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10 Pregnancy and Childbirth

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1 Summary

Introduction

Pregnancy and childbirth are common and highly important aspects of women's lives. Government policy has affected maternity care through a number of policy documents, particularly *Changing Childbirth*, which aimed to provide more woman-centred care, offering choice, continuity of care and control. In the UK, NHS maternity care is provided in hospitals and the community by midwives, GPs, obstetricians and paediatricians.

The material in this chapter is primarily concerned with uncomplicated pregnancy and childbirth but also focuses on two other sub-groups: women with major obstetric complications and women in vulnerable social groups. Material for this chapter was researched in 2001 and sent to the editors in 2002.

Prevalence and incidence

Vital statistics

In 1999, 615 994 women in England and Wales had pregnancies ending in live or stillbirth and there were 57.7 live births per thousand women aged 15–44 years. The live birth rate ranged from 52 to 65 per 1000 women aged 15–44 years, and was slightly higher in London and Northern Ireland, and slightly lower in Scotland. Age-specific fertility rates show that many women are postponing childbearing into their 30s and 40s.

Perinatal and infant mortality rates declined steadily through the twentieth century but may now be plateauing, although the infant mortality rate in 2000 was the lowest ever at 5.6 per thousand live births in England and Wales. Families from lower social classes still experience greater perinatal and infant mortality than other groups and the incidence of low birthweight is also greatest in families from lower social classes. The percentage of low birthweight babies as a proportion of all births increased steadily over the last two decades. Over 7% of babies had a birthweight of less than 2500 g in England in 1999. This was partly a result of increases in number and survival of multiple births.

Pregnancy, labour and delivery

The Hospital Episode Statistics provide some information on complications in pregnancy and labour. They suggest that prolonged pregnancy and hypertension were the most common reasons for admission

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antenatally. Major complications, such as haemorrhage, occurred only rarely. Trauma to the perineum was the most common adverse outcome arising from labour.

Postnatal health

Adverse postnatal health problems such as incontinence, perineal pain and backache are common after childbirth. Postnatal depression affects between 10–15% of women in the first few months after childbirth but the proportion declines rapidly up to about 6 months. Breastfeeding rates in the UK compare unfavourably with other developed countries. Initiation of breastfeeding has remained about the same over the last decade at 68% in England and Wales, 55% in Scotland and 45% in Northern Ireland in 1995, compared to over 90% in Russia and Norway and over 70% in Italy. Six weeks after birth only 44% of women were breastfeeding in England and Wales.

Services currently available

Patterns of care

Many different patterns of care have been set up including 'shared care', 'midwife-led care', and 'caseload midwifery'. Such systems of care were established to provide more woman-centred care and involved midwives as primary carers. They were generally available only to women at low risk of complications, although some schemes were aimed at women at higher risk of complications. In general, women receiving these new models of care have been enthusiastic about them, as were midwives who had been involved in designing and setting up the schemes. Evaluation of these new systems of care has been limited and there is little reliable evidence about their impact on maternal or neonatal morbidity, their sustainability or the costs associated with them.

Hospital-based services

There is substantial variation geographically in provision of maternity beds and in the way they are organised into small and large units. Since the NHS was established, there has been a steady decline in numbers of maternity beds available and they have tended to become more concentrated in large units. In common with other specialties, durations of inpatient stay in maternity have declined considerably over the last decade. In 1997–98 (the most recent national data available) in England and Wales about 13% of women left hospital on the same day as delivery and three quarters within 3 days.

Elements of care

Women may receive an enormous range of care antenatally, intrapartum and postnatally. It is not possible to cover the whole range of services offered and the following is a partial summary. Pregnant women are generally offered tests for anaemia, blood group antibodies, rhesus type and certain infectious diseases (including rubella, hepatitis B, HIV, syphilis and asymptomatic bacteriuria). Blood pressure and fetal growth are monitored throughout pregnancy. Most maternity units offer screening for Down's syndrome using biochemical markers.

Data from the Hospital Episode Statistics give information on induction rates (22% in 1998–99 in England and Wales), method of delivery (caesarean section rate 19% in 1998–99 in England and Wales) and pain relief in labour (about half of women delivered by elective caesarean had a spinal anaesthetic in England and Wales in 1997–98).

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The Infant Feeding Survey describes the type of support available to mothers when breastfeeding. The vast majority (86%) of mothers reported receiving help the first time they breastfed their baby. For subsequent feeding problems, mothers turned predominantly to midwives and health visitors for support. Postnatal depression is screened for in many areas using the Edinburgh Postnatal Depression Scale.

Costs of services

About three quarters of the total NHS budget goes to the hospital and community health services (HCHS) and about two thirds of this goes on staff salaries. Over half of the maternity budget goes to inpatient services. The programme budget for maternity and early childhood amounted to 5.6% of the total HCHS budget in 1997/98. There is insufficient information on costs for detailed planning of local maternity services.

Effectiveness and cost-effectiveness of services

Due to the breadth of the subject of maternity care it is not possible to cover clinical and cost-effectiveness comprehensively. Selected examples of relevance to commissioners of services are given in this section.

Interventions to reduce smoking in pregnancy have been systematically reviewed and published in the Cochrane Library. The most intensive smoking cessation programmes achieved significant reductions which reduced problems of low birthweight and prematurity. There were no differences in perinatal mortality, a much rarer outcome.

Ultrasound screening is carried out primarily to detect anomalies and can be used to screen for Down's syndrome. The most common test for Down's syndrome is a biochemical blood test (the triple test) which has 69% detection rate for a 5% false positive rate. The quadruple test has a 76% detection rate for a 5% false positive rate but is more costly.

Breech presentation at term occurs in 3–4% of pregnancies and good evidence exists that external cephalic version (ECV) is a safe and cost-effective method to increase the rate of vaginal delivery. However, if ECV is unsuccessful (approximately one third of cases), the evidence suggests that the safest method of delivery is by caesarean section.

Preterm birth (birth at less than 37 weeks of pregnancy) is strongly associated with poor perinatal and infant outcomes. The most common problem is respiratory distress syndrome (RDS). Although there have been no interventions demonstrated to prevent preterm labour, administration of corticosteroids has been shown to speed up maturation of the fetal lungs and reduce RDS and perinatal mortality.

Models of care and recommendations

Professional and governmental bodies recommend that various problems be routinely screened for in pregnancy and postnatally including HIV, hepatitis B, and Down's syndrome antenatally and domestic violence postnatally.

Various themes have also emerged as important principles in caring for women in the maternity service. For women with uncomplicated pregnancies and labour, the most important is woman-centred care, which permits women choice and control in their childbearing. Where complications or problems arise, it is important that appropriate referral procedures are in place, that staff communicate well between themselves and with the woman, and that policies consistent with national guidelines are in place which cover health professionals' training for emergencies, referral and audit of outcomes.

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2 Introduction and statement of the problem

Pregnancy is an important part of the lives of the majority of women aged 15 to 44 years. It is not an illness, although in a minority of cases pregnancy-associated medical problems arise for the mother or the baby. In 1999, 615 994 women in England and Wales had pregnancies ending in live or stillbirth and there were 57.7 live births per thousand women aged 15–44 years. As the topic of pregnancy and childbirth is a very broad one, this needs assessment will focus on uncomplicated pregnancy and its outcome, although specific major complications experienced by some mothers and babies will be included. Rather than attempting to be comprehensive, the text will review antenatal, intrapartum and postnatal care of women and well babies and give directions to sources providing clear and up to date information on other aspects of maternity care, summarised in Appendix 1. A glossary of terms is given in Appendix 2.

The material included has been taken from a selective review of the worldwide literature (available in English), including Cochrane reviews where available. The Cochrane Database of Systematic Reviews includes over 400 regularly updated reviews in the area of pregnancy and childbirth. For this chapter, the epidemiological data and information on current services and costs relate primarily to England and Wales. Material from Scotland and Northern Ireland which is easily accessible has been incorporated into the relevant tables and mentioned in the text. Information on costs and cost-effectiveness has been included where available.

This review excludes services for the management of sub-fertility, early pregnancy loss and termination of pregnancy, which are covered in the chapter on gynaecology. This chapter does not review the neonatal care of acutely ill preterm or term babies. Clinical obstetric management is also not covered.

Maternity care is distinct from many other health areas in having a legal framework that governs parts of practice and service provision. Readers should bear in mind that the legal framework and guidance documents may be different in Scotland and Northern Ireland from those in England and Wales. The legal framework relating to maternity care in England and Wales is outlined in **Box 1** below.

Box 1: Summary of legal framework.

- Midwives are obliged to notify the UKCC of their intention to practice in the forthcoming year (Nurses, Midwives and Health Visitors Rules 1983; Nurses, Midwives and Health Visitors Act 1997).
- Notification of births and registration of stillbirths by attendant at birth (Notification of Births (Extension) Act 1915).
- Registration of births by nearest relative (Birth and Deaths Registration Act 1953; Stillbirth (Definition) Act 1992).
- It is no longer required that a GP be present at a home delivery. Maternity records need to be retained for a minimum of 25 years (HSC 1999/053).

In addition to laws specific to maternity care, normal legal requirements regarding healthcare also apply. Staff working in maternity care must be aware that personal data storage must be registered (Data Protection Act 1998) and that clients have a right of access to records pertaining to themselves (Access to Health Records Act 1990). Staff should also be aware of the Children Act (1989), the Human Rights Act (1998) and the Health and Social Care Act (2001). The Department of Health publication *Working together to safeguard children* brings together much of the relevant material relating to children.[1] Providing appropriate services for minority ethnic groups is also covered by legislation. Guidance for NHS Trusts is provided by the Commission for Racial Equality (website listed in Appendix 1).

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In September 2001 a new Nursing and Midwifery Council responsible for professional self-regulation replaced the existing UK Central Council for Nursing, Midwifery and Health Visiting (UKCC) and the four National Boards. It is responsible for maintaining the professional register and regulating practice.

There are also minimum standards of care recommended by such bodies as the Royal College of Midwives (RCM) and the Royal College of Obstetricians and Gynaecologists (RCOG), such as those relating to the organisation of labour wards[2] and routine ultrasound screening in pregnancy.[3] Maternity care is unusual in having local Maternity Services Liaison Committees that advise Health Authorities, which include representatives of users of maternity services along with professionals in maternity care (website listed in Appendix 1).

Changing Childbirth (1993)[4] was a government policy document focused entirely on maternity services. It represented a change in approach to maternity care, moving the service from being a clinically driven one to focusing on the needs of women and their babies to have woman-centred care that offers choice, continuity of care and control to each pregnant woman.

Other recent government plans for health and health services have been less specific about maternity care. The White Paper *Saving Lives: Our Healthier Nation* (July 1999)[5] was an action plan to tackle poor health and required the setting of local targets for reducing health inequalities. The NHS Plan[6] published in July 2000 uses this emphasis on removing inequalities to set the agenda for improving the health of babies. It proposes national health inequalities targets to narrow the health gap in childhood and throughout life between socio-economic groups and between the most deprived areas and the rest of the country. Targets will be set to narrow the longstanding gap in infant and early childhood mortality and morbidity between socio-economic groups. It recognises that women's health in infancy can affect the health of their children. A National Service Framework is currently being drafted.

These government documents propose that targets to reduce inequalities will be achieved by a combination of specific health policies and broader government policies. These include abolishing child poverty, expanding Sure Start (a government programme which aims to improve the health and well-being of families and children – *see* Appendix 1 for website) to cover one third of children living in poverty, increasing support for breastfeeding and parenting and introducing effective and appropriate screening programmes for women and children. Screening programmes include a new national linked antenatal and neonatal screening programme for haemoglobinopathy and sickle cell disease. The national plan gives particular priority to reducing smoking. Specialist smoking cessation services are to be set up to try to reduce the prevalence of maternal smoking and the incidence of low birthweight. Midwives are also expected to develop their role in public health and family well-being, working with local doctors and nurses in developing maternity and child health services and Sure Start projects. *Making a Difference* (1999) introduced new nurse, midwife and health visitor consultant posts, extending pay scales and career structures for staff. An all party parliamentary group on maternity was set up in December 2000 to focus on maternity services and build on the success of *Changing Childbirth* in the modernised NHS.

3 Sub-categories

- The majority of pregnant women are in good health and have straightforward pregnancies, uncomplicated deliveries and healthy babies. They comprise the main sub-category in this chapter.
- The next sub-category includes women with major obstetric complications such as pregnancy-induced hypertension, multiple pregnancies or breech presentation.

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- The final sub-category includes women in vulnerable social groups including teenagers, women who do not speak English, women experiencing domestic violence, and women with physical and mental health problems.

The following sections will give information primarily on the first group, with selected information on women with obstetric complications and on women in vulnerable social groups where available.

4 Prevalence and incidence

This section provides national information on birth rates, mortality, complication and intervention rates, low birthweight and postnatal problems. The sources for these data are given in the relevant tables. They include data from the Office for National Statistics (ONS), the Confidential Enquiry into Maternal Deaths (CEMD) published triennially, and the Confidential Enquiry into Stillbirth and Deaths in Infancy (CESDI) published annually. Many of the prevalence and incidence rates vary by social class, geographical area and ethnicity. Up to the year 2000, births and deaths were classified using the Registrar General's social classes, but in 2001, the Office for National Statistics introduced a new classification, the National Statistics Socio-economic Classification.[7,8]

Vital statistics

Fertility

Summary statistics for the UK by country and region are shown in **Table 1**. The general fertility rate was between 52 and 65 per 1000 women aged 15–44 years, slightly higher in Northern Ireland and London, slightly lower in Scotland. Fertility rates declined steadily through the 1980s and 1990s and age-specific fertility rates show that many women are continuing to postpone childbirth into their 30s and 40s. The crude birth rate (not shown in the table) was 1230 births per 100 000 total population in 1997. A typical Primary Care Group or Primary Care Trust (PCG/PCT) population of 100 000 might expect to have about 1200 births per year.

Variations in birthweight by country and region in 1999 are shown in **Table 2**. There is a substantial correlation between birthweight and infant and perinatal mortality rates (*see* **Table 1**). The proportion of babies born weighing less than 2500 g was lowest in Northern Ireland at 5.7% and highest in the West Midlands region at 8.5%. Mortality rates within each birthweight group have fallen since the 1960s, particularly among babies born at or below 1000 g.[9] As a result, the percentage of low birthweight babies as a proportion of all births increased steadily through the late 1980s and 1990s. This was due, in part, to the increase in survival of multiple births as well as improvements in care. The proportion of babies with birthweight of 4000 g and over also increased over the last two decades.[9]

Perinatal and infant mortality

Mortality rates generally have been declining steadily through the twentieth century but appeared to be levelling off during the 1990s, although the infant mortality rate in 2000 in England and Wales was the lowest ever recorded. The decline in postneonatal mortality (deaths from one month to one year of age) was attributed to the 'Back to sleep' campaign, launched in December 1991, which encouraged parents to place their babies to sleep on their backs, to avoid cigarette smoke and over-wrapping their babies.

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Table 1: Summary statistics by Regional Office area, 1999.

	General fertility rate[1]	Stillbirth rate[2]	Perinatal mortality rate[3]	Neonatal mortality rate[4]	Infant mortality rate[5]
England	57.8	5.3	8.2	3.9	5.7
Wales	56.6	4.8	7.8	4.1	6.4
Scotland	52.9	5.6	8.7	3.6	5.6
Northern Ireland*	64.9	5.1	8.1	3.9	5.6
Regional Office areas					
Northern & Yorkshire	55.3	5.2	8.3	4.0	6.0
Trent	55.2	4.8	8.2	4.4	6.1
Eastern	57.5	4.9	7.1	3.0	4.6
London	63.2	5.9	8.9	4.0	6.0
South East	57.6	4.5	6.9	3.2	4.9
South West	55.0	5.3	7.8	3.2	4.6
West Midlands	59.2	6.1	9.9	4.8	6.9
North West	56.7	5.4	8.6	4.4	6.6

[1] Rate of live births per 1000 resident women aged 15–44 years.
[2] Rate per 1000 live and stillbirths.
[3] Stillbirths and deaths at 0–6 days, rate per 1000 live and stillbirths.
[4] Deaths at 0–27 days after birth, rate per 1000 live births.
[5] Deaths under the age of 1 year after live birth, rate per 1000 live births.
* Data for Northern Ireland relate to 1998.
Source: ONS VS5, ISD Scottish Health Statistics, Northern Ireland Statistics and Research Agency

Table 2: Birthweight (grams) by country and Regional Office area, 1999 (%).

	Under 1,000	1,000–1,499	1,500–1,999	2,000–2,499	2,500–2,999	3,000–3,499	3,500+	Not stated
England	0.5	0.8	1.5	4.8	16.8	35.8	39.5	0.3
Wales	0.5	0.8	1.6	4.4	16.3	35.7	40.5	0.1
Scotland	0.4	0.6	1.4	4.4	16.0	34.6	42.5	0.0
Northern Ireland*	0.5	0.6	1.1	3.5	13.9	34.9	45.4	0.0
Regional Office areas								
Northern & Yorkshire	0.4	0.8	1.7	5.2	17.3	35.9	38.3	0.3
Trent	0.6	0.8	1.8	5.0	17.1	35.5	39.2	0.2
Eastern	0.4	0.6	1.5	4.2	15.4	35.9	41.9	0.1
London	0.6	0.8	1.5	5.0	18.4	37.0	36.1	0.6
South East	0.4	0.8	1.4	4.2	15.4	35.0	42.4	0.5
South West	0.4	0.7	1.3	4.3	15.3	35.3	42.4	0.2
West Midlands	0.6	0.8	1.7	5.4	18.0	35.9	37.4	0.2
North West	0.5	0.8	1.6	5.0	17.1	35.7	39.2	0.2

* Data for Northern Ireland relate to 1996.
Source: ONS VS5, ISD Scottish Health Statistics, Northern Ireland Statistics and Research

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However, the decline in postneonatal mortality began before the campaign was initiated. In 1999, stillbirth rates varied from 4.5 per 1000 live and stillbirths in the South East region to 6.1 in the West Midlands region. Perinatal mortality rates (PMR) showed a parallel pattern, as shown in **Table 1**. The PMR was 8.2 per 1000 live and stillbirths in England; rates in other parts of Europe varied from 5.4 in Sweden and Finland to 9.7 in Greece. However, these differences are probably partly due to differences in criteria for registration.[10] Neonatal and infant mortality rates show similar regional variation, again, with lowest rates in the South and East and highest in the West Midlands and Northern regions.

Pregnancy, labour and delivery

Health-related behaviour in pregnancy

The Infant Feeding Survey, conducted every 5 years, provides nationally representative information on feeding practices and also about women's use of folic acid, smoking habits and alcohol intake during pregnancy.[11]

There is strong evidence to support periconceptional supplementation with folic acid to reduce the rate of neural tube defects[12] (*see* 'Folic acid in pregnancy' in section 6). Approximately 75% of the women sampled in the Infant Feeding Survey knew that folic acid would be good for them in early pregnancy.[11] Most of these women had increased their intake of folic acid, half through changing their diet and half through folic acid supplements.

Smoking prevalence before pregnancy, in pregnancy, and between 6 and 10 weeks after birth is also reported in the Infant Feeding Survey,[11] based on maternal report. For the UK as a whole, 35% of mothers smoked before they became pregnant, decreasing to 24% during pregnancy and 26% postnatally. All these figures were higher for Scotland and Northern Ireland than for England and Wales. For example, the proportion of women who smoked during pregnancy in England and Wales, Scotland and Northern Ireland were 23%, 28% and 27%, respectively. In all countries, however, women reported that they smoked fewer cigarettes per day while they were pregnant than before their pregnancy.[11] There has been some decline in the prevalence of smoking over the last decade, both before pregnancy and during pregnancy. For example, in 1990 38% of mothers in the UK smoked prior to pregnancy and 33% during pregnancy compared to 35% and 27% respectively in 1995.[11]

Alcohol consumption in pregnancy is also reported in the Infant Feeding Survey.[11] In the UK in 1995, 86% of mothers drank alcohol before pregnancy and 66% drank alcohol during pregnancy. However, the amount was very low – 70% consumed less than one unit of alcohol per week. Only 3% drank more than 7 units per week. There was some variation by age: mothers older than 30 years were more likely to continue drinking in pregnancy and tended to drink more than younger mothers. Similarly, women in England and Wales were more likely to continue drinking in pregnancy than women in Scotland and Northern Ireland but were also more likely to reduce their consumption.[11] The survey found a reverse social class gradient for alcohol consumption; women whose partners were in non-manual occupations were more likely to have drunk alcohol in pregnancy than other women.

Common complications in pregnancy and labour

National data about complications in pregnancy and labour are derived from the Hospital Episode Statistics (HES). Only about two thirds of these data have diagnostic information. The most recent published data relate to 1997/98. HES report a standard list of complications, as shown in **Table 3**, for England, 1997–98.[13]

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According to HES, in the delivery episode the most common conditions related to the pregnancy were prolonged pregnancy (7%) and preterm delivery (before 37 weeks' gestation) (4%)[13] (*see* **Table 3**). The most common complications of labour were long labour (9%), fetal distress (19%) and perineal laceration (31%).

Table 3: NHS hospital deliveries: deliveries with antenatal, delivery or postnatal complications, England, 1997–98.

ICD-10 condition code	Condition	1997–98	
		% of deliveries with mention of complication/ indication for care	Estimated number of cases
Oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium			
O10	Pre-existing hypertension complicating pregnancy, childbirth and the puerperium	0.2	1,400
O11	Pre-existing hypertensive disorder with superimposed proteinuria	0.0	200
O12	Gestational (pregnancy-induced) oedema and proteinuria without hypertension	0.6	3,500
O13	Gestational (pregnancy-induced) hypertension without significant proteinuria	2.5	14,700
O14	Gestational (pregnancy-induced) hypertension with significant proteinuria (pre-eclampsia)	1.8	10,600
O15	Eclampsia	0.1	500
O16	Unspecified maternal hypertension	1.7	10,100
Other maternal disorders predominantly related to pregnancy			
O20	Haemorrhage in early pregnancy	0.1	600
O21	Excessive vomiting in pregnancy	0.2	1,200
O22	Venous complications in pregnancy	0.2	1,400
O23	Infections of genitourinary tract in pregnancy	0.7	4,100
O24	Diabetes mellitus in pregnancy	0.9	5,500
O25	Malnutrition in pregnancy	0.0	0
O26	Maternal care for other conditions predominantly related to pregnancy	2.8	16,500
O28	Abnormal findings on antenatal screening of mother	0.2	1,200
O29	Complications of anaesthesia during pregnancy	0.0	0
Maternal care related to the fetus and amniotic cavity and possible delivery problems			
O30	Multiple gestation	0.7	4,100
O31	Complications specific to multiple gestation	0.0	200
O32	Maternal care for known or suspected malpresentation of fetus	4.9	28,700
O33	Maternal care for known or suspected disproportion	0.4	2,500
O34	Maternal care for known or suspected abnormality of pelvic organs	5.9	34,400
O342	Uterine scar from previous surgery (including previous caesarean section)	4.6	26,800
O35	Maternal care for known or suspected fetal abnormality and damage	0.2	1,300
O36	Maternal care for known or suspected fetal problems	7.3	42,300
O40	Polyhydramnios	0.4	2,100
O41	Other disorders of amniotic fluid and membranes	1.2	6,800
O42	Premature rupture of membranes	3.5	20,500

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Table 3: Continued.

ICD-10 condition code	Condition	1997–98	
		% of deliveries with mention of complication/ indication for care	Estimated number of cases
O43	Placental disorders	1.2	7,300
O44	Placenta praevia	0.5	3,200
O45	Premature separation of placenta (abruptio placentae)	0.3	2,000
O46	Antepartum haemorrhage not elsewhere classified	1.4	8,400
O47	False labour	1.1	6,200
O48	Prolonged pregnancy	7.3	42,900
Complications of labour and delivery			
O60	Preterm delivery	4.2	24,600
O61	Failed induction of labour	0.7	4,000
O62	Abnormalities of forces of labour	2.5	14,700
O63	Long labour	9.5	55,400
O630	Prolonged first stage	2.0	11,800
O631	Prolonged second stage	6.6	38,700
O632	Delayed delivery of second twin, triplet, etc.	0.0	100
O64	Obstructed labour due to malposition and malpresentation of fetus	2.1	12,300
O65	Obstructed labour due to maternal pelvic abnormality	0.4	2,400
O66	Other obstructed labour	1.8	10,300
O67	Labour and delivery complicated by intrapartum haemorrhage, not elsewhere classified	0.4	2,300
O68	Labour and delivery complicated by fetal stress (distress)	19.4	113,300
O69	Labour and delivery complicated by umbilical cord complications	5.2	30,500
O70	Perineal laceration during delivery	30.9	180,700
O71	Other obstetric trauma	1.3	7,800
O72	Postpartum haemorrhage	5.1	29,700
O73	Retained placenta and membranes, without haemorrhage	1.0	6,100
O74	Complications of anaesthesia during labour and delivery	0.2	900
O75	Other complications of labour and delivery, not elsewhere classified	4.3	25,400
Complications predominantly related to the puerperium			
O85	Puerperal sepsis	0.0	200
O86	Other puerperal infections	0.9	5,400
O87	Venous complications in the puerperium	0.4	2,200
O88	Obstetric embolism	0.0	100
O89	Complications of anaesthesia during the puerperium	0.1	400
O90	Complications of the puerperium, not elsewhere classified	0.4	2,300
O91	Infections of breast associated with childbirth	0.0	200
O92	Other disorders of breast and lactation associated with childbirth	0.2	1,400
Other obstetric conditions complicating pregnancy, childbirth and the puerperium			
O98	Maternal infectious and parasitic diseases	0.3	1,900
O99	Other maternal diseases	8.6	50,500

Source: DoH Statistical Bulletin[13]

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Postnatal health

We know much more now about women's physical and mental health in the postnatal period than we did 10 years ago. Recent studies have shown that problems like incontinence, perineal pain, backache, sexual problems, tiredness and depression are more common than previously supposed.[14–16] Some understanding of the factors related to this ill health is beginning to emerge, and interventions directed at the problems are being tested in randomised trials.[18,19] This chapter focuses on a few of the key areas of women's postnatal health.

Postnatal depression

Postnatal depression (PND) is thought to affect between 10–15% of women in the first few months after childbirth.[20] It usually disappears by 6 months but can occasionally lead to serious mental disorder in the mother and is related to cognitive and behavioural disturbances in the infant.[21] The condition becomes recurrent in about one third of cases.[20] It may continue for a year or more[22] but psychosis is rare. Depression also occurs antenatally and both antenatal and postnatal depression are associated with social adversity and the lack of a supportive partner.[20]

Breastfeeding

In 1995 about 68% of women in England and Wales initiated breastfeeding, 55% in Scotland and 45% in Northern Ireland.[11] This was a slight improvement over previous years but nevertheless contrasts poorly with the situation in Scandanavia and in Southern and Eastern Europe. For example, in 1994 in Russia 99% of women initiated breastfeeding and in Norway 98%.[23] In the UK there are enormous variations by social class, with 90% of women with partners in social class I starting breastfeeding compared to only 50% with partners in social class V. More women breastfed their first babies than second or later babies and women who were older and better educated were more likely to breastfeed.[11]

Breastfeeding rates decline sharply over time after birth: in England and Wales the proportion of women breastfeeding fell from 68% at birth to 58% at one week, 44% at 6 weeks, 28% at 4 months and 14% at 9 months.[11] The rate of decline was similar in the other countries of the UK and similar to previous surveys. The most common single reason given for stopping breastfeeding for all time periods up to 8 months was that the baby seemed hungry and a perception that insufficient milk was being produced. Other important reasons for giving up breastfeeding in the first few weeks were that the baby would not suck or rejected the breast, and that breasts or nipples were painful.[11]

Perineal problems

By far the most common adverse outcome of labour for women as reported in HES data was perineal trauma. Such injury, which is associated with pain, infection and delay in return to sexual activity,[24–26] was reported as a complication in a third of women. However, this is likely to be an under-estimate, as perineal trauma may not be noted as a complication and diagnostic information is available for only two thirds of episodes. A better estimate of the prevalence comes from a trial carried out amongst 5500 women who had spontaneous vaginal births in Southern England in the mid-1990s. It estimated that 85% of those women experienced some genital tract trauma, with two thirds having lacerations which involved the perineal skin (first degree trauma) or perineal skin and muscle (second degree trauma).[27] Perineal trauma involving the anal sphincter (third degree trauma) is associated with higher rates of episiotomy[27,28–30] and with instrumental delivery.[26,29,31] Such damage increases the risk of serious postnatal morbidity such as incontinence.[26,29]

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Women with major obstetric complications

Multiple pregnancies

The multiple birth rate has been increasing steadily over the past 20 years. Numbers of triplet and higher order multiple births in England have increased from 96 in 1980 to 304 in 1998. This increase is thought to be primarily as a result of infertility treatment.[32] **Table 4** shows HES data on the incidence of multiple deliveries in England in 1997–98 and their gestational age at birth. It demonstrates the rarity of high order multiple deliveries; there were only 280 deliveries of triplets or higher order multiple births out of approximately 585 000 deliveries. Eighty-nine percent of higher order multiple births were born preterm compared to 7% of singletons and 47% of twins.

