed countries, antenatal corticosteroids are part of routine clinical care. However, results from a recent meta-analysis indicate there was a larger reduction in neonatal mortality in low-income countries (PR 0.47, 95% CI 0.35–0.64) than in a high-income setting (RR 0.79, 95% CI 0.65–0.96), when antenatal corticosteroids were administrated. These data indicate that the routine use of these
drugs in developing countries would significantly impact positively on global perinatal mortality rates.

The repeat administration of corticosteroids has been used to manage the treated period; but the efficacy and adverse effects of such treatment have been questioned. Some data showed no improvement in composite neonatal morbidity with a weekly course of antenatal corticosteroids. However, in 2009, the Cochrane review determined that repeat corticosteroids were associated with a reduction in occurrence (RR 0.82, 95% CI 0.72–0.93) and severity (RR 0.60, 95% CI 0.48–0.75) of any neonatal lung disease and serious infant morbidity (RR 0.79, 95% CI 0.67–0.93), but were complicated by a reduction in birth weight and head circumference. Repeat corticosteroids are also associated with a slightly higher rate of cerebral palsy, but no significant differences in body size or major neurosensory disability at two years of age were noted. These data emphasize the need for adequate, long-term studies when designing drug based protocols for the prevention of perinatal mortality. It is essential to understand the effects of these management strategies on infant, child, and adult morbidities before declaring them a success and putting them to routine use. We must decrease perinatal mortality, but at the same time take care to reduce the global burden of disease, not transfer the ‘load’ from one condition to another.
5. **National Standards**

Across large jurisdictions (either in terms of population or territory) national standards of evidence-based care that are proven to reduce risk and improve perinatal outcomes must be implemented. In Canada there are large and persistent disparities in fetal and infant mortality between Inuit-inhabited areas and the rest of the country. From 1990–2000, Inuit-inhabited areas had substantially higher rates of preterm birth (RR 1.45, 95% CI 1.38–1.52), stillbirth (RR 1.68, 95% CI 1.38–2.04), and infant death (RR 3.61, 95% CI 3.17–4.12) compared with the rest of Canada. The risk ratios and absolute differences in risk for these outcomes changed little over time. The difference of risk ratios for infant death between Aborigines and non-Aborigines in Western Australia, and between American Indians or Alaskan Natives and white populations has also been observed. These data illustrate the disparities that occur in perinatal mortality rates across large jurisdictions and emphasize the need to improve these situations through effective public health programs. Jurisdictional differences are most pronounced in developed countries and governments must allocate adequate resources to alleviate such situations. The following are some practices that should be consistently implemented at the national level:
5.1 Fetal ultrasound screening test

Maternal and child mortality and morbidity can be improved through the direct effects of perinatal care on pregnancy. With medical progress, clinicians can detect and assess the fetal condition using ultrasound technology and magnetic resonance imaging. The early detection of fetal disease such as cardiovascular or renal anomaly allows obstetricians and neonatologists to collaborate on a plan of management and/or treatment and counselling before birth. Medically indicated preterm or term caesarean section might be selected depending on the case, or maternal transportation to medical facilities connected with a NICU could occur in those cases where infants will require these facilities. In addition, postnatal assessment is facilitated by antenatal screening; for example, a diagnosis of pyelectasis before birth requiring neonatal surgery can prevent worsening of renal function within the first month of life. Fetal ultrasound and other screening tests have been adopted in the USA, Canada, Japan, and other countries.

The Society of Obstetricians and Gynecologists of Canada (SOGC) recommends that pregnant women should be offered a routine second trimester ultrasound between 18 to 22 weeks gestation.

5.2 Maternal Child Health Handbook

The perinatal mortality rate in Japan is amongst the lowest of those in developed
countries. Many reasons including economic development, improved sanitation, medical progress, and education are responsible for this improvement. However, the development of a Maternal and Child Health (MCH) handbook has played a pivotal role in the reduction and maintenance of the low perinatal mortality. The MCH handbook is given to all pregnant women in each city. It includes records of antenatal care and postpartum examinations, information about maternal health during pregnancy and methods of delivery, advice on pregnancy, a child growth chart, and an immunization history. Maternal blood pressure and weight, urinary glucose and protein concentrations, edema, abdominal girth, and the length of uterine fundus with respect to gestational age are recorded throughout pregnancy. The handbook encourages mothers to adopt a healthy lifestyle during pregnancy, to seek appropriate medical care, and to follow the recommended guidelines for the prevention of complications such as pre-eclampsia or gestational diabetes mellitus. In Japan, the Maternal and Child Health Act was established in 1937 and the original MCH handbook was published in 1942. Since then, the handbook has been a major part of the MCH service and an important factor in maintaining low rates of perinatal, infant, and maternal mortality. Other countries have now introduced a MCH handbook in an attempt to improve maternal and child health care. In Thailand, the MCH service was established in 1918 and the MCH handbook
was published in 1985. Maternal mortality dropped from 374.3 per 100,000 live births in 1961 to 48.0 in 1984, and 9.8 in 2006; the infant mortality rate declined from 84.2 infant deaths per 1,000 live births in 1964 to 40.7 in 1984, and 11.3 in 2005–2006. The perinatal mortality rate decreased from 20 perinatal deaths per 1,000 live births in 2000 to 15 in 2004. Clearly, more than the MCH handbook is responsible for this decline, but it is one part of a coordinated approach to improved perinatal care. The MCH handbook is now commonly used in Japan, Korea, Indonesia, Cote d’Ivoire, Niger, Senegal, Thailand, Tunisia, Bukina Faso, and the State of Utah (USA), and is widely recognized as a useful tool to improve maternal health during perinatal period. Projects similar to the MCH handbook are being promoted by The Japan International Cooperation Agency, United Nations Children’s Fund, and Health and Development Service in Bangladesh, Vietnam, Afghanistan, and other countries with high perinatal mortality rates. MCH handbooks in developed and developing countries should allow significant progress toward MDG 4 and 5.

5.3 National Birthing Strategy

Sweden and other Scandinavian countries have some of the lowest perinatal mortality rates in the world. This may be due to their national programs for the "protection of mother and child” which provide free access to prenatal care, enrollment of all women
in a well-organized prenatal care system, and paid maternity leave for all employed women. In addition, The Swedish Medical Birth Registry it is one of the most complete birth registries in the world; it provides data on 98–99% of births in Sweden and is an invaluable resource for the development of strategies to maintain and continue reducing their already impressive statistics.

In Scotland, a preventive program among women carrying twins achieved a remarkable improvement in the perinatal death rate due to a reduction in the numbers of babies weighing < 1,500g at birth, and a reduction in the number of births at very short gestation. A similar program in Norway resulted in a reduction in the numbers of very low birth weight babies and a reduced risk of handicap.

Canada’s international ranking for perinatal mortality, infant mortality, and maternal mortality has been dropping relative to other OECD countries. Therefore, in 2006 the SOGC developed a draft for a National Birthing Strategy. Its recommendations include federal leadership in seven key areas, including a mechanism to gather precise and uniform data across the country, focusing on maternal patient safety, implementing national standardized practice guidelines, and a coalition that would create a model of sustainable maternity and newborn care. Until this time, the only developed countries in which no National Birthing Programs were implemented were the USA and Canada. As
a probable consequence of this, the preterm birth rates in these two countries were much higher than in the countries with prevention policies for all women. Presently, there is nothing to determine whether Canada’s national birthing plan will be effective. However, the need has been recognized, and data from other developed countries are indicative of the potential of such a strategy.

What does the future hold?

Canadian Prime Minister Stephen Harper has pushed for the G8 to take on the improvement of global health and pledged $1 billion to target poor countries with the worst records of maternal and child mortality and malnutrition. Canada will host the G8 and G20 this June (2010), and Stephen Harper will urge leaders to provide the costs of clean water, inoculations and better nutrition, as well as the training of health workers to care for women and deliver babies in the developing world.

In the developed world, further steps must be taken to reduce prematurity, hypoxic-ischemic brain injury, neonatal infection, and congenital abnormalities. Complications of preterm infants such as brain injury, necrotizing enterocolitis, bronchopulmonary dysplasia, and retinopathy of prematurity must be avoided. Efficient data collection by Medical Birth Registries and financial support for research are
essential for continued investigations into the causes, consequences, and prevention of every aspect of perinatal mortality.

Conclusions

In developing countries, public health and access to care issues need to be addressed. In developed countries, surveillance, uniform evidence-based obstetric practices, decreases in prematurity, and national birthing policies including the MCH handbook are most likely to have a positive impact on perinatal mortality. Taken together, these strategies should allow the WHO to approach MDG 4 and 5.

Practical points

- Perinatal mortality can be decreased by the induction of labour after 41 weeks of gestation; postterm pregnancies are associated with an increased risk of perinatal deaths.

- The MCH handbook can encourage awareness of maternal complications and child health in pregnant women.
A National Birthing Strategy may provide an effective public health care system for all and help pregnant women become aware of lifestyle and environmental issues.

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Table 1. Definitions of perinatal mortality

**WHO**

| Perinatal mortality = | \[
| \frac{(Early\ \text{neonatal\ mortality} + \text{stillbirths})}{\text{Total\ births}} \times 1000 |
| Total\ births |
|-----------------|-----------------------------------------------------|

- Total births = live births + stillbirths.
- Perinatal period commences at 22 completed weeks (154 days) of gestation and ends seven completed days after birth (0-6 days).
- Stillbirth is the death of a fetus without the possibility of resuscitation with a birth weight of 500 g or more.

**OECD**

Stillbirth: minimum gestation period 28 weeks or minimum fetal weight of 1000g.
### Figure 1. Under five mortality in Canada, UK, and Japan in 2007.

Early neonatal mortality is 0-6 days after birth; late neonatal mortality is 7-27 days after birth.


