

GCPH Breastfeeding Project: Investigation of breastfeeding rates in deprived areas

Literature review

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1. Introduction/Background

The World Health Organisation (WHO) describes breastfeeding as the '*normal way of providing infants with nutrients for healthy growth and development*'. Exclusive breastfeeding, which has been shown to provide the greatest benefit for an infant, is recommended for the first six months of life with complementary feeding until two years of age¹. However this is not widely practised².

In Scotland, the importance of giving children the best possible start in their early years is reflected in legislation, policies and programmes designed to support health care staff and breastfeeding women. This includes the Breastfeeding etc (Scotland) Act issued in 2005^a to promote the acceptance of breastfeeding in public places; the Equally Well (Scottish Government, 2008) policy to address health inequalities³; the WHO/UNICEF Baby Friendly Initiative, which outlines standards of good practice for maternity/community services; the Scottish Government Healthy Eating Active Living Action plan to improve maternal and infant nutrition through the Infant Nutrition Coordinator; and national monitoring via the HEAT target^b. Additional strategies have been designed to address maternal and infant feeding from preconception through to three years of age with a particular focus on health inequalities⁴. At a local level, the NHS Greater Glasgow and Clyde infant feeding strategy proposes a comprehensive system of care comprising the baby friendly initiative and Scottish Government strategies through joint health and community care implementation.

Based on the Infant Feeding Survey conducted in 2010, the estimated breastfeeding initiation rate in Scotland was 74%. This was a significant increase from rates reported in 2000 (55%) and compared favourably with initiation rates in England (82%), Wales (71%), and Northern Ireland (64%)⁵. However, this rate was still less than the rates reported in other European countries⁶. Although initiation rates appear to have improved, there is a marked decrease within the first few weeks and shorter breastfeeding duration compared to other European countries^c. In 2009, results from the CHSP-PS^d scheme, which covers over 80% of all births in Scotland, showed that 44% of infants were breastfed at ten days (38% exclusively) and 36% by six to eight weeks (27% exclusively). These rates have been relatively stable since 2001⁷.

Breastfeeding is influenced by varying and complex inter-related factors that often reflect the mother's socio-cultural environment. In Scotland, increased breastfeeding rates have proven difficult to achieve. Further improvements will require changes to the prevailing 'breastfeeding culture'⁸.

^a Breastfeeding Act (Scotland) 2005: The Act makes it an offence to prevent or stop a person in charge of a child feeding that child milk in a public place (<http://www.scotland.gov.uk/Publications/2006/07/04152607/1> accessed October 2010).

^b HEAT target: Scottish Government Health Efficiency Access and Treatment Target 7: to increase the proportion of newborn children exclusively breastfed at 6-8 weeks from 26.6% in 2006/07 to 33.3% in 2010/11. The breastfeeding rates in 2009 were 26.2%. Training and support has been provided to both staff and mothers to support this target. (<http://www.healthscotland.com/topics/stages/early-years/index.aspx> accessed 14/08/2010)

^c Compare with rates reported in Europe 42-71% at three months and 19-52% at six months (cited in Callen and Pirelli, 2004) or Western Australia 61% and 50% at three and six months respectively (cited in Hall and Hauck, 2007). Also note that standardised rates for Scotland are actually lower (53% in 2001 to 57% in 2005). Also see reference by Britten et al (2009): Support for Breastfeeding mothers – Cochrane review. Cochrane database of systemic reviews.

^d CHSP-PS – Child Health Surveillance Programme – Pre-School

2. Breastfeeding: How it works

Breastfeeding is the '*natural*' form of infant feeding for humans (mammals) providing the main source of nutrients within the first few months of life⁹. Breast milk contains both macro and micro nutrients and a variety of bioactive substances known to support infant growth and development. During pregnancy, the ability of the mammary gland to secrete milk is developed in two phases. The first phase (*mammogenesis*) comprises the growth of breast structure and functionality; while the second phase (*lactogenesis*) develops components important in milk production and secretion. These phases are coordinated by the endocrine system (progesterone and oestrogen)¹⁰.

At birth, the sudden drop in the levels of circulating hormones (human placental lactogen, progesterone and oestrogen) stimulates the onset of lactogenesis, which peaks at 30-40 hours post partum. The rate of production and composition changes significantly during this period, with a marked increase in protective components (e.g. lactose, oligosaccharides, immunoglobulin IGA and lactoferrin). There is also a sharp increase in milk volume within 36-96 hours post partum. Endocrine hormones drive the initial stages of lactogenesis, however this converts to autocrine control within a few days in most women (i.e. when milk removal becomes the primary mechanism for milk synthesis). In other words, at this stage, milk production should continue for as long as milk removal occurs. Variation in milk production is reportedly influenced by maternal diet, daily hormonal fluctuations and feeding patterns (i.e. regular emptying of the breast)¹⁰.

The process of milk removal is a reflex action coordinated by the central nervous system and other hormonal processes. Effective breastfeeding technique involves the correct positioning of the infant to stimulate the reflex action. Initially, this is unconditioned and requires a physical stimulus to control milk supply. Once it is conditioned however, it can be hindered by physical stress (e.g. pain) and emotional stress (e.g. embarrassment and anxiety). An inhibited reflex depresses both milk secretion and supply. When milk removal stops completely, the mammary gland ultimately loses its capacity to produce milk¹⁰.

3. Measuring breastfeeding

The term breastfeeding as used in research studies may refer to different forms of infant feeding patterns, which could influence the comparison and consequent application of findings¹¹. Methodological problems also include subject selection/recall bias and failure to report gestational weight/age of infants¹². Several criteria have been proposed by the WHO¹³ working group (2008) to help with the definition of infant feeding which can be described as 'exclusive breastfeeding', 'predominant breastfeeding', 'bottle feeding' and 'complementary feeding' (Table 1).

Table 1: Definition of infant feeding

Mode of infant feeding	WHO description
Exclusive	Feeding from the breast (directly or expressed) received by an infant from his mother or wet nurse as the only source of nourishment excluding all other liquids/solids (particularly non human milk or formula) with the exception of vitamin and mineral supplements/medicines and oral rehydration therapy.
Predominant	Feeding with breast milk supplemented with certain water based infusions such as water, fruit juice, ritual liquids or oral re-hydration therapy. It excludes feeding with liquids or other solid foods particularly non-human/ formula milk.
Bottle feeding	Feeding with liquid or semi solid/solid food from the bottle with a teat (liquids may include breast milk).
Complementary feeding	Feeding with breast milk and other liquid, solid and semi solid food including human and non human milk.

Source: WHO Indicators for assessing infant feeding and development, 2008¹³.

The calculation of breastfeeding rates for each infant feeding category is based on the feeding practice within the previous 24 hours and the age of the child. Although considered a reliable and widely used method for assessing nutrient intake, it may result in an overestimation of exclusive breastfeeding rates¹².

Maternal recall has also been identified as a source of bias. Aarts et al (2000)¹⁴ reported an overestimation of 40 percentage points in the proportion of infants exclusively breastfeeding in a comparison of 24 hour recalls with other records at two months. Inaccurate infant feeding records adversely influence research outcomes and the potential application of findings for clinical research especially research designed to link infant feeding to health outcomes. The most accurate period recommended for reporting previous activity is seven days i.e. 'the 7-day recall'¹⁵.

In Scotland, breastfeeding information is based mainly on maternal recall following child birth. The main sources are:

- The Infant Feeding Survey: A UK wide survey conducted every five years, that collates information by maternal recall from a representative sample of mothers and their babies from birth to nine months. The information includes incidence of breastfeeding (proportion of infants breastfed initially, even once), the pattern and duration of infant feeding (exclusive/mixed) and feeding intentions and health behaviour of mother before, during and after pregnancy^{5,16}.
- Child Health Surveillance Programme: This data scheme was introduced in 1991 to monitor child health from birth to primary school and has a high coverage of over 80% for all births in Scotland. It collates information via maternal recall on infant feeding at birth, hospital and community discharge, at first visit (seven to ten days after birth) and at a six to eight week review. Breastfeeding is defined as the feeding method in the previous 24 hours before the review visit described as 'breast only', 'bottle only' or 'both'.

- SMR 02: The Scottish Morbidity Record for maternity services (SMR02) collates information on all hospital discharges from maternity services in Scotland and includes all hospital-based births. Infant feeding information comprises first feed and feed on discharge as reported by the midwife on the mother's case notes¹⁸. This is defined as 'breast only', 'formula feed' or 'mixed feed'. There may be slight issues of interpretation based on the midwives' understanding of first feed (i.e. first full feed after/before colostrum)¹⁹.
- Guthrie Test Data: The Guthrie Test is a blood test conducted about seven to ten days after birth to screen for metabolic/congenital disorders. It has a high coverage of all births in Scotland and collates infant feeding information (relevant to the test) on the predominant mode of infant feeding from birth defined as 'breast only', 'bottle only', 'mixed feeding' or 'other'²⁰.
- 'Growing up in Scotland' (GUS): A cohort based longitudinal study set up to provide an information resource on children from the early years through childhood. The first sweep of interviews with primary caregivers identified through the child benefit records was conducted between April 2005 and March 2006. It comprised infants (0-1 years) and children aged 2-3years. Data on infant feeding includes if '*the child was ever breastfed*'²¹.

4. Benefits and protective effects of breastfeeding for infants

The nutritional, immunological, psychosocial and developmental benefits of breastfeeding for both mother and child are well established. Recent advances in the understanding of human milk and human growth suggest that breastfed infants have slower linear growth compared to formula fed infants. Furthermore, reduced mortality and morbidity has been associated with breastfed babies even in low birth weight/preterm infants and sick infants. Compared to bottle fed or artificially fed infants, exclusively breastfed infants were at lower risk of infections, particularly gastrointestinal infections in the first few months of life^{22,23}.

This protective effect is dependent on the pattern of infant feeding i.e. the risk of infection was lower in infants exclusively breastfed for longer²². Similar observations were made from the infant feeding survey in the United States suggesting a 'dose-response' relationship with diarrhoea and the common cold among infants without siblings, independent of the household income²⁴.

As the major source of nutrients in the first years of life, breast milk contains many components such as immunoglobulins, lactoferrin, oligosaccharides and anti-secretory peptides shown to be protective against infections and microorganisms²⁵. The infant's antibodies may be provided via breast milk and have been shown to prevent diarrhoea by microorganisms such as *enteric escherichia coli*, *campylobacter*, *shigella*, *vibrio cholerae*. Furthermore, breast milk complements the immune response to vaccination, particularly in mothers who have been vaccinated (suggesting a transfer of immunological information), and reduces the risk of developing allergies and atopic diseases in infants with familial history of atopic dermatitis. This protective effect, vital in developing countries, is also significant in developed countries where cost benefits may be accrued up to the first three years of life²⁶. According to WHO, a worldwide increase in breastfeeding rates by 40% would reduce respiratory deaths by 50% and diarrhoea by 66% in infants aged less than 18 months²⁵.

Breastfeeding has also been associated with a reduced risk of other infections, particularly upper respiratory tract infections. The 'Pima infant feeding study'²⁷ found a significant effect of exclusive breastfeeding on reduced risk of respiratory infection in the first year of life, compared to bottle fed infants and after adjustment for seasonality, birth weight and adverse social conditions.

Moreover, the protective effect of breastfeeding extends beyond the first few months of life, even after breastfeeding has terminated, influencing the hospitalisation rate in infants. Results from the UK Millennium Cohort Study (MCS) of 15,890 infants found a 53% decrease in the rate of hospital admissions for diarrhoea and 27% for respiratory tract infections in infants exclusively breastfed for six months. An association was also found in partially breastfed infants (31% for diarrhoea and 25% for respiratory illnesses), although the protective effect was not as high as those reported in other smaller studies²⁸.

More recently, there have been suggestions that nutrition in early life may be protective against chronic illness in later life and could inform population strategies to prevent obesity in adults. There have been studies showing the protective effect of breastfeeding on the incidence of non communicable diseases particularly obesity, diabetes mellitus I, multiple sclerosis and rheumatoid arthritis but the overall magnitude of the association remains inconclusive. Moreover, there have been conflicting findings from different studies²⁵. At least 60 studies have been published which show an association between infant feeding and adiposity/obesity in later life^{29,22}. Owen et al, in an extensive review of nutrition in early life and risk of later obesity, suggest that variations in the outcomes of the different studies may be due to statistical power of studies, or differences in adjusted confounding factors (e.g. maternal obesity, smoking, socioeconomic background, age of infant at outcome, birth weight, year of infant feed), the method of assessment and definition of the body mass index²⁹. Furthermore, the varying definitions used to describe breastfeeding and marked improvements to substitute baby formula could influence trends in the comparative outcome of the studies reported. However, there appears to be strong support for a link between duration of breastfeeding and obesity in later life. Results are inconclusive for childhood cancers²⁵.

Longitudinal studies of breastfeeding and intelligence in later life (in Denmark and the Philippines) suggest a strong association between breastfeeding and performance in intelligence tests in adulthood. Findings from these studies, comparing breastfed and non breastfed infants, showed that longer breastfeeding duration of up to nine months influenced intelligence even after adjustment for socioeconomic and possible family effect³⁰. The composition of breast milk (availability of long chain polyunsaturated fatty acids – LCPUFA) and the interaction of physical and psychological factors known to improve cognitive development (frequent contact, better bonding) may be associated with the observed findings²⁵. Studies linking intelligence to breastfeeding patterns can be complex and may be confounded by factors such as maternal education, race and intelligence/IQ, socioeconomic circumstances and the measures of breastfeeding used³¹.

^{31b}

5. Maternal issues

The act of feeding breast milk described as a 'living nutritional fluid' ¹⁴ also has benefits for the mother. The potential benefits for women who decide to breastfeed include: reduced cost, suppressed ovulation, improved child spacing, decreased post partum bleeding, rapid uterine involution, return to pre-pregnancy weight, enhanced physical and psychological health ^{28, 32,33,34}, reduced risk of certain cancers such as breast cancer (and ovarian cancer before menopause) ^{33,34}, higher bone density – protective against osteoporosis³⁴, and better mother/child bonding³³. Although breastfeeding has clear advantages, there are also 'disadvantages' or challenges cited by mothers. These include discomfort, severe after-pains, soreness, issues with positioning, time involved, physical constraint and tiredness³⁵. The decision to initiate and continue breastfeeding (duration) is determined by complex, multifaceted factors²⁶. Influential factors include age, education, deprivation, maternal physical and psychological health, maternal and societal beliefs/attitudes, social networks and experience of health care.

5.1 Socio-demographic factors: age and education

There is substantial evidence that demographic, socio-cultural and economic factors influence breastfeeding practices. Grummer-Strawn³⁶ (1996) in an extensive review of breastfeeding trends in 15 developing countries identified changes in population characteristics and subgroup culture that could influence breastfeeding behaviour. These included residence (urban/rural), educational attainment of parents, mother's childhood residence, mother's work experience, maternal age, parity, contraceptive use, and the presence of other children/siblings in the home. Similar observations have been made in developed countries, particularly with regard to the mother's educational status and age ³⁷. Although the direction and effect of influence observed differs between developed and developing country contexts, the variables are consistent. For example, in the developing countries, mothers without any educational qualifications were 1.9 times as likely to breastfeed as mothers who had at least seven years of formal education³⁶; while in developed countries, mothers with higher educational qualifications were more likely to breastfeed³³.

Education is known to be a major determinant of breastfeeding³³. The effect of education on exclusive breastfeeding was more significant than age when the results were adjusted for baby birth rank, premature birth and low birth weight³⁷. It could also be described as a proxy measure for socioeconomic status (e.g. household income, occupation). However, compared to other measures of socioeconomic status, education has the most significant impact on breastfeeding duration³³. Higher educational attainment is positively associated with initiation and duration in developed countries ²⁸.

In contrast, an inverse relationship was observed in developing countries. This is possibly due to a perception that 'breastfeeding is old fashioned' or an indication of 'lesser social status'³³. There may also be an interaction between higher education and socioeconomic status, which increases the mother's ability to purchase infant formula ³⁶.

In addition to educational attainment, maternal age has been identified as among the factors most strongly influencing the initiation, duration and level of infant feeding ^{28, 33}. Results from the MCS confirmed that maternal age, particularly age at first motherhood, was a significant factor in infant feeding patterns; the likelihood of initiating breastfeeding increased by 4-8% per five year increase in maternal age⁴². Studies consistently show that older women (25 years or older) are more likely to initiate and continue breastfeeding,

particularly exclusive breastfeeding, compared to younger women^{16,33,37}. Younger women with lower educational levels (no high school diploma) were more likely to give bottle/formula feed. The mother's age was the most significant factor for formula feeding³⁷.

5.2 Socio-demographic factors: marital status/social support

Marital status influences infant feeding behaviour^{39,26}. Results from a Canadian longitudinal study found that mothers in a two parent family were more likely to breastfeed than single mothers³⁷. Similar findings were reported in the MCS. There were statistically significant differences between mothers who were married and unmarried (co-habiting and lone mothers) in the type and duration of infant feeding. Co-habiting mothers reported more emotional support from the father than mothers who were closely involved with the father of the child but not living with them. Compared to partners who were ambivalent, the partner's preference for breastfeeding was more influential in determining the likelihood to initiate breastfeeding regardless of maternal age, education, ethnicity, marital status or the advice of health care professionals³⁹. In addition, the mother and mother-in-law reportedly influence both the intention and practice of breastfeeding⁴².

The influence of marital status was also observed on the mother's health and health behaviour. For example, the risk of depression and the likelihood of smoking during pregnancy were higher in cohabiting/lone mothers compared to married mothers³⁹.

5.3 Socio-demographic factors: socioeconomic status

Higher socioeconomic status, as described in various studies by the mother's occupation, partner's occupation or household income, has been associated with higher breastfeeding rates. In addition, results from population based studies show that paid maternal employment influences the duration and initiation of infant feeding^{33, 38, 41}. The length of maternity leave and expectations to return to full-time work significantly influenced the duration of breastfeeding³³. Mothers who expected to return to work within four to six months were more likely to introduce early weaning⁴¹. Moreover, results from a study of American first time mothers, showed that women who successfully combined breastfeeding with work were older, more likely to be highly educated and employed in a professional capacity with an option of working for shorter hours, compared to those who weaned early or those who did not return to work³². Similarly, in the MCS, mothers who worked on their own, had supportive working arrangements or received statutory maternity pay were more likely to initiate and continue breastfeeding for at least four months, even after adjustment for socioeconomic factors and maternal education. In contrast, mothers who worked long hours, had informal caring arrangements for their babies, or had to return to work for financial reasons were less likely to breastfeed for more than four months^{38,41}.

5.4 Socio-demographic factors: Scottish perspective²¹

Preliminary results from the GUS data suggest that maternal age, socioeconomic position, marital/cohabitation status and educational qualifications are associated with child and maternal behaviours and outcomes in this Scottish cohort.

Younger mothers, lone mothers, and mothers with fewer educational qualifications or on a low income were less likely to breastfeed and more likely to smoke and not attend antenatal classes. Of interest is the fact that younger mothers who chose to breastfeed

were more likely to live with a partner, be owner-occupiers (i.e. not social renters) or have attained higher educational qualifications.

Education appeared to be the strongest predictor of breastfeeding behaviour, linked to other factors that determine maternal behaviours and outcomes. However, results from the MCS suggest that educational attainment is not strongly associated with breastfeeding for ethnic minority women⁴².

5.5 Socio-demographic factors: ethnicity

Ethnicity is also an important factor associated with breastfeeding³³. In the United States, lower breastfeeding rates were observed in African American and Hispanic women compared to 'white' women, even after adjustment for socio-demographic factors (age and maternal age and level of education)^{33,42}.

In contrast, a greater likelihood of breastfeeding has been observed amongst ethnic minorities in the UK, particularly mothers of Asian origin^{43,63}, compared to the 'white' population. Indeed, breastfeeding rates of 75% have been reported in mothers of Pakistani origin³². Ethnic minority women were also found to be less likely to smoke or consume alcohol during pregnancy. Findings from the MCS, investigating the influence of ethnicity on breastfeeding practices, found that white women were less likely than other ethnic groups to initiate breastfeeding and continue breastfeeding for at least four months even after adjustment for socioeconomic circumstances⁴². This observation was particularly marked amongst younger women (breastfeeding was defined as any breastfeeding in children surveyed at nine months and continued for at least one month; ethnicity was defined by the country of mother⁴³).

However, breastfeeding patterns of new migrant mothers may be influenced by their host community, through the process of '*acculturation*'⁴⁴. Reports have suggested reduced breastfeeding behaviour with greater acculturation measured by generational status (i.e. first or second generation migrant); language spoken at home; length of residency and country of birth. For migrant mothers, the transition from extended to nuclear families, rural to urban residence, availability of infant formula, maternal employment and the process of 'westernisation' are all reasons given for decreased breastfeeding patterns³³. Findings from the MCS showed increased smoking and alcohol use during pregnancy and a lower duration of breastfeeding with every additional five years residence in the UK. In contrast, immigrