

ABC SERIES

- The ABC titles are serialised and peer reviewed in the **BMJ** before being published in this great series of books
- The pages are always laid out in two columns with the highly illustrated 'slide show' of relevant visual aids alongside the text, pulling out key points from the text
- Each book is easy to read and contains a consistent style and the following key features which help to show the important aspects of the text

Comparison tables

Graphs and charts

Advertisements and other cultural references

Diagnostic images

Tinted key information boxes

Bulleted lists

Photographs and line drawings

ABC of preterm birth

Incidence

Over the past 20-30 years the incidence of preterm birth in most developed countries has been about 5-7% of live births. The incidence in the United States is higher, at about 12%. Some evidence shows that this incidence has increased slightly in the past few years, but the rate of birth before 32 weeks' gestation is almost unchanged, at 1-2%.

Several factors have contributed to the overall rise in the incidence of preterm birth. These factors include increasing rates of multiple births, greater use of assisted reproduction techniques, and more obstetric intervention.

Part of the apparent rise in the incidence of preterm birth, however, may reflect changes in clinical practice. Increasingly, ultrasonography rather than the last menstrual period date is used to estimate gestational age. The rise in incidence may also be caused by inconsistent classification of fetal loss, still birth, and early neonatal death. In some countries, infants who are likely to be categorised as live births.

With the limited provision of antenatal or perinatal care in developing countries, there are difficulties with population based data. Registration of births is incomplete and information is lacking on gestational age, especially outside hospital settings. Data that are collected tend to give only estimates of perinatal outcomes that are specific to birth weight. These data show that the incidence of low birth weight is much higher in developing countries than in developed countries with good care services.

In developing countries, low birth weight is probably caused by intrauterine growth restriction. Maternal undernutrition and chronic infection in pregnancy are the main factors that cause intrauterine growth restriction. Although the technical advances in the care of preterm infants have improved outcomes in many countries with well resourced care services, they have not influenced overall morbidity and mortality in countries that lack basic midwifery and obstetric services. In these developing countries, the priorities are to reduce intrauterine growth restriction, identify and manage pregnancies of women who are at high risk, and provide basic neonatal resuscitation.

Causes of preterm birth

Spontaneous preterm labour and rupture of membranes

Most preterm births follow spontaneous, unexplained preterm labour, or spontaneous preterm prelabour rupture of the amniotic membranes. The most important factors that contribute to spontaneous preterm delivery are a history of preterm birth and poor socioeconomic background of the mother.

One of the many factors that contribute to the association of preterm birth with socioeconomic status is complex. Mothers who smoke are twice as likely as non-smoking mothers to deliver before 32 weeks of gestation, although this effect does not explain all the risk associated with social disadvantage.

Evidence from meta-analysis of randomised controlled trials shows that antenatal smoking cessation programmes can lower the incidence of preterm birth. Women from poorer socioeconomic backgrounds, however, are least likely to stop smoking in pregnancy although they are most at risk of preterm delivery.

No studies have shown that other interventions, such as better antenatal care, dietary advice, or increased social support during pregnancy, improve perinatal outcomes or reduce the social inequalities in the incidence of preterm delivery.

Epidemiology of preterm birth

Preterm births by ethnic group in United States 2000*

- Black—17.3%
- Hispanic—11.2%
- Non-Hispanic white—10.4%

*Adapted from MacDorman MF et al. *Pediatrics* 2002;110:1037-52

Multiple pregnancy and assisted reproduction

Multifetal pregnancy increases the risk of preterm delivery. About one quarter of preterm births occur in multiple pregnancies. Half of all twins and most triplets are born preterm. Multiple pregnancy is more likely than singleton pregnancy to be associated with spontaneous preterm labour and with preterm obstetric interventions, such as induction of labour or delivery by caesarean section.

The incidence of multiple pregnancies in developed countries has increased over the past 20-30 years. This rise is mainly because of the increased use of assisted reproduction techniques, such as drugs that induce ovulation and in vitro fertilisation. For example, the birth rate of twins in the United States has increased by 55% since 1980. The rate of higher order multiple births increased fourfold between 1980 and 1998, although this rate has decreased slightly over the past five years. In some countries two embryos only are allowed to be placed in the uterus after in vitro fertilisation to limit the incidence of higher order pregnancy.

Singleton pregnancies that follow assisted reproduction are at a considerable increased risk of preterm delivery, probably because of factors such as cervical trauma, the higher incidence of uterine problems, and possibly because of the increased risk of infection.

Maternal and fetal complications

About 15% to 25% of preterm infants are delivered because of maternal or fetal complications of pregnancy. The principal causes are hypertensive disorders of pregnancy and severe intrauterine growth restriction, which is often associated with hypertensive disorders. The decision to deliver these infants is informed by balancing the risks of preterm birth for the infant against the consequence of continued pregnancy for the mother and fetus. Over the past two decades improved antenatal and perinatal care has increased the rate of iatrogenic preterm delivery. During that time the incidence of still birth in the third trimester has fallen.

Outcomes after preterm birth

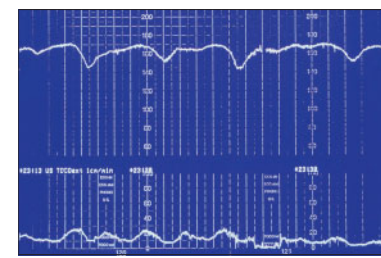
Broadly, outcomes improve with increasing gestational age, although for any given length of gestation survival varies with birth weight. Other factors, including ethnicity and gender also influence survival and the risk of neurological impairment.

The outcomes for preterm infants born at or after 32 weeks of gestation are similar to those for term infants. Most serious problems associated with preterm birth occur in the 1% to 2% of infants who are born before 32 completed weeks' gestation, and particularly the 0.4% of infants born before 28 weeks' gestation. Modern perinatal care and specific interventions, such as prophylactic antenatal steroids and exogenous surfactants, have contributed to some improved outcomes for very preterm infants. The overall prognosis remains poor, however, particularly for infants who are born before 26 weeks' gestation.

The outcome for preterm infants of multiple pregnancies can be better than that of singleton pregnancies of the same gestation. In term infants the situation is reversed. The

ABC of preterm birth

Cardiotography and fetal biophysical profiling are two tools often used to determine the physiological status of the potentially compromised fetus. Unfortunately these tools have no benefit in predicting and preventing poor outcomes in high risk pregnancies. Some evidence shows, however, that computerised cardiotography is more accurate in predicting poor outcome than subjective clinical assessment alone. The biophysical profile takes into account the tone, movement, breathing, heart rate pattern of the fetus, and liquor volume.

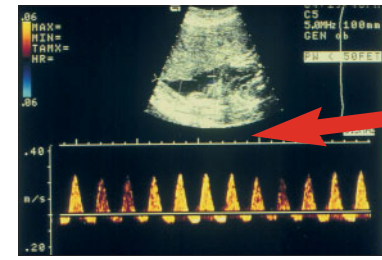


Monitoring the fetal heart rate can help determine the physiological wellbeing of the fetus. This cardiotogram shows fetal tachycardia with reduced variability and decelerations

Doppler

Umbilical arterial blood flow becomes abnormal when there is placental insufficiency—for example, secondary to pre-eclampsia. Doppler measurement of fetoplacental blood velocity may be a more useful test of fetal wellbeing than cardiotography or biophysical profiling. However, a recent systematic review of randomised controlled trials did not indicate that Doppler measurement of fetoplacental blood velocity is associated with a substantial reduction in perinatal mortality. Additionally, there is uncertainty over the ideal frequency of examination and the optimum threshold for intervention. Umbilical artery Doppler ultrasonography to detect fetal compromise is part of routine obstetric practice for high risk pregnancies in many countries, so there may not be further randomised controlled trials in high risk populations.


Recent studies have investigated the use of middle cerebral artery and ductus venosus Doppler waveforms in evaluating cardiovascular adaptations to placental insufficiency. Results are promising, although the effect on important outcomes when used as part of clinical practice has yet to be evaluated.



Doppler measurement of middle cerebral arterial flow. Abnormal waveforms can show cardiovascular adaptations to placental insufficiency

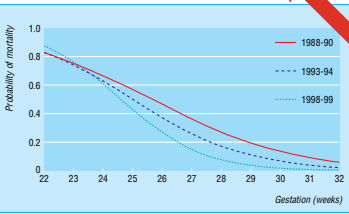
Epidemiology of preterm birth

Twins pregnancy increases the risk of preterm birth



Induction of labour is most likely to be successful in a woman with a favourable cervix (as assessed by the Bishop score) who has had no caesarean sections and has a history of vaginal delivery

Probability of mortality



Mortality in UK neonatal intensive care cohorts of infants born before 32 weeks' gestation. Adapted from Parry G, et al. *Lancet* 2003;361:1789-91

Outcomes for infants live born before 26 weeks' gestation in British Isles*

| Gestation (weeks) | Survival to discharge (%) | Survival without handicap at 30 months (%) |
|-------------------|---------------------------|--|
| 22 | 1 | 0.7 |
| 23 | 11 | 5 |
| 24 | 26 | 12 |
| 25 | 44 | 23 |

*Adapted from Wood NS et al. *New Engl J Med* 2000;343:378-84