Trends in Perinatal Mortality in the Developed World

Figure 2. Perinatal mortality in developed countries has decreased over the last few decades.


UK data definition and source: number of deaths per 1000 total births. Death of a fetus or newborn in the perinatal period that commences at 24 weeks’ gestation and ends at 6 completed days from the time of birth. http://www.cmace.org.uk/publications/CEMACH-publications Maternal-and-Perinatal-Health.aspx


Canada data definition and source: number of perinatal deaths during a given year per 1,000 total births (live births plus late fetal deaths) in the same year. Perinatal death is the death of a child under one week of age (0 to 6 days) or a stillbirth of 28 or more weeks of gestation. Statistics Canada, Canadian Vital Statistics, Birth, Death and Stillbirth Databases.
Further Reading


Useful website

Organisation of Economic Co-operation and Development (OECD) Health data.

Questions regarding “Understanding Perinatal Mortality”

True – False Questions

The following features of perinatal mortality can be interpreted as follows:

(a) Perinatal mortality consists of the rate of stillbirths, neonatal, and maternal deaths.

(b) Perinatal mortality is one measure used to promote comprehensive worldwide policies for the improvement of maternal and child health.

(c) The World Health Organization (WHO) defines perinatal mortality by the week of gestation and the birth weight; however the adopted definitions are actually different for each country or set of statistics.

(d) The decrease in perinatal mortality over the last few decades in developed countries is due to developments in obstetric and neonatal care, maternal health, and infant nutrition.

(e) The major causes of perinatal mortality in developed countries are infection, intrapartum causes, and prematurity compared with those in developing countries.

Answers

(a) F

(b) T

(c) T
(d) T

(e) F

**Explanation to answers**

Perinatal mortality is one measure of global perinatal health, although various assessments of health are used to promote comprehensive, formulated worldwide policies for the improvement of delivery care. The WHO defines perinatal mortality as the number of stillbirths that occur after 22 completed weeks of gestation plus the number of deaths in the first seven full days of life (early neonatal deaths) per 1,000 total births. However, it is unfortunate that each country and often each set of statistics have adopted different definitions of the perinatal period, and this causes problems when comparing data between countries. Perinatal mortality in developed countries has improved over the last few decades because of developments in the wealth of the economy, education, obstetrics and neonatal care, medical facilities, nutrition, and the environment. Perinatal mortality in developing countries is caused by high rates of infection (syphilis, malaria and viral infections), intrapartum causes, and prematurity; developed countries have higher rates of malformations, and lower rates of infection and intrapartum causes.
Extended matching questions (EMQs)

Questions

For each statement given below, choose the single most appropriate explanation from the list of A~J.

A. Caesarean section
B. Antibiotics
C. Tocolytic agents
D. Administration of antenatal corticosteroids
E. Induction of labour
F. 22 weeks of gestation
G. 24 weeks of gestation
H. 28 weeks of gestation
I. National birth strategy
J. Millennium Development Goal
K. Maternal and Child Health Handbook
L. Prematurity
M. infection
N. congenital malformations
O. asphyxia and birth trauma

1. The main cause of early neonatal deaths in developing countries.

2. The generally accepted definition of the beginning of the perinatal period in completed weeks of gestation that is used for comparison of perinatal mortality data.

3. This has contributed to an improvement in perinatal mortality by accelerating the production of surfactant activity and reducing respiratory morbidity in preterm infants.

4. This can encourage awareness of maternal complications and child health in pregnant women. It includes records of antenatal care and postpartum examinations, information about maternal health during pregnancy, advice on pregnancy, a child growth chart, and an immunization history.

5. This intervention can reduce perinatal mortality after 41 weeks of gestation because postterm pregnancies are associated with an increased risk of perinatal deaths.

Answers

1. L:

Prematurity is the major cause of early neonatal mortality, followed by asphyxia and
birth trauma, congenital anomalies, and infection.

2. **H:**

   The OECD recommends the perinatal period as after 28 weeks of gestation for the purpose of comparing statistics.

3. **D:**

   Antenatal corticosteroids have contributed to improvements in perinatal mortality in developed countries in the last few decades because of a reduction in respiratory disorders and intraventricular hemorrhage. Antenatal corticosteroids are part of routine clinical care for women at risk of preterm birth. This has a significant impact on global perinatal mortality in both the developing and developed world.

4. **K:**

   The Maternal and Child Health Handbook (MCH handbook) has played an important role in the reduction and maintenance of the low perinatal mortality in Japan. The MCH handbook includes records of maternal examinations during pregnancy, methods of delivery, advice on pregnancy, a child growth chart, and an immunization history. It encourages mothers to take care of maternal and child health. This is recognized as a useful tool and has been introduced in other countries with high perinatal mortality rates.
5. E:

Induction of labour for women beyond 41 weeks of gestation can decrease perinatal mortality when compared to expectant management, because postterm or postdates pregnancies are associated with an increased risk of perinatal death.