Table 4: NHS hospital deliveries: total, singleton, twin and higher order multiple deliveries by gestation, England, 1997–98.

Gestation (weeks)	Total deliveries		Singleton deliveries		Twin deliveries		Triplet and higher	
	Estimated number	%	Estimated number	%	Estimated number	%	Estimated number	%
Total	585,000	*100.0*	576,000	*100.0*	8,300	*100.0*	280	*100*
under 20	130	*0.0*	130	*0.0*	0	*0.0*	0	*0*
20–23	500	*0.1*	500	*0.1*	50	*0.5*	10	*2*
24–27	2,300	*0.4*	2,100	*0.4*	180	*2.2*	20	*7*
28–31	4,800	*0.8*	4,200	*0.7*	500	*6.4*	70	*24*
32–36	33,900	*5.8*	30,600	*5.3*	3,200	*38.3*	160	*55*
37–41	511,300	*87.4*	506,900	*87.9*	4,300	*52.1*	30	*11*
42 or over	32,100	*5.5*	32,100	*5.6*	40	*0.4*	0	*0*

Source: DoH Statistical Bulletin[13]

Similarly, rates of low birthweight are significantly higher among multiples than among singletons. National data for England and Wales for the years 1991–95 showed an 11-fold differential in birth rates between singletons and multiples in the lowest birthweight category, those less than 1000 grams.[9] In the 1000–1499 gram category, there was a 12-fold differential. In the 1500–1999 gram category, there was a 13-fold differential.[9] For all low birthweight infants, there was a 9-fold differential in birth rates between singletons and multiples.

In addition to the impact upon low birthweight, it has long been known that stillbirth rates and death rates in infancy are higher among multiples than among singletons. National data for England and Wales for the year 1996 showed a three-and-a-half-fold differential in the stillbirth rate, a seven fold differential in the neonatal mortality rate, a two-and-a-half-fold differential in the postneonatal mortality rate and a five-and-a-half-fold differential in the infant mortality rate.

Maternal mortality

The triennial report by the Confidential Enquiry into Maternal Deaths (CEMD) reported that maternal mortality between 1994–96 for the UK was 268 or 12.2 per 100 000 maternities.[33] The two most common causes of death were thrombosis and thromboembolism, which were the causes of 46 deaths. Thromboembolic disease (TED) is the most common single cause of maternal death in developed countries.[34] Eclampsia, though rare, is a serious disease associated with hypertension in pregnancy and it is still an

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important cause of maternal death. Between 1994–96 there were 22 deaths from hypertensive disease of pregnancy, 19 of which were due to pre-eclampsia and eclampsia in the UK.[33]

Haemorrhage is also an important cause of maternal mortality; in 1994–96 there were 12 maternal deaths directly due to haemorrhage.[33] About half of bleeding in the second half of pregnancy is associated with either placental abruption, in which the placenta begins to detach from the uterine wall, or placenta praevia, in which the placenta is located close to the cervix. Perinatal mortality due to placental abruption and placenta praevia is about one in three and morbidity is common. Postnatal haemorrhage may be due to trauma or failure of the uterus to contract. Four of the five deaths from postnatal haemorrhage reported in the most recent CEMD followed caesarean section; two of them were repeat sections, the fifth followed vacuum extraction.

Women in vulnerable social groups

Minority ethnic groups

The chapter by Gill *et al.* in this volume (Black and Minority Ethnic Groups) provides key information about health needs of minority ethnic groups. In relation to language needs, the survey of Infant Feeding Practices in Asian Families Living in England[35] asked a representative sample of Bangladeshi, Indian and Pakistani women about their infant feeding. Interpreters were needed for 44% of first interviews; 25% of interviews with Indian women, 44% with Pakistani and 68% with Bangladeshi mothers. Some information on pregnancy outcome is available from ONS by country of origin, but not by ethnic background of mothers born in the UK. Crude mortality rates and incidence of low birthweight were higher in babies born to mothers from the 'New Commonwealth', especially from Pakistan.[8] The association between birthweight and mortality is striking but not straightforward because birthweight distributions differ between populations; what is considered low birthweight for Europeans may still be a healthy weight for other populations.

A number of studies of antenatal care use by different ethnic groups showed that, after adjusting for parity, Pakistani and Indian women consumed fewer antenatal resources and initiated care later than other groups.[36–37] However, there is no evidence that these differences in use of services account for the differences in infant mortality rate. The chapter in this book by Gill *et al.* in this volume (Black and Minority Ethnic Groups) suggests that, apart from South Asians, Chinese immigrants may be particularly in need of help in accessing care generally.

Teenage pregnancies

The rise in teenage pregnancies has been a cause of enormous concern. The UK has teenage birth rates which are much higher than those in Germany, France and the Netherlands.[38] A halving of the teenage pregnancy rate was one of the key health targets of the government.[5] Conceptions to girls under the age of 16 increased from 7.2/1000 in 1980 to 8.9/1000 in 1997 but the rate appears to have levelled off since then. Approximately half of these pregnancies were terminated.[9]

Social class variations

There are marked social class gradients in stillbirths and infant mortality. In 1997, stillbirths were about twice as likely to occur in babies born into social class V and babies of single mothers compared to those born into social classes I and II.[8] However, the new classification of social class reveals a slightly different pattern. Stillbirth rates were lowest among babies with fathers in higher managerial and professional

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occupations and also those whose fathers were small employers or self-employed.[8] There are also marked social class differences in low birthweight. A high proportion of low birthweights occurred in babies born with fathers in semi-skilled or unskilled occupations and in those registered by their mother alone.[8] There also remains the well-known association between social class and smoking; women in non-manual social classes were less likely to smoke and more likely to give up smoking in pregnancy.

Domestic violence

Domestic violence (defined as violence between current or former partners in an intimate relationship, wherever and whenever the violence occurs[6]) affects women in pregnancy as well as at other times. It is thought that between one in ten and one in three women experience domestic violence at some stage of their lives.[33] It is a common cause of injury and psychological distress to women and may have an impact on pregnancy outcome.[39–40] The high estimates of the prevalence of domestic violence make it one of the most common health-related problems suffered by pregnant women. Health consequences can range from psychological effects to physical injury and death. There is some evidence that domestic violence may be initiated or increase in severity around the time of pregnancy though this is not proven.[39–40]

5 Services available and their costs

Introduction

This section is organised into three main sub-sections dealing with (i) patterns of care; (ii) hospital-based services including beds, lengths of stay and staffing; and (iii) the different elements of care such as antenatal visits and screening.

Patterns of care

In general, maternity care is provided by GPs, by midwives working in the hospital or the community or both, and by specialist doctors working in hospital. Over the course of pregnancy, birth and the puerperium, almost all women receive some care from professionals in each category.[41] The majority of care, in terms of time spent with the woman, is usually provided by midwives. Detailed data about the proportion of care provided by each type of care-giver in each phase of care are not routinely available. Some of the different patterns of care are described in **Box 2**.

Box 2: Summary of different patterns of care.

- **Shared care:** Usually an arrangement between the GP and obstetrician but may also be between the midwife and obstetrician. The majority of the antenatal care takes place at the GP's surgery or health centre, where care is provided by the GP and a midwife. Women are booked to deliver at hospital.
- **Midwife-led care:** Where the midwife is the lead professional taking responsibility for planning and providing care antenatally, intrapartum and postnatally.

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- **Community-led care:** Care provided by GPs and midwives where hospital visits are kept to a minimum.
- **Caseload midwifery**: A single midwife or a group of midwives with a specified number of women under their care.
- **Domino schemes (Domiciliary In and Out):** Care is provided by midwives working in the community throughout the antenatal, intrapartum and postpartum period. Women are usually discharged 6–24 hours after the birth.
- **GP care:** Care provided by the GP and midwife at the GP's surgery or health centre. The woman is usually booked to give birth at the hospital but the GP and midwife provide postnatal care.
- **GP unit:** Small maternity hospital run by GPs.
- **Planned home birth:** This occurs under the care of a midwife working in the community; usually two midwives are present at the birth.
- **Midwifery unit:** Units in which women give birth, staffed only by midwives and, sometimes, GPs. They may be separate or attached to a hospital.
- **Team midwifery:** A group of midwives working together to provide antenatal, intrapartum and postpartum care for a named group of women in both the hospital and community.

Taken from Green *et al.*, 1998[42]

A survey by the English National Board for Nursing, Midwifery and Health Visiting in 1999[43] found that 66% of maternity units in England offered midwife-led care but only 42% offered GP care (*see* **Table 5**). This ranged from 48% in North West region to 91% in South West region for midwife-led care, and from 23% in South East region to 65% in Trent region for GP care. These schemes are generally available only to women without major obstetric complications. In a survey of English maternity care carried out at the beginning of 2001, directors of midwifery services were asked about the organisation of midwife staffing in the maternity units within their Trusts (personal communication – Jacci Parsons). Of the 156 responding Trusts, 116 had some form of team or group practice midwifery operating. In total there were 687 teams within the 116 Trusts. There were 9 Trusts with one team, and one Trust with 19 teams. Most Trusts had between 4 and 8 teams. The mean number of teams was 5.9. Team size varied substantially, with teams as small as 2 and as large as 57 midwives. The most common team size was 6 midwives (in whole time equivalents).

Table 5: Percentage of units in each region offering specific aspects of care.

Region	Midwife-led care	GP care	Satellite consultant clinics	Fetal assessment day care	Early pregnancy unit care	High dependency care	Transitional care (neonatal)
Northern & Yorkshire	67	55	61	78	69	65	45
Trent	71	65	53	94	87	73	50
Eastern	75	43	80	35	50	55	37
London	81	28	47	87	80	73	53
South East	68	23	88	65	58	42	32
South West	91	59	76	30	38	20	23
West Midlands	58	50	55	75	60	65	60
North West	48	45	57	86	79	62	55
England	66	42	62	64	60	51	41

Source: ENB 2000

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Hospital-based services

The majority of women attend a hospital for antenatal care at least once during their pregnancy, usually for an ultrasound scan and booking. Women with complications usually attend more frequently.

Maternity services are provided in different ways across England and Wales. In 1999, the majority were managed within 171 NHS Trusts providing acute services; an additional 5 were within community Trusts.[43] In some Trusts a single main consultant unit is affiliated with smaller GP or midwife-led units. In other Trusts there may be more than one consultant unit offering care. Mergers between Trusts are changing these patterns of service provision. The most up-to-date figures available to us come from a survey of English Trusts carried out at the beginning of 2001. At that time there were 183 eligible Trusts identified. Of the 156 that responded to the questionnaire, 83% included one maternity unit, 8% two and the rest more than two (personal communication – Jacci Parsons).

Units and beds

Table 6 shows the number of maternity units in the countries and regions of the UK in 1996 sub-divided by number of births. Overall there is a trend away from small maternity units towards larger ones. The majority of maternity units in England had between 2000 and 4000 births in 1996 although in the other countries of the UK there were still more small maternity units. Within England, only the South and West region still had significant numbers of small maternity units in 1996. The 75 units with fewer than 10 births in 1996 were probably where births took place unintentionally.[8]

Table 6: Distribution of maternity units by number of births, 1996.

	All units	Less than 10*	10–199	200–999	1,000–1,999	2,000–2,999	3,000–3,999	4,000 and over
England	341	*75*	45	22	43	63	62	31
Wales	31	*3*	12	1	7	6	2	0
Scotland	54	–	30	2	9	5	5	3
Northern Ireland	16	–	1	3	7	4	1	0
Regional office areas								
Northern & Yorkshire	49	*12*	5	4	13	7	4	4
Trent	32	*6*	6	1	4	7	5	3
Anglia and Oxford	32	*5*	5	2	3	5	7	5
North Thames	54	*16*	4	3	3	9	15	4
South Thames	41	*7*	2	1	7	13	11	0
South and West	59	*12*	17	8	6	6	5	5
West Midlands	37	*10*	5	3	1	7	5	6
North West	37	*7*	1	0	6	9	10	4

* Thought to be births taking place unintentionally at non-maternity units.
Source: Macfarlane *et al.*[8]

Average numbers of maternity beds available daily and beds per thousand maternities are shown for the countries and regions of the UK for 1999/2000 in **Table 7**. They do not include beds in delivery suites. There has been a marked decline in NHS maternity beds available, from 59 beds per 1000 maternities in 1949 to about 20/1000 maternities in 1999/2000.[8] Regional differences in provision are largely historical, with Scotland and the northern regions having greatest numbers of available beds.

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Table 7: Average available beds by Regional Office area, 1999/2000.

	Average number available daily	Beds/thousand maternities
England	10,203	17.8
Wales	627	19.5
Scotland	1,220	22.2
Northern Ireland	466	20.1
Regional Office areas		
Northern & Yorkshire	1,358	19.3
Trent	930	16.4
Eastern	1,035	16.7
London	1,769	16.9
South East	1,607	16.1
South West	1,003	19.4
West Midlands	1,038	16.5
North West	1,463	19.3

Source: Macfarlane *et al.*[8]

Duration of antenatal and postnatal inpatient stay

There is an important relationship between number of available beds, lengths of stay and the costs of the service. Durations of antenatal and postnatal stay are shown in **Tables 8** and **9** for 1997–98 for the regions of England. About 56% of deliveries took place on the same day as admission and a further 33% on the next day. Only 3% of women were in hospital for 4 days or more prior to delivery. There was very little regional variation.

Table 8: NHS hospital deliveries: duration of antenatal stay by region, 1997–98.

	Days from start of episode to delivery (percentages)									
	total	same day	1	2	3	4 or more				
						total	4	5	6	7 or more
England	100	56	33	6	2	3	1	1	0	1
Regional Office area										
Northern & Yorkshire	100	54	35	6	2	3	1	1	0	2
Trent	100	59	31	6	2	3	1	0	0	1
Eastern	100	57	33	5	2	3	1	0	0	1
London	100	56	32	6	2	2	1	1	0	2
South East	100	54	35	7	2	3	1	0	0	1
South West	100	60	30	5	2	3	1	0	0	1
West Midlands	100	56	33	6	2	3	1	1	0	2
North West	100	53	35	6	2	3	1	1	0	2

Source: DoH Statistical Bulletin, 2001[13]

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Table 9: NHS hospital deliveries: duration of postnatal stay by region, 1997–98.

	Total days from delivery to end of episode (percentages)										
	Total	**0 to 3**					**4 to 6**				
		total	**same day**	**1**	**2**	**3**	**total**	**4**	**5**	**6**	**7 or more**
England	100	**79**	13	31	21	13	**19**	11	6	2	3
Regional Office areas											
Northern & Yorkshire	100	**76**	12	26	21	16	**21**	12	6	2	4
Trent	100	**81**	13	32	22	13	**17**	11	5	2	2
Eastern	100	**81**	16	34	19	12	**16**	10	5	2	3
London	100	**79**	13	36	19	11	**18**	10	6	2	4
South East	100	**78**	13	32	20	13	**19**	10	6	2	3
South West	100	**81**	12	32	22	14	**17**	10	5	2	3
West Midlands	100	**77**	11	30	23	14	**20**	12	6	2	3
North West	100	**75**	10	27	23	15	**21**	11	8	3	3

Source: DoH Statistical Bulletin, 2001[13]

Following delivery, 13% of women left hospital on the same day as delivery and three quarters within 3 days of the birth. There has been a considerable decline in length of postnatal stay over the last 25 years. This reduction is driven, in part, by women's wishes to return home sooner, as well as by concerns over cost and service capacity. Given the increase in caesarean section rates over the same time period, which necessitate longer postnatal stays, it is perhaps surprising that overall lengths of stay have declined to such an extent. There were substantial differences between regions in duration of postnatal stay. In 1997–98 in the North West region, only 10% of women were discharged on the same day, compared to 16% in the Eastern region. A correspondingly higher proportion of women stayed more than 4 days in hospital in the North West. This tallies with the greater bed provision in the north described in the previous section.

Staffing

Table 10 shows the whole time equivalent (wte) number of hospital medical staff in obstetrics and gynaecology by grade, country and region in the UK in 1996. Numbers are highest in Northern & Yorkshire region and the North Thames region, both in terms of absolute number and as rate per 1000 maternities (*see* **Tables 11(a)** and **11(b)**). Between 20–30% of hospital medical staff were consultants, higher in Scotland and Northern Ireland and lower in Wales; around 40% were senior house officers, slightly more in Scotland, Wales and Northern Ireland. There were quite substantial differences in the proportions of staff at registrar and senior registrar level, 3% and 15% respectively in Trent region compared to 16% and 5% respectively in Northern Ireland.

Tables 11(a) and **11(b)** shows numbers of qualified and student midwives, nurses working in maternity and health visitors in countries and regions of the UK in 1998. Some figures are also expressed as rates per 1000 maternities. As expected, there were considerably fewer nurses working in maternity than midwives. The rate of qualified midwives ranged from 25.7 per 1000 maternities in the South Thames region to 52.7 in Scotland. In general, Scotland appeared to be better resourced than other countries in the UK.

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Table 10: Hospital medical staff in obstetrics and gynaecology by grade, Regional Office areas, England, Wales, Scotland and Northern Ireland, 1996 (whole time equivalent).

	All staff	Consultant	Staff grade	Associate specialist	Senior registrar*	Registrar	Senior house officer	House officer	Other staff	Hospital practitioner	Clinical assistant
England	3,540.1	909.6	142.1	65.2	487.2	339.6	1,480.0	16.0	0.0	7.0	93.4
Regional Office areas											
Northern & Yorkshire	572.1	146.2	23.9	13.4	117.0	24.4	225.5	1.0	0.0	1.8	18.8
Trent	329.9	84.5	19.0	3.0	48.2	10.0	146.3	14.0	0.0	0.4	4.6
Anglia and Oxford	353.7	98.7	10.3	9.0	50.2	34.1	142.8	0.0	0.0	0.6	8.0
North Thames	595.1	137.5	13.7	9.2	66.1	99.1	245.8	1.0	0.0	0.5	22.2
South Thames	501.3	123.7	23.8	7.6	59.7	67.7	210.2	0.0	0.0	0.7	8.0
South and West	363.9	94.9	12.8	7.4	36.5	44.8	156.2	0.0	0.0	1.0	10.4
West Midlands	352.8	95.1	17.0	6.1	59.5	25.0	143.0	0.0	0.0	1.0	6.0
North West	471.3	129.0	21.6	9.5	50.0	34.5	210.2	0.0	0.0	1.0	15.4
Wales	231.5	52.6	17.7	3.0	20.0	20.0	113.5	0.0	4.7	0.0	0.0
Scotland	453.7	135.0	0.0	5.1	79.9	17.0	216.7	0.0	0.0	0.0	0.0
Northern Ireland	157.6	47.7	0.0	2.9	7.5	25.5	74.0	0.0	0.0	0.0	0.0

* For Wales and Scotland includes specialist registrar.
Source: Department of Health, Medical and Dental Workforce Census, Welsh Office, ISD Scotland, DHSS Northern Ireland

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Table 11(a): Midwives, nursing staff working in maternity and health visitors by Regional Office area, 1998.

	Qualified midwives (wte)	Student midwives	Nurses working in maternity (wte)	Health visitors
England	18,479	3,263	7,869	10,068
Regional Office areas				
Northern & Yorkshire	2,375	391	1,129	1,288
Trent	1,845	345	757	1,046
Anglia and Oxford	1,820	207	865	1,004
North Thames	2,524	483	1,062	1,311
South Thames	2,249	570	1,287	1,536
South and West	2,416	374	811	1,234
West Midlands	2,266	441	790	1,105
North West	2,975	452	1,167	1,544
Wales[1]	1,764	39	–	644
Scotland	2,994.7	497	1,019.8[2]	1,459
Northern Ireland	1,002.7	57	–	434

Table 11(b): Rate of wte staff per thousand maternities.

	Hospital medical staff[3]	Qualified midwives	Nurses working in maternity
England	5.81	31.0	13.2
Regional Office areas			
Northern & Yorkshire	7.57	32.8	15.6
Trent	5.46	31.5	12.9
Anglia and Oxford	5.36	27.8	13.2
North Thames	6.13	26.1	11.0
South Thames	5.78	25.7	14.7
South and West	4.86	32.8	11.0
West Midlands	5.27	35.2	12.3
North West	5.80	38.3	15.0
Wales[1]	6.69	–	–
Scotland	7.74	52.7	17.3[2]
Northern Ireland	6.50	42.4	–

[1] Welsh data aggregates midwives and nursing staff working in maternity.
[2] Scottish data for nursing staff working in maternity relate to 1997.
[3] Data for hospital medical staff relate to 1996.
Source: English National Board of Nursing, Midwifery and Health Visiting, Department of Health, Non-Medical Workforce Census, Welsh Office, ISD Scotland, Personnel Information Management System, Northern Ireland; Department of Health, Medical and Dental Workforce Census

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There is a statutory duty for midwifery care to be available to women for 10 days routinely and up to 28 days if needed. Clearly, as the length of postpartum hospital stay has decreased, the workload of midwives working in the community has increased. The health visitor takes over general responsibility for both women's postnatal care and care of the infant at the point at which the midwife discharges the woman, any time between 10 and 28 days.

Data on GPs working in maternity are derived from their claims for payment and the General Medical Register. **Table 12** shows the number of GPs on the 'obstetric list' and the rate per 1000 maternities in the Regional Office areas. A GP may be included on the 'obstetric list' on completion of 6 months' training in a department of obstetrics and gynaecology or on meeting other criteria. In 1997, 91% of GPs were on the obstetric list, although this does not necessarily mean that they undertook maternity care.[8] Numbers of GPs on the 'obstetric list' ranged from 37.9 per 1000 maternities in North Thames to 52.5 per 1000 maternities in the South and West.

Table 12: General medical practitioners on obstetric list, 1997, England, regional office areas and Wales.

	Principals on obstetric list	
	Number	**Rate per 1,000 maternities**
England	26,618	44.3
Regional Office areas		
Northern & Yorkshire	3,496	47.5
Trent	2,706	46.0
Anglia and Oxford	2,989	45.2
North Thames	3,657	37.9
South Thames	3,581	41.0
South and West	3,892	52.5
West Midlands	2,797	42.5
North West	3,500	44.3
Wales	1,731	50.7

Source: General Medical Services Statistics, England and Wales, May 1998.

Home births

Although the great majority of babies are born in hospital, numbers of women giving birth at home increased steadily during the last decade of the twentieth century. In 1999 in England and Wales 2.2% of births were at home.[44] This varied across the country from 1.2% in the North West and Northern & Yorkshire Regions to 3.6% in the South West Region. In Scotland, 0.9% of maternities were at home in 1999 (*see* **Table 13**). These figures include both planned and unplanned home births, which often have very different maternal and infant health outcomes (*see* 'Home birth' in section 6).

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Table 13: Home births, numbers and percentages of maternities.

	Numbers of maternities at home				Percentage of maternities			
	1995	**1996**	**1997**	**1998**	**1995**	**1996**	**1997**	**1998**
England and Wales	12,487	13,460	14,412	13,815	1.9	2.1	2.3	2.2
England	11,752	12,719	13,621	13,104	1.9	2.1	2.3	2.2
Regional Office areas								
Northern & Yorkshire	780	867	976	947	1.0	1.1	1.3	1.3
Trent	920	965	1,030	1,085	1.5	1.6	1.7	1.9
Anglia and Oxford	1,459	1,495	1,712	1,662	2.2	2.3	2.6	2.5
North Thames	1,822	2,036	2,127	1,987	1.9	2.1	2.2	2.1
South Thames	2,741	2,825	3,124	3,007	3.2	3.3	3.6	3.4
South and West	2,085	2,475	2,527	2,490	2.8	3.3	3.4	3.4
West Midlands	955	1,014	1,033	949	1.4	1.5	1.6	1.5
North West	990	1,042	1,092	977	1.2	1.3	1.4	1.3
Wales	735	741	791	711	2.1	2.1	2.3	2.1
Scotland	541	476	543	502	0.9	0.8	0.9	0.9

	Number	**%**
	1999	
England and Wales	13,272	2.2
England	12,561	2.2
New Regional Office areas		
Northern & Yorkshire	873	1.2
Trent	1,088	1.9
Eastern	1,737	2.8
London	2,262	2.2
South East	2,881	2.9
South West	1,881	3.6
West Midlands	895	1.4
North West	945	1.2
Wales	710	2.2
Scotland	490	0.9

Source: ONS/OPCS Birth statistics, Series FM1; General Register Office, Scotland

Antenatal care

Antenatal visits

In the UK, women traditionally visit their GP or clinic once every four weeks between 12 and 28 weeks, fortnightly until 36 weeks and weekly thereafter, making 13 visits in total.[45] Some women see only their midwife on these visits, some see both midwife and GP and a few see only their GP (personal communication – Mary Renfrew). The randomised controlled trials which have evaluated a reduced antenatal visiting schedule are considered in 'Antenatal visits' in section 6.

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It is generally recommended that women carry their own notes[46,47] but it is not clear to what extent this is carried out.

Antenatal screening

Antenatal screening is carried out to check the health and well-being of both the mother and fetus. Pregnant women are generally offered tests for anaemia, blood group antibodies, rhesus type and certain infectious diseases (including rubella, hepatitis B, HIV, syphilis and asymptomatic bacteriuria). Most maternity units offer screening for Down's syndrome using biochemical markers. Ultrasound scanning is used to test for multiple pregnancy, fetal growth and anomalies and to determine gestational age. At each routine antenatal consultation fundal height is assessed to estimate fetal growth, maternal blood pressure is measured and urine tests are carried out for proteinuria and glycosuria, which are signs of pre-eclampsia.

A recent survey of maternity units in the UK asked about policies for antenatal screening for Down's syndrome, neural tube defects (NTD), haemoglobinopathies and cystic fibrosis.[48] They found that 76% of units had local and regional policies for Down's syndrome screening, 66% for neural tube defects, 35% for haemoglobinopathies and 22% for cystic fibrosis. Written policies often differed widely from guidelines published by the RCOG. The National Screening Committee (NSC) sub-group on antenatal screening has responsibility for developing national screening policy and issuing recommendations. The website for the NSC is given in Appendix 1.

Labour and delivery

Induction

About 20% of women in England in 1994–95 had their labour induced. In 1998–99 this had increased slightly to 22%.[49] This was usually by oxytocic drugs, some by surgical procedure such as artificial rupture of the membranes, and some using a combination.[13] This is shown by Regional Office area for 1997–98 in **Table 14**. About 8% of deliveries were by elective caesarean section, part of an increasing trend in both emergency and elective caesarean section (*see* **Figure 1**). Induction rates, however, after peaking in the 1970s, have been around 20% since 1989–90. In 1997–98 there was some geographical variation in induction rates, ranging from 18% in London to 24% in West Midlands region.

Method of delivery

Just over two thirds of all births in 1995–98 occurred by spontaneous vaginal delivery, as shown in **Table 15**. The caesarean section rate has been increasing steadily, from under 3% in the 1950s to 10% in the early 1980s, 15% in 1994–95 and 19% in 1998–99[49] (*see* **Figure 1**). Instrumental deliveries accounted for about 10% of births in 1994–95 and 1998–99, of which an increasing proportion were ventouse. Geographically there was little variation, but the Northern & Yorkshire and North West regions had highest rates of spontaneous delivery (74%) and South East the lowest (68%).

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Table 14: NHS hospital deliveries: method of onset of labour by region, 1997–98 (%).

	Total	Spontaneous	Caesarean section	Induction			
				Total	Surgical induction	Oxytocic drugs	Surgical and drugs
England	100	70	8	21	3	13	5
Regional Office areas							
Northern & Yorkshire	100	72	7	21	3	12	5
Trent	100	72	7	21	2	11	5
Eastern	100	71	8	21	3	14	7
London	100	74	8	18	3	10	5
South East	100	69	9	22	4	13	5
South West	100	70	10	20	3	13	4
West Midlands	100	67	10	24	4	14	5
North West	100	68	8	23	3	15	5

Source: DoH Statistical Bulletin, 2001[13]

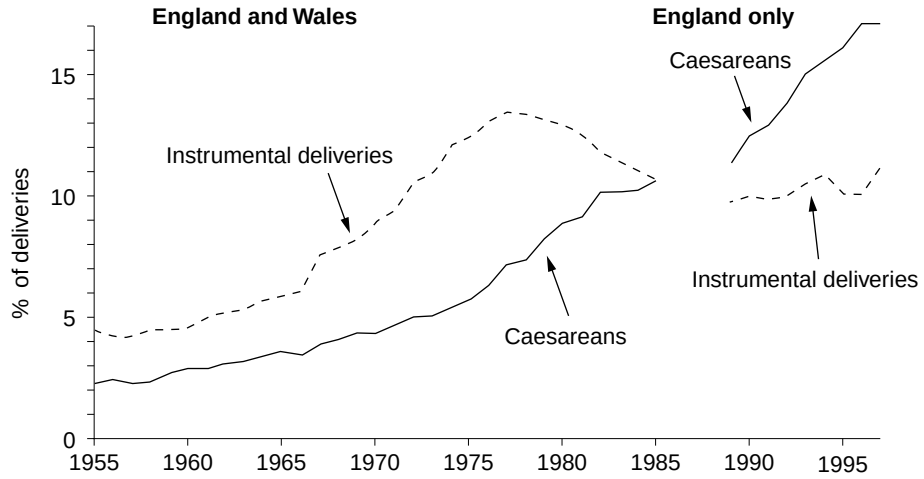

Figure 1: Operative delivery rates, 1955 to 1997/98.

Pain relief in labour

Table 16 shows type of pain relief used, sub-divided by method of delivery. Eighty-six percent of women having a spontaneous delivery used only gas and air or pethidine ('other' in the table) or no analgesic, 12% of them had an epidural. Over half of women having an instrumental delivery had an epidural or spinal anaesthetic. Among women having an elective caesarean section, the majority had a spinal anaesthetic; women having an emergency section generally had an epidural or general anaesthetic.

Continuous support in labour has been demonstrated to reduce the need for pain relief in labour as well as reducing the rate of operative deliveries (*see* 'Continuous support in labour' in section 6). At present nearly a third of maternity units are unable to give women in labour one-to-one care.[43]

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Table 15: NHS hospital deliveries: method of delivery by region, 1997–98 (%).

	Total	Spontaneous		Forceps		Ventouse	Breech	Breech extraction	Caesarean			Other
		Vertex	Other	Low	Other				Total	Elective	Emergency	
England	100	69	1	2	2	7	1	0	18	8	10	1
Regional Office area	100	73	1	3	2	4	1	0	16	7	9	1
Northern & Yorkshire												
Trent	100	69	1	2	2	8	0	0	17	7	11	0
Eastern	100	68	1	3	2	7	0	0	19	8	11	0
London	100	68	1	2	2	7	0	0	19	7	12	1
South East	100	67	1	3	2	7	0	0	19	9	10	1
South West	100	68	1	2	2	8	1	0	18	8	10	1
West Midlands	100	69	1	2	2	5	0	0	20	9	11	0
North West	100	73	2	2	1	5	1	0	16	8	8	0

Source: DoH Statistical Bulletin, 2001[13]

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Table 16: NHS hospital deliveries: anaesthetics used before or during delivery by method of onset of labour and method of delivery, 1997–98 (%).

Method of onset of labour	Method of delivery	Total number of cases	Type(s) of anaesthetic/analgesic used before or during delivery						
			General anaesthetic	Epidural	Spinal anaesthetic	General & epidural	General & spinal	Epidural & spinal	Other/none
Total all deliveries		585,000	4	20	7	0	0	1	67
Spontaneous	Spontaneous	325.7	1	12	0	0	0	0	86
	Instrumental	44.2	1	49	3	0	0	1	47
	Caesarean	40.0	22	31	24	3	1	3	16
Induced	Spontaneous	87.0	1	22	1	0	0	1	76
	Instrumental	17.3	1	59	2	0	0	2	37
	Caesarean	19.7	20	39	18	5	0	3	15
Caesarean	Caesarean	47.0	17	10	55	0	1	5	11

Source: DoH Statistical Bulletin, 2001[13]

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Postnatal care

Breastfeeding support

There was little change in the proportion of women who initiated breastfeeding from 1980 to 1995. In 1995 the incidence of breastfeeding was 68% in England and Wales, 55% in Scotland and 45% in Northern Ireland.[11] Breastfeeding rates are described more fully in 'Breastfeeding' in section 4.

The vast majority of first-time mothers (86%) reported having been given help the first time they breastfed their baby. Mothers of subsequent children were less likely to receive help at this stage. Mothers who reported having problems breastfeeding after leaving hospital turned predominantly to midwives and health visitors for advice. A small proportion of women received help or advice from voluntary agencies such as La Leche League or National Childbirth Trust. These women were more likely to continue breastfeeding. However, they were also more likely to be in non-manual social classes and it is difficult to identify the separate effects of advice received.[11] In the survey carried out at the beginning of 2001, English Trusts were asked if they included maternity units accredited by the UNICEF UK Baby Friendly Initiative. Of the 154 Trusts that responded, 17 had an accredited unit. A further 47 Trusts had signed a certificate of commitment towards the Baby Friendly Initiative. Trusts that signed but were not yet accredited were also asked about which of the 10 Steps to Successful Breastfeeding had been implemented in their Trust. Seven of the ten steps had been implemented by over 89% of Trusts. The step that was least likely to be fulfilled was *'Give newborn infants no food or drink other than breastmilk, unless medically indicated'*, which was reported by 57% of these Trusts (personal communication – Jacci Parsons).

Screening for postnatal depression

As described in 'Postnatal depression' in section 4, postnatal depression (PND) is thought to affect between 10–15% of women in the first few months after childbirth.[20] Routine screening of women during the postnatal period has been advocated by the RCM. The Edinburgh Postnatal Depression Scale (EPDS) was developed as a screening tool for use in the community.[22] It has satisfactory sensitivity and specificity (86% and 78%, respectively) and is now used extensively by health visitors and some midwives working in the community.[50] A recent survey found that 94% of maternity units asked about psychological problems at booking, 25% screened for PND antenatally and 57% screened postnatally. Screening was most often done by health visitors using the EPDS (personal communication – Lucy Tully).

The expectation is that increased identification of cases and increases in referral and treatment will lead to reductions in incidence and duration of PND and improved infant outcomes. However, to date this has not been tested. In addition, adequate resources and effective interventions are needed for women with PND.

Well babies and neonatal screening

Although this chapter deals primarily with maternity, certain aspects of neonatal care fall within the remit of maternity care. There is a consensus that well babies should be checked prior to discharge to rule out congenital problems not apparent on physical inspection. This is currently done by paediatricians but consideration is currently being given to whether this could be done by specially trained midwives.[51]

Neonatal screening is carried out on the maternity wards to identify babies with particular disorders who may benefit from early diagnosis and treatment. It is also sometimes done even if there is no treatment available, to alert parents and their doctors to the risk to subsequent pregnancies. Though there are many disorders that *can* be screened for neonatally, the majority of them are not tested for routinely but only if there is a specific indication for doing so. They will not be reviewed in this chapter except to list those currently offered nationally. Current practice is described in **Box 3**.

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Box 3: Neonatal screening/examinations.

- 'Guthrie' test – blood spot taken at 6 days – hypothyroidism and phenylketonuria (PKU) and, in some parts of the UK, cystic fibrosis and muscular dystrophy. There are plans for universal neonatal testing for haemoglobinopathies (sickle cell anaemia and thalassaemia).
- Congenital dislocation of the hip – there is some debate as to whether routine testing by the Barlow Ortolani test is effective.
- Routine examination at birth to check for obvious structural and neurological abnormalities such as congenital heart disease, cataracts.

Collaboration with the regional laboratories and paediatric services are essential to ensure rapid and complete notification and intervention where appropriate, as even a short delay can result in significant developmental impairment in the case of PKU or hypothyroidism.

Women with major obstetric complications

Antenatal conditions

Medical conditions in the mother, such as diabetes, thyroid disorders, congenital heart disease and epilepsy, may be affected or exacerbated by pregnancy and may cause health problems for mother and/or baby. As these occur relatively infrequently in the pregnant population, many units hold combined clinics between physicians and obstetricians to cut down on the number of visits for the woman and to pool knowledge and expertise on dealing with complications of medical conditions.

Multiple pregnancy, although increasing in prevalence, is also relatively infrequent and mothers expecting more than one child benefit from referral to a specialist centre.

High dependency care

Occasionally, women will have serious health problems during pregnancy either as a result of existing illness or a new pregnancy-related illness. Women with serious and/or rare disorders or fetal problems are generally cared for in a high dependency unit. Problems may include pre-existing conditions which may affect the pregnancy or be exacerbated by pregnancy, such as severe cardiac disease, or pregnancy-related problems such as severe pre-eclampsia. Where high dependency units also monitor severe fetal problems, it is usually in association with fetal medicine specialists and a neonatal intensive care unit because of the frequent need for preterm delivery. Nationally, about half of maternity units provide high dependency care (*see* **Table 5**), but this varies geographically from only 20% in the South West region to 73% in Trent and London regions.[43]

Women in vulnerable social groups

Minority ethnic groups

The chapter by Gill *et al.* in this volume (Black and Minority Ethnic Groups) provides detailed information about the health needs of black and minority ethnic groups and about the limited evidence on the

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effectiveness of interventions. The responsibilities of care providers are also discussed. Specific issues for maternity care include appropriate offers of prenatal screening and the challenge of providing advocacy or interpreter services for care that takes place in both community and hospital settings and at unpredictable hours. An annotated bibliography of studies relevant to maternity care for non-English speaking women is available[52] but no systematic reviews have been identified.

Routine questioning for domestic violence

Because almost all pregnant women access NHS maternity care in the UK, pregnancy is considered an opportune time at which to screen for domestic violence. Professional and governmental bodies (RCOG, RCM, DoH) have recommended that all pregnant women are seen unaccompanied at least once during antenatal care, and asked about their experience of violence. Provision of an interpreter, should that be needed, who is not the partner, a friend or family member, is also advocated (*see* 'Recommendations on screening and interventions' in section 7). Training of professionals and appropriate referral is essential[6] but often not in place.

A survey of all NHS Trusts in England and Wales was conducted in 1999 to measure the extent to which these guidelines were matched by practice in maternity units. Only 49% of units offered women an appointment without their partner and only 12% of units routinely asked women about violence.[53] Most pregnant women carry their own notes and this, clearly, has implications for confidentiality. The majority of units maintain a separate hospital record for women experiencing domestic violence. Although these measures are recommended by the CEMD, RCOG and BMA, this approach has not been tested in a randomised controlled trial. There may well be risks as well as benefits of such measures, particularly if introduced without appropriate training and resources.

Very little has been published on the costs of domestic violence. Health service costs in Hackney in 1996 amounted to £590 000 for injury and psychological care, but excluded hospitalisation and medication costs.[54] Other studies have documented the considerable additional health services resources used in treatment and care of women suffering domestic violence.[55–57]

Costs of maternity services

It is impossible to calculate the exact costs of maternity care. In 1997/98 a total of £44 billion was allocated to the NHS in the UK. Almost three quarters of this (74%) was spent on the hospital and community health services (HCHS). Of this, 65% was spent on staff salaries. The programme budget for maternity and early childhood amounted to 5.6% of the total HCHS budget in 1997/98.[9] Estimates for maternity budgets are shown in **Table 17** for the years 1988/89 to 1997/98 at 1997/98 prices. These exclude GP services and are consistently dominated by the cost of obstetric inpatient care, which accounted for over half of the total expenditure. Spending on hospital and community maternity care increased in real terms until 1991/92 but has declined thereafter. The Audit Commission estimated that maternity services cost £1.1 billion in 1997 or around £1700 per birth.[58]

GPs also provide some maternity care and get paid separately. GP maternity payments are shown in **Table 18**, along with the HCHS maternity budget. However, these figures should be interpreted cautiously given that there were changes in methods of data collection over this period.

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Table 17: Hospital and community health services programme budget, 1988/89 to 1997/98, at 1997/98 prices.

	Obstetric inpatient	Obstetrics outpatient	Community maternity	Professional advice & support	All
			£ million		
1988/89	840	120	195	272	1,427
1989/90	805	109	209	294	1,417
1990/91	780	100	222	305	1,407
1991/92	854	161	165	351	1,531
1992/93	832	167	160	333	1,492
1993/94	777	151	161	336	1,425
1994/95	776	135	163	325	1,399
1995/96	751	129	176	329	1,385
1996/97	731	134	202	277	1,344
1997/98	730	137	210	266	1,343

Source: NHS Executive, Leeds, FPA PX-3

Table 18: Total expenditure on maternity services, 1992/93 to 1997/98.

Financial year	Total expenditure on HCHS maternity services (£ millions)	GP maternity payments (£ thousand)
1992/93	21,265	71,243
1993/94	22,096	72,465
1994/95	22,573	74,017
1995/96	23,890	73,148
1996/97	24,148	76,449
1997/98	25,329	80,381

Sources: Health and personal social services statistics for England, Table E3
GP maternity payments: NHS Executive FIS (FHS)

Since the introduction of the internal market in healthcare, information about costs of services, initially considered confidential, have been more widely disseminated. *The new NHS: reference costs* includes averages, ranges and variation in costs of certain maternity events as shown in **Table 19**. These data are provided by Trusts but it is not always clear how these costs are arrived at. The website for NHS reference costs is given in Appendix 1.

Intrapartum care costs are principally dependent on the duration of labour, provision of analgesia or anaesthesia, mode of delivery and staff present. A recent systematic review of costs associated with different methods of delivery has been conducted.[59] It found that, although there was considerable overlap in costs, complicated caesarean section costs were greater than those associated with instrumental delivery which, in turn, were greater than spontaneous vaginal delivery.

Postnatal care costs depend mainly on duration of inpatient stay. Community care costs are also important, particularly where women are discharged early. Some early discharge schemes used more resources than they saved due to the number of domiciliary visits made.[60]

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Table 19: NHS reference costs for different methods of delivery.

HRG label	No. of trimmed* FCEs	Mean	Range for 50% of NHS Trusts		Range for all NHS Trusts	
			Minimum	Maximum	Minimum	Maximum
Elective inpatients						
Normal delivery with complications	80	795	795	795	795	795
Normal delivery without complications	7,376	883	547	1,183	352	1,886
Assisted delivery with complications	42	1,773	1,773	1,773	1,773	1,773
Assisted delivery without complications	535	1,024	767	1,272	684	1,362
Caesarean section with complications	168	2,556	1,773	3,339	1,593	4,039
Caesarean section without complications	1,523	1,649	1,222	2,065	1,034	2,370
Other maternity events	5,088	578	288	775	81	1,886
Non-elective inpatients						
Normal delivery with complications	1,036	901	770	1,088	232	1,797
Normal delivery without complications	26,115	720	500	855	171	1,673
Assisted delivery with complications	295	1,469	1,141	1,922	893	2,468
Assisted delivery without complications	3,645	1,162	886	1,362	741	1,875
Caesarean section with complications	860	2,284	2,055	2,403	1,788	3,092
Caesarean section without complications	5,727	1,577	1,393	2,040	227	2,370
Other maternity events	40,595	516	328	638	108	2,086

* 'Trimmed' means excluding outliers.

Multiple births are potentially very costly for the health service. We analysed the data for the former North West Thames Region in England (St Mary's Maternity Information System (SMMIS)) in order to estimate the cost of hospital obstetric care by multiplicity of birth. For this analysis, we attached unit costs, derived from primary and secondary sources, to each item of resource use, and built up a picture of the total cost of obstetric care. Mean obstetric costs per woman totalled £1360 for mothers of singletons, £2836 for mothers of twins, £6400 for mothers of triplets and £9514 for mothers of quadruplets (1998 prices) (Unpublished data). We also estimated the cost of neonatal care by attaching unit costs, derived from primary and secondary sources, to the neonatal experiences of each group of babies. We estimated neonatal costs at £167 for a singleton, £856 for a twin, £2395 for a triplet and £4424 for a quadruplet (1998 prices) (Unpublished data).

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Litigation is an important issue in maternity care and contributes independently to overall NHS costs. There has been a steady rise in the rate of litigation from about 0.46 closed cases per 1000 finished consultant episodes in 1990 to 0.81 in 1998. This represents a growth rate of about 11% per year.[61] The most pronounced growth in litigation has occurred in obstetrics and gynaecology. Total costs nationally arising from clinical negligence claims have been estimated at between £32 million to £99 million per year across all specialties. This includes defence costs as well as costs from successful claims.[61]

6 Effectiveness of services and interventions

Introduction

Due to the breadth of the subject and the extent of the research that has been carried out, it is impossible to be comprehensive in this section. *Effective Care in Pregnancy and Childbirth*, published in 1989,[62] was one of the first major outputs of the evidence-based medicine movement. The second edition of *A Guide to Effective Care in Pregnancy and Childbirth*[63] provides comprehensive information as of 1995 and an updated edition will be available in the second half of 2001. There are now over 400 Cochrane reviews of randomised controlled trials in the area of pregnancy and childbirth, which provide excellent resources. There is consequently more material than could be covered in a chapter. We have therefore selected examples where there is compelling evidence in areas particularly relevant to PCTs and health authority commissioners.

Different patterns of care

'Patterns of care' in section 5 summarises the different elements and patterns of midwifery and maternity care that have been implemented. A range of different care schemes has been set up and some evaluated. All attempt to provide a service that is less fragmented and more user-friendly and women-centred, which minimises duplication of tasks and obstetric contact for women without obstetric problems whilst utilising midwives' skill. The five randomised controlled trials, two comparative studies, and four multi-scheme descriptive studies which attempted to evaluate the effects of women knowing their midwife, having midwife-only care and/or a homely care environment have been summarised by Green *et al.*[42] Some of the different schemes shared goals such as having the same carer throughout the antenatal, intrapartum and postpartum periods. Most were set up for women perceived to be at low risk of complications. Some were implemented by highly committed and motivated midwives and may not be generalisable to other settings; other schemes proved too consuming of midwives' family and social life to be workable. Midwives were also more motivated and enthusiastic about systems that they had chosen or developed. Users of these services perceived the majority of these schemes as better than the traditional hospital-based approaches. A consistent finding was that continuity of carer was at least as important for midwives as for the women they were caring for[42] (Grade B I-2).

There have been a limited number of economic evaluations comparing the costs of alternative models of maternity care.[14,64,65] These have varied in their findings from cost-saving to cost-generating depending on resource components included in the evaluation, the settings of the evaluations and the costing methodology. For example, epidural use was costed in a different way in each study.

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Antenatal care

Information needs in antenatal care

Women often present very early in pregnancy at which stage many women want information. *The Pregnancy Book*, published by Health Promotion England, and given free to all women in their first pregnancy, can fill that need. The MIDIRS leaflets on Informed Choice also give clear information on various subjects. They are produced in pairs; the one for health professionals gives details of the research evidence, the one for women gives a summary. A recent evaluation of the MIDIRS leaflets found that, although they were considered helpful or very helpful by over 90% of the women who returned the questionnaires, they did not promote informed decision making.[66] This was thought to be partly due to the lack of coherent strategy for leaflet distribution (Grade D I-1).

Folic acid in pregnancy

The evidence for the beneficial effect of folic acid comes from a case-control study in the early 1980s[67] and a number of randomised controlled trials (*see* Cochrane review[12]) (Grade A I-1). Folic acid supplementation decreased the incidence of neural tube defects by at least half. On the basis of this, the government has planned to routinely supplement flour with folic acid. The Cochrane review suggested that there may be the possibility of increases in multiple births as a result of increased folic acid and subsequent perinatal loss.[12] The policy may therefore, on balance, be detrimental. The impact of this policy should be evaluated.

Smoking in pregnancy

Cigarette smoking in pregnancy is still common, as shown in 'Health-related behaviour in pregnancy' in section 4. It is associated with low birthweight, preterm birth, perinatal death and infant morbidity. A systematic review of interventions for promoting smoking cessation during pregnancy reviewed 44 trials including 16 916 women.[68] Interventions included information about the harmful effects of smoking, advice by health professional, reinforcement at antenatal visits, group counselling and peer support, a self-help manual, rewards and incentives, and others. The interventions achieved a significant reduction in smoking with absolute differences between the experimental and control groups of between 6.4% and 8.1% of women depending on the intensity of the intervention. As a result there was a reduction in low birthweight as well as in the proportion of babies born preterm but no difference in perinatal mortality[68] (Grade B I-1).

Several studies document increased neonatal hospital costs associated with maternal smoking.[69] The general conclusion of this body of literature is that neonatal costs could be reduced substantially by identifying family and social problems that mothers face antenatally and by delivering effective anti-smoking advice.

Antenatal visits

There have been six randomised controlled trials, which compared a reduced schedule of antenatal visits with a traditional schedule of visits, five of which were carried out in developed countries. All but the most recent randomised controlled trial[70] have been included in systematic reviews.[71] There was no significant difference in clinical outcomes but women's satisfaction with care was lower in those receiving fewer visits.

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Most of the trials did not achieve a large reduction in number of visits and the lack of clear effect may be due to this (Grade C I-1). An economic evaluation of one of the trials showed that there would be no significant reduction in costs of care if a policy of reduced visits was implemented, partly because of non-significant but costly increases in admissions to neonatal care.[72]

Antenatal screening

One of the main purposes of antenatal care is screening for fetal and maternal disorders. The evidence for the effectiveness of some of these are summarised below. Detection of a problem will generally necessitate referral to a specialist.

Screening for Down's syndrome

Most maternity units provide some form of screening for Down's syndrome, although sometimes with age restrictions. There are a number of different serum markers that can be measured, including alpha feto-protein (AFP), human chorionic gonadotrophin (hCG) and unconjugated oestriol (uE_3), along with maternal age. These have various detection rates: AFP and hCG (the double test) with maternal age and a first trimester dating scan gives a detection rate of 59% with a 5% false positive rate. This rises to 69% for AFP, hCG and uE_3 (the triple test), and to 76% if inhibin A is added (the quadruple test)[73] (Grade B II-1). Ultrasound markers can also be used to detect Down's syndrome, and nuchal fold thickness and nuchal translucency show great potential but have not been subjected to randomised controlled trial.

If Down's syndrome is suspected then antenatal diagnosis is by amniocentesis or chorionic villus sampling with karyotyping of cultured cells. This allows the family either to plan for birth of an affected child or to terminate the pregnancy. The triple test appears to be the most cost-effective option in terms of cost per Down's syndrome birth avoided.[73] The NHS Executive plans to implement a national programme of screening for Down's syndrome but the particular approach is currently under discussion.

Ultrasound screening for anomalies, dates, multiple pregnancy and fetal well-being

A Cochrane review compared the use of routine ultrasound for detection of fetal anomalies with selective ultrasound prior to 24 weeks' gestation.[74] Routine ultrasound was associated with earlier detection of twins and a reduction in inductions for post-term pregnancies. There was no difference in perinatal mortality (Grade B I-1).

Another Cochrane review examined the evidence for third trimester scans for fetal well-being and intrauterine growth retardation in an unselected population. It included seven trials and found no benefit in terms of perinatal mortality although placental grading may be of value.

Labour and delivery

Method of delivery

As described in 'Method of delivery' in section 5, the majority of women have spontaneous vaginal deliveries. However, there is ongoing debate about the use of caesarean section. Proponents of caesarean section argue that it is now a safe operation, that perineal problems are avoided and that an elective caesarean section avoids the possibility of a long labour followed by emergency caesarean section.[75] Opponents of the more liberal use of caesarean section argue that it is associated with considerable

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maternal morbidity such as depression, difficulty with breastfeeding and ectopic pregnancy[76,77] (Grade IV). Caesarean section for breech presentation is discussed in 'Breech presentation' below. With regard to instrumental delivery, a Cochrane review suggests that ventouse has advantages over forceps, causing less maternal trauma,[78] (Grade B I-2) but in many regions forceps are still more commonly used (*see* **Table 15**).

Home birth

The debate about home birth has been characterised by a similar polarisation of views. In the 1960s and 1970s, improvements in perinatal mortality rates were taken, without evidence, as proof of the superiority of hospital birth.[79] However, such correlational inferences were challenged.[80] A review of the literature on place of birth concluded that there is some evidence, although not conclusive, that women and their babies do better and women are more satisfied with their care when cared for out of an institutional setting[79] (Grade II-2). It is important to differentiate between planned and unplanned home births. For women at low risk of complications, outcomes of planned home births are generally as good or better than hospital births.[69] Unplanned home births often occur when women don't get to hospital in time and are commonly associated with problems requiring transfer to hospital[81] (Grade II-1).

An economic evaluation was carried out as part of the National Birthday Trust Fund study of home birth in 1994. Planned hospital birth was compared with planned home birth and with unplanned home birth. Planned home birth was less costly to the health service than a planned hospital birth, although costs to the women were higher. For women who had an unplanned home birth, outcomes were significantly poorer, and costs consequently higher than for women who had either a planned home birth or a hospital birth.[82]

Continuous support in labour

The effects of having the continuous supportive presence of midwife or other trained person with a labouring woman have been analysed in 12 randomised controlled trials and summarised in a Cochrane review.[83] Continuous professional support reduces rates of instrumental delivery and, in some settings, rates of caesarean section. Duration of labour and use of epidural analgesia and other forms of pain relief are also reduced, while satisfaction with care is increased (Grade B I-1). In trials carried out in hospitals in developing countries, where friends or relatives are generally not permitted to attend women during labour, the additional support is often provided by lay helpers and the intervention has far greater effect.

The costs of a policy of continuous support by midwives would appear to be higher than the costs associated with current care, but this depends on the assumptions made about staffing patterns.[84] If midwives can work more flexibly, increasing their time with women in labour, it may be possible to provide continuous support without additional cost. This is the subject of ongoing research.

The maternal postnatal period

This is the time at which many women suffer health problems of shorter or longer duration, such as painful stitches, sore nipples, mastitis, other infections and bleeding and 'baby blues' or depression. In addition, women report the lowest levels of satisfaction with maternity care, particularly in hospital.[58] The section below concentrates on evidence of effectiveness in relation to some key aspects of care.

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Breastfeeding

Babies who are not fully breastfed for the first three to four months of life are more likely to suffer health problems such as gastroenteritis, respiratory infection, otitis media, urinary tract infections and atopic disease if a family history of atopic disease is present.[23] There is also evidence of reduced mortality in preterm infants who are fed breast milk.[85] Breastfeeding is also beneficial to the mother's health, protecting against epithelial ovarian cancer and pre-menopausal breast cancer.[23] Breastfeeding is, however, contra-indicated if the mother is infected with HIV. The initiation and duration of breastfeeding is described in 'Breastfeeding' in section 4. These rates are disappointing considering the considerable short-term and long-term health benefits of breastfeeding.[23]

Interventions have been aimed at increasing the initiation as well as the duration of breastfeeding. Various strategies have been used, including health education programmes, media campaigns, peer support programmes and health service changes. Postnatal support from health professionals resulted in a modest increase in breastfeeding at 2 months. Where the support was provided face to face it was more effective than where it was provided by telephone[85] (Grade B I-1).

There are no economic evaluations in the English language literature of breastfeeding support. However, an increase in breastfeeding rates is likely to lead to a decrease in admissions for gastrointestinal, respiratory and other infections and thus reduce costs to the health service.[86,87]

There is very little evidence relating to effective support for women who bottlefeed their babies. Anecdotally, midwives and health visitors feel some difficulty in providing this support, fearing to undermine breastfeeding. Nevertheless, the dangers of over and under-concentrating formula milk, of poor hygiene and inappropriate feeds, are very real and need addressing.

Postnatal depression

There is evidence that women may not report their symptoms of depression to health professionals and that PND often goes undetected.[22] As a result, many professionals advocate screening for PND. The Edinburgh Postnatal Depression Scale (EPDS) has been validated as a screening tool for recognition of PND[22] and is being used widely by health visitors. On the other hand, there have not yet been any trials to test the effectiveness of routine screening for postnatal depression.

Small randomised controlled trials have shown beneficial effects of non-directive counselling and cognitive behavioural counselling in treatment of PND[21,88] (Grade B I-2). Anti-depressant drugs were also found to be an effective treatment, but women were less keen to take them[21] (Grade B I-2). Some hormonal therapy has been tested in randomised controlled trials with mixed results. Progestogens may have a role in causing depression but oestrogen therapy may be beneficial.[89]

A recent study of debriefing (a psychological treatment involving some form of emotional processing, catharsis or ventilation) following operative childbirth found no effect on rates of postnatal depression[18] (Grade D I-2). A randomised controlled trial of extra postnatal care in the form of home visits by support workers showed that this new model of care was welcomed by women. However, it was not effective in reducing rates of postnatal depression or improving well-being, as measured using the SF36[19] (Grade D I-2).

To date, there have been no economic evaluations of successful strategies for the prevention or treatment of postnatal depression in the English language literature. It is, however, likely that this condition has considerable cost consequences to the health service, women and their families and society at large.

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Women with major obstetric complications

Multiple pregnancy

One of the purposes of the antenatal ultrasound scan is to determine fetal number. When a multiple pregnancy is found it is important to establish whether the fetuses share the same placenta and the same chorionic sac (di or mono-amniotic) because mono-chorionic fetuses share the same placenta and fetal blood circulation which may lead to problems. This may result in life-threatening haemodynamic imbalance as well as poor fetal growth and require closer monitoring than in other multiple pregnancies[90] (Grade B-III).

A greater proportion of multiple gestation pregnancies have adverse clinical outcomes than of singleton pregnancies. These will inevitably have significant resource implications for the health service and the wider economy. Multiple gestation pregnancies carry a significantly increased risk of maternal complications, including gestational diabetes, pregnancy-induced hypertension and caesarean delivery. They also carry a significantly increased risk of perinatal complications, including intrauterine growth restriction, premature delivery, intrauterine demise, low birthweight, and an increase in both short- and long-term medical and neurodevelopmental problems. In addition, multiple gestation pregnancies and births impose psychosocial and economic stresses on families. At the extreme end, this may lead to serious difficulties in daily living and marital discord and occasionally to child abuse, divorce and serious financial difficulties.

Hospitalisation and bed rest for multiple pregnancy has been evaluated in a systematic review of six trials.[91] Preterm birth and perinatal mortality were not reduced; indeed, for twin pregnancies the risk of very preterm birth was increased. Therefore routine hospitalisation and bed rest are not recommended (Grade E I-1).

Gestational diabetes

This is defined as 'carbohydrate intolerance of varying degrees of severity with onset or first recognition during pregnancy'.[92] There is diversity in opinions as to whether all pregnant women should be screened routinely. Gestational diabetes is associated with macrosomia (a birthweight in the upper centiles of the distribution). This, in turn, may lead to complications at birth, and women with gestational diabetes are commonly delivered by caesarean section.[93] Reasons for screening are to identify women at risk of developing diabetes mellitus in the future, and to prevent fetal malformations and macrosomia.[94] However, others argue that the glucose tolerance test is poorly reproducible and that the acquisition of a disease label and the increased risk of caesarean section are disadvantageous to women.[93] Moreover, there is no good evidence that diagnosis and treatment of gestational diabetes alter perinatal outcome[95,96] (Grade IV).

Breech presentation

Although the incidence of breech presentation at 28 weeks is about 20%, most of them turn spontaneously, so the incidence at term is only 3–4%. Babies in breech presentation suffer higher incidence of mortality and morbidity, due mainly to prematurity, congenital malformations and birth asphyxia or trauma.[97] External cephalic version (ECV) has been rigorously tested and found to reduce the risk of a caesarean section without any increased risk to the baby[98] (Grade A I-1).

A recent randomised controlled trial comparing vaginal breech delivery with elective caesarean section at term found that babies born vaginally were three times more likely to die or be injured than those born by elective caesarean section[99] (Grade A I-1). Management of preterm (<37 weeks) breech lacks good

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evidence on which to base recommendations. The decision about mode of delivery should therefore be made with the labouring woman and her partner.[97]

Adams *et al.*[100] examined the hospital clinic and Medicaid claims for 679 deliveries with breech presentation in a US inner city population. Based on the amounts that Medicaid was billed, attempting ECV reduced the use of resources by a little over US$3000 per birth of babies breech at term. Sensitivity analysis showed, however, that the savings may be as low as US$906.

Another American study aimed to determine the most cost-effective delivery management method of vertex and non-vertex twin pair gestations.[101] The investigators found that maternal and neonatal hospital charges were both significantly lower in the vaginal delivery and breech extraction group than in either the vaginal delivery and ECV group or the caesarean delivery group.

Preterm labour

Preterm birth is the most important predictor of infant outcome, both in terms of mortality and morbidity.[97] Preterm birth is defined as birth prior to 37 completed weeks, but it is babies born prior to 34 weeks who experience the worst outcomes.

The most common problem associated with preterm birth is respiratory distress syndrome (RDS), which affects 40–50% of babies born at less than 32 weeks.[97] Antenatal corticosteroids are associated with significant reduction in rates of RDS, neonatal death and intraventricular haemorrhage[97] (Grade A I-1). The cost and duration of neonatal intensive care is reduced following corticosteroid therapy.

Preterm uterine contractions can be suppressed by beta-agonists, which delay birth, but this is not reflected in improvements in perinatal mortality or morbidity. Beta-agonists do have side effects, occasionally serious, including maternal pulmonary oedema and myocardial ischaemia. Beta-agonists also cross the placenta and have a similar effect on the fetus[97] (Grade C I-1).

Eclampsia and pre-eclampsia

Eclampsia is a rare condition. Consequently, few medical staff have much experience of treating it. Specific continuing education of both medical and midwifery staff is therefore recommended.[32] It is also considered vital that such cases are managed in a delivery suite or high dependency unit by consultant obstetric and anaesthetic staff[97] (Grade A-III).

Prior to 1996, diazepam and phenytoin were the main treatments for eclampsia in the UK. A large randomised controlled trial found that magnesium sulphate produced significantly better results[102] (Grade A I-1). Pre-eclampsia, characterised by maternal hypertension and significant proteinuria, is much more common (*see* **Table 3**). It can lead to eclampsia and other significant health risks for the mother and baby, as well as the possibility of adverse neurodevelopmental outcome for the baby. The effectiveness of magnesium sulphate in the treatment of pre-eclampsia is currently under evaluation.

Shoulder dystocia

Shoulder dystocia is a rare and dangerous problem where the baby's emerging shoulders become stuck as the baby is delivered. It is more commonly a problem in large babies and can be associated with brachial plexus injury to the baby and perineal trauma to the mother. It may cause long-term disability or be fatal for the baby and calls for an emergency response by senior trained obstetric and paediatric staff.[103] There is reasonable consensus on the various manoeuvres that may be attempted to expedite delivery[103] (Grade III).

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Training

In common with other specialities where emergency situations are encountered, the need for special training in obstetrics has been highlighted. The importance of 'fire drills', simulating real emergencies, to deal with rare but life-threatening obstetric emergencies has been stressed by the RCOG, RCM, CESDI and CEMD. The successful implementation of such training programmes should reduce perinatal and maternal mortality and morbidity and also reduce litigation to the NHS (Grade III). The Advanced Life Support in Obstetrics (ALSO) course is one such training programme for doctors and midwives. However, staff must also be recognised as having a role to play in reducing morbidity associated with obstetric emergency. With more obstetric care being provided in the community, GPs and paramedics also need to be trained in the basics of obstetric emergency care.[104] There have, however, been no trials to support this (Grade III). In the past, obstetric and neonatal flying squads were considered useful but they are not now recommended.

Women in vulnerable social groups

Teenage pregnancies

An Effective Health Care review noted that teenage pregnancy was associated with poorer health outcomes for both mother and baby.[105] This may be ameliorated by use of programmes promoting access to antenatal care, targeted support by health visitors, social workers or lay mothers and provision of social support and educational opportunities.[106] In one study from the USA special teen clinics were shown to have some potential for reducing low birthweight.[107] The recently launched government Teenage Pregnancy Strategy is being evaluated in a series of complementary studies.

Women living in poverty

Babies of women living in poverty are at higher risk of low birthweight and preterm birth. Various strategies have been tried, with the aim of increasing birthweight and reducing preterm birth. These have included home visiting, education, support, nutrition supplements and community links. Unfortunately, these have generally been unsuccessful.[108–110] The only positive outcome reported was in a study of home visiting by nurses, which helped to reduce pregnancy-related hypertension.[111]

7 Models of care and recommendations

General themes

For most women, pregnancy and birth are straightforward. However, they are life-changing events of enormous significance to the woman and her family. All too often in the past, and sometimes still, the importance of the latter was lost in the routine of the former by treating pregnancy and birth as a medical problem. The following principles have emerged as important themes in developing services for women in the maternity services.

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Philosophy

- The majority of women have uncomplicated pregnancies and can be cared for in the community.
- Services should be 'women-centred', allowing women choice of models of care that best meet their needs.
- Providers and users of the service and MLSCs should have regular input into service development.
- Service development should reflect local case-mix, age structure of the population and ethnicity.

Structure of services

- Appropriate referral procedures are necessary to ensure that women at higher risk or those who develop problems receive specialist help.
- Combined clinics should be held where appropriate, to ensure integrated service delivery for women with medical problems or complications.

Information sharing

- Information services, including leaflets and access to interpreters, should be available to all women.
- Women should carry their own maternity notes and the National Maternity Record should be used.
- All provider units should send complete information for inclusion in HES.
- Routine data should be monitored to ensure implementation of the contract, to monitor quality and users' satisfaction.
- Translation and advocacy should be provided where necessary.

Process

- Good communication between staff and between staff and women and their families is essential.
- Women and their families should be treated with respect for privacy, confidentiality and informed consent.
- Women should be encouraged and facilitated to adopt healthy lifestyles.
- Policies should be in place, consistent with national guidelines, about antenatal screening, obstetric emergencies, training, referral and audit.
- Guidelines and recommendations from Department of Health (DoH) and professional bodies should be implemented.
- Models of care and interventions in pregnancy and childbirth should be evidenced-based as far as possible given current knowledge, and cost-effective.
- In particular, reducing rates of smoking in pregnancy and increasing rates of breastfeeding would have significant and far reaching benefits.

These recommendations may pose considerable challenges to health providers and commissioners. Planning and prioritising these different themes require that the different parts of the service work together. Some of the interventions and strategies highlighted may be costly to set up but be cost-saving in the longer term. For example, providing continuous support to women in labour reduces their need for pain relief and operative delivery, with long-term benefits.[82]

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Recommendations on screening and interventions

Antenatal screening

Infectious diseases

Screening for the following infectious diseases is recommended by the RCOG[97] and/or the Department of Health:

- **Rubella:** Sero-negative women should be informed of their status and offered postnatal vaccination to protect future pregnancies.
- **Syphilis:** Antenatal serological screening should be offered to all pregnant women even though the incidence of the disease is now very low. This recommendation was made by the National Screening Committee because of the rising incidence of syphilis in Eastern Europe.
- **Hepatitis B:** Screening should be offered in early pregnancy, to allow for immunisation of babies born to infected mothers.
- **HIV:** An HIV test should be offered and recommended to all pregnant women as a routine part of their antenatal care. The test is highly sensitive (99.9%) and specific (99.7%). Arrangements for screening were to be in place by the end of 2000. A minimum take-up rate of 50% is expected by this date. By the end of 2002 take-up is expected to be at least 90%.
- **Asymptomatic bacteriuria:** Urine culture to detect asymptomatic bacteriuria should be offered to all women early in pregnancy to reduce the incidence of pyelonephritis, preterm birth and low birthweight babies. If a culture is positive, treatment with appropriate antibiotics should be offered.[97]
- **Toxoplasmosis, bacterial vaginosis and cytomegalovirus:** There is currently insufficient evidence to recommend screening for these infections.[97]

Other antenatal screening/interventions for pregnant women

- Screening for hypertension should be accompanied by a urine test for proteinuria. Blood pressure should be measured using standardised techniques and conditions (RCOG).[97]
- Symphisis-fundal height measurement (in centimetres) may have value in assessing uterine size. However, the interpretation is not straightforward. A randomised controlled trial (cited in RCOG[97]) detected no differences in any of the outcomes. Nevertheless, symphisis-fundal height measurement takes minimal equipment, training and time and may still have value.
- Screening for haemoglobinopathies is recommended for all people in whose racial background the haemoglobinopathies predominantly occur. In areas where greater than 15% of the population fulfil these criteria universal screening is recommended (RCOG).[112]
- Screening for rhesus negativity and provision of anti-D for those identified. This prevents RhD alloimmunisation (RCOG).[97]
- The UK National Screening Committee (website listed in Appendix 1) has recommended that there should be second trimester serum screening for Down's syndrome. This should be at least a double test but it would be desirable for laboratories to move to triple or quadruple tests in the future when possible. Screening in the first trimester and other screening modalities is being kept under review by the committee.
- All women should be offered an ultrasound scan between 18 and 22 weeks' gestation to look for major fetal anomalies (RCOG).[97]
- Identifying domestic violence in pregnancy. All pregnant women should be seen, unaccompanied, by a health professional at least once during antenatal care. All women should be asked about their experience of violence as part of the social history. Provision of an interpreter, should that be needed,

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who is not the partner, a friend or family member, is also advocated. Training of professionals and appropriate referral is essential (DoH, RCOG, RCM).[6]

Interventions around the time of birth

- All women with an uncomplicated breech presentation at term should be offered ECV (RCOG).[97,98] Cardiotocography should be done; ultrasound and tocolysis can be helpful. Training and supervision of health professionals in carrying out ECV is an important consideration to avoid the loss of skills.
- Babies that are still in a breech position at term, who could not be turned by ECV, should be delivered by elective caesarean section (RCOG).[97]
- All women presenting in premature labour should be offered corticosteroids (RCOG).[97]
- The use of beta-agonists in preterm labour should be cautious, with careful monitoring. The time gained should be used actively to promote fetal maturation (RCOG).[97]
- Pregnant women should be made aware of the early symptoms of pre-eclampsia, its importance and the need to obtain formal assessment (DoH).[32] Because of the uncertainty in the efficacy of magnesium sulphate in treatment of pre-eclampsia and because magnesium sulphate is not without toxicity, units should develop local protocols for prophylaxis of seizures which may include the use of magnesium sulphate.
- It is essential that protocols are in place to deal with shoulder dystocia (CESDI).[103]
- All units should have a protocol for the management of massive haemorrhage. Regular 'fire drills' should be organised so that when these emergencies occur all members of staff know exactly what to do (DoH).[32]

Screening/interventions for women and babies after birth

- Identification of postnatal depression so that effective interventions can be offered.
- Vitamin K prophylaxis against haemorrhage.
- Hypothyroidism and phenylketonuria (PKU) (Guthrie) screening.
- BCG vaccination.
- Neonatal hearing screening.
- Support for breastfeeding.

Interventions for special groups at risk

- The recently launched Teenage Pregnancy Strategy calls on each Local and Health Authority area to jointly appoint a local co-ordinator. Their role is set out in guidance from the Teenage Pregnancy Unit in the Department of Health.
- Translation services and health information should be made available to non-English speakers.

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8 Outcome measures

The Department of Health has published recommendations for health outcome indicators for normal pregnancy and childbirth.[113] These are tabulated by availability nationally and locally (**Table 20**). Many of these data items are not routinely collected or published and many are process rather than outcome measures. Data are available from routine systems for 11 of these data items, six have been piloted using data from the St Mary's Maternity Information System (SMMIS). They report a high level of completeness, although noting that SMMIS may be unrepresentative. They also note that there are some problems of definition and many indicators are associated more with social variables than hospital care.

Table 20: 'Candidate' outcome indicators for pregnancy and childbirth.

	Availability
Effective and safe care during pregnancy, labour, delivery and post-delivery:	
Maternal mortality rate	CEMD
Stillbirth, neonatal and post-neonatal mortality rate	CESDI
Incidence of eclampsia	No
Incidence of severe post-partum haemorrhage	HES
Perineal trauma and episiotomy	HES
Pain in labour and delivery	No
Incidence of postnatal urinary incontinence	No
Incidence of postnatal faecal incontinence	No
Gestational age	HES
Birthweight	ONS
Maternal admission to ICU	Locally
Use of antenatal corticosteroids to enhance pulmonary maturity	No
Mode of delivery rates	HES
Neonatal admissions to intensive care or special care	Locally
Emergency postnatal admission of mother	Locally
Well-being of mother and baby during and after pregnancy:	
General health status of mother after delivery	No
Incidence of postnatal depression	No
Smoking among pregnant women	Infant Feeding Survey
Weekly alcohol consumption among pregnant women	Infant Feeding Survey
Illicit drug use among pregnant women	No
Incidence of domestic violence associated with pregnancy and childbirth	No
Incidence and duration of breastfeeding	Infant Feeding Survey

HES contains diagnostic information on approximately two thirds of deliveries.
The Infant Feeding Survey is carried out approximately every 5 years on a sub-sample.
Some of these data may be available from local ad hoc surveys.
Source: Troop P, Goldacre M, Mason A, Cleary R. *Health outcome indicators: normal pregnancy and childbirth. Report of a working group to the Department of Health.* Oxford: National Centre for Health Outcomes Development, 1999

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Other resources for audit include:

- **The Confidential Enquiry into Maternal Deaths:** This is an audit of all maternal deaths in the UK. It is carried out triennially, most recently covering the years 1994–96.[32] It reports causes of death and makes recommendations that it follows up in subsequent reports. The next volume will be issued at the end of 2001.
- **The Confidential Enquiry into Stillbirths and Deaths in Infancy:** This is carried out annually over the UK and aims to provide an overview of the numbers and causes of stillbirths and infant deaths, together with a detailed enquiry into specific subsets. Specific topics have included audits in three reports, on postmortem reporting (1993 and again in 1994–95), and CTG education (1999).[114]
- **Effective Procedures in Maternity Care Suitable for Audit:** This publication by the RCOG is available on the internet (*see* Appendix 1). It includes six sections: prevention of malformations, e.g. by appropriate management of diabetics; antenatal screening and diagnosis, e.g. Down's syndrome; antenatal management, e.g. of smoking; management of antenatal complications such as eclampsia; labour and birth such as fetal monitoring; and care after birth, including infant feeding. For each subsection auditable standards are listed.
- **Sentinel audit:** A survey has been carried out by the RCOG of all caesarean sections in England and Wales. It collected information over a 3 month period in 2000. Data collected included type of section (elective/emergency), method of onset of labour, anaesthetic, the reason for the woman having a section and the birth outcome. Information on women's views was also collected for a sample. Information from the survey is now becoming available.
- **Perinatal Audit:** A report produced for the European Association of Perinatal Medicine in 1996.[115] This covers various approaches to audit of maternal mortality and morbidity and fetal and infant mortality and morbidity.
- **Women's views count:** This resource pack, published by the College of Health, aims to help health professionals and user representatives ask service users their views.[116] It includes copies of four validated questionnaires with directions on how to use them.
- **Evaluation through clinical audit (Ch. 9 in The Organization of Maternity Care: A Guide to Evaluation[121]):** This chapter describes the different stages in the audit process; setting standards, objectives, getting information, feeding back results and writing up. Other chapters in this book examine other methods of evaluation.
- **Assessing the needs and experiences of women using the maternity services who do not speak or write English:** A pamphlet that gives some of the reasons why it is important to assess the views of these women and looks at ways of doing so[51] (available from the NPEU).

9 Information and research requirements

Information requirements

The information collected about maternity care and its outcome falls well short of what is required to monitor the care given in pregnancy and birth and its outcome for mothers and babies.[8,117] Data are collected and aggregated in different ways in each of the four countries of the United Kingdom. Each has considerable deficiencies, even in Scotland, which has the best information systems.

In England, data about care given at birth are available at a national level for only about a two thirds of deliveries, despite the fact that the data items required and a wider range of information are recorded at a local level.[118] This is in part because some maternity units do not have computer systems and others have

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systems which are not linked to their hospital patient administration systems.[119] Even where such systems exist, there is a lack of linkage with other hospital systems, notably those in neonatal units and community systems, especially child health systems.[119] Child health systems exist in most districts. They were first designed as operational systems to schedule immunisation and screening programmes but they contain information on gestation and neonatal screening. Sometimes the software makes it difficult to extract data from them and in some places there are problems with the completeness of data.

These problems are well documented and it is hoped that a number of initiatives under way at the time of writing will lead to improvements. The NHS number programme (website listed in Appendix 1), to be implemented by 2002, will issue NHS numbers to babies at birth, instead of waiting for up to six weeks for the birth to be registered. The availability of NHS numbers to babies admitted to neonatal and intensive care will enable their records to be linked to those of their birth and hence their mothers' pregnancy. As a welcome by-product, the project will ensure that all maternity units have access to a computer system.

There are considerable inconsistencies between ways in which any given data item is recorded in maternity systems, thus making comparisons between units difficult. The Maternity Care Data Project (web site listed in Appendix 1) is working to compile a data dictionary with definitions agreed by representatives of clinicians. It is also working with system suppliers to ensure that they all use these common definitions. The Körner minimum dataset of items to be collected about birth was compiled in the early 1980s and so more up to date datasets are needed to reflect current concerns and practice. Although there is a minimum dataset associated with the allocation of NHS numbers at birth, it is very limited and so cannot, in its present form, replace the Körner minimum dataset. The Maternity Care Data Project is therefore inviting clinical groups to use the common dictionary, to define their own minimum datasets containing the items they need to monitor their practice.

As maternity care takes place in a variety of settings and usually involves two individuals, records need to be linked together to give a full picture of the care given antenatally, in labour, at birth and postnatally. In the longer term, this should be achieved through implementing electronic health records, due to be implemented in 2003. Linkage of records should also improve when babies receive NHS numbers at birth rather than at 6 weeks of age. However, it is likely that some years will elapse before these capture all the information related to any one pregnancy. Maternity care is an area where more resources are needed in terms of both infrastructure and skilled staff before the aims set out in policy documents are translated into reality.

Research requirements

Detailed lists of research topics cannot be accommodated in this chapter. Research in the area of pregnancy and childbirth benefits from being multidisciplinary and having user involvement. In addition to the ongoing work of assessing interventions, research is needed on the organisation of maternity care, on costs and benefits and on the views of patients and care-givers. Long-term follow-up of both mothers and babies will be needed to address key questions of effectiveness and cost-effectiveness. Priorities for R&D in primary care of mother and infant have also been evaluated in an NHS strategic review.[120]

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Appendix 1: Sources of further information

Data sources

- *Cochrane Library* – includes Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effectiveness, the Cochrane Controlled Trials Register, the NTA database, and the NHS economic evaluation database.
- *Birth Counts: statistics of pregnancy and childbirth* (Volumes 1 and 2)[8,9]
- National Guidelines Clearing House http://www.guidelines.gov
- *Effective Care in Pregnancy and Childbirth*[62] – tables on effective/ineffective care
- Maternity Data Project Data Dictionary http://www.nhsia.nhs.uk/mcd
- National Maternity Record http://www.nmrp.co.uk/demo
- NHS Number for babies http://www.nhsia.nhs.uk/nn4b
- Health Service Circulars http://www.open.gov.uk/doh/coinh.htm
- NHS Reference Costs http://www.doh.gov.uk/nhsexec/costing.htm
- Sure Start http://www.surestart.gov.uk

Professional bodies

- Royal College of Obstetricians and Gynaecologists http://www.rcog.org.uk
- Royal College of Midwives http://www.rcm.org.uk
- UK Central Council for Nursing, Midwifery and Health Visiting http://www.ukcc.org.uk/cms/content/home
- English National Board for Nursing, Midwifery and Health Visiting http://www.enb.org.uk
- Maternity Services Liaison Committee http://www.mslc.org
- Office for National Statistics http://www.statistics.gov.uk
- National Screening Committee http://www.doh.gov.uk/nsc/index.htm
- National Institute of Clinical Excellence http://www.nice.org.uk
- Sure Start http://www.surestart.gov.uk/home.cfm
- Commission for Racial Equality http://www.cre.gov.uk
- NHS Information Authority http://www.nhsia.nhs.uk

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Appendix 2: Glossary of terms[8]

Readers should also check the Maternity Data Project Data Dictionary (*see* Appendix 1).

Abruptio placenta: condition in which the placenta detaches from the uterine wall.
Amniocentesis: withdrawal of fluid from the amniotic sac surrounding the fetus in the uterus for investigation of genetic constitution of fetus.
Anaemia: deficiency of haemoglobin in the red blood cells.
Anaesthesia: a state in which drugs are used to make the whole body, in general anaesthesia, or part of it, in local or regional anaesthesia, insensible to pain.
Analgesia: relief of pain by drugs or other means. May be general or local.
Antepartum: before delivery.
Booking: arranging where the baby will be born.
Caesarean section: delivery of the baby through an incision in the mother's abdominal wall and uterus.
Consultant obstetric maternity unit: a maternity unit in which women book with a consultant obstetrician to give birth under the supervision of midwives and obstetricians.
Domino: domiciliary in and out.
Down's syndrome: disorder caused by the presence of an extra chromosome.
Eclampsia: convulsions associated with hypertension in pregnancy.
Elective: a planned procedure, not undertaken as an emergency.
Epidural: a local anaesthetic injected into the space around the spinal cord, causing loss of sensation to the lower part of the body.
Episiotomy: surgical cut through the perineum performed at the end of labour immediately before a vaginal birth to facilitate delivery of the baby.
Fetal distress: changes in the condition of the fetus which might indicate a potentially harmful environment in the womb. The most common signs are abnormalities of fetal heart rate and rhythm and meconium staining of the amniotic fluid.
Forceps: instrument applied to the baby's head to assist in delivery.
Fundal height: distance between a pregnant woman's pubic bone and umbilicus.
General practitioner maternity unit: a maternity unit in which women book with a general practitioner to deliver under the supervision of midwives and general practitioners.
Glycosuria: the presence of glucose in the urine.
Haemorrhage: bleeding. Loss of blood either internally, when bleeding occurs into body cavity, organs or tissues, or externally onto the body surface.
High dependency care: care additional to usual routine care.
Hypertension: raised blood pressure.
Hysterectomy: operation to remove the uterus.
Induction: of labour or abortion. Process by which contractions of the womb are initiated artificially, either by breaking the membranous sac around the baby, or by drugs, or both.
Intrapartum: during labour.
Intrauterine: inside the uterus or womb.
Labour: the process of delivering a baby. It can be divided into three stages: dilatation of the cervix, delivery of the baby, and delivery of the placenta.
Midwife: a person who is qualified to supervise women in childbirth.
Neonatal: the period from birth to 28 days.
Neural tube defect: a defect of closure of the spinal canal or skull associated with failure of development, or an abnormal protrusion of brain or spinal cord tissue. Includes anencephaly, spina bifida and is often associated with hydrocephaly.

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Oxytocin: drug commonly used in induction and acceleration of labour.
Parity: total number of previous live births and stillbirths. This does not include abortions or miscarriages.
Periconceptional: the period around conception.
Perineum: a woman's area of pelvic floor between the vagina and the anus.
Placenta praevia: condition in which the placenta is located close to the cervix.
Pre-eclampsia: complication of pregnancy including raised blood pressure and protein in urine, also known as toxaemia.
Prolonged pregnancy: a pregnancy that extends beyond the expected date of delivery.
Prostaglandin: hormone used in induction of labour or abortion, among other uses.
Proteinuria: the presence of protein in the urine.
Puerperium: time period after delivery during which the mother's body adjusts to the end of pregnancy.
Respiratory distress syndrome (RDS): condition occurring usually in preterm babies: can result from lack of surfactant, which is necessary for lung expansion of immature lungs.
Rubella: german measles.
Spina bifida: congenital defect of the spinal column.
Thalassaemia: a genetic blood disorder.
Trimester: approximately one third of pregnancy.
Ultrasound: high frequency sound waves used in obstetrics. They can be of two kinds. Doppler sound is used for measurement of fetal blood flow. Real time scanning ultrasound gives a picture of the area scanned, allowing assessment of fetal position, size and diagnosis of some malformations or of multiple pregnancy. Also used after birth for assessment of extent of neonatal brain damage caused by intracranial or intraventricular haemorrhage.
Vacuum extraction: method increasingly used as an alternative to forceps to assist delivery. Also known as ventouse delivery. Vacuum extraction may also refer to a method of induced abortion using suction, done early in pregnancy, before 12 weeks.
Ventouse: equipment used for vacuum extraction.

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Appendix 3: Voluntary organisations

Action on Pre-Eclampsia (APEC)
Action for Sick Children
Arthrogryposis
Association for Community-based Maternity Care
Association for Improvements in the Maternity Services (AIMS)
Association for Spina Bifida and Hydrocephalus
BLISS
CERES
Caesarean Support Network
Child Bereavement Trust
Child and Adolescent Self-Harm in Europe
National Children's Bureau
Child Poverty Action Group (CPAG)
Contact at Family
Down's Syndrome Association (previously Down's Children's Association)
Foundation for the Study of Infant Deaths
Group B Strep Support
In Touch Trust
Maternity Alliance
MIND
Miscarriage Association
Multiple Births Foundation
National Childbirth Trust
National Children's Bureau
National Council for One-Parent Families
National Council of Voluntary Organisations (NCVO)
Parents in Partnership-Parent Infant Network (PIPPIN)
PETS
The Patients' Association
Royal Society for Mentally Handicapped Children and Adults (MENCAP)
SCOPE
STEPS
Stillbirths and Neonatal Death Association (SANDS)
Support Around Termination for Fetal Abnormality (SATFA)
Toxoplamosis Trust
Twins and Multiple Births Association (TAMBA)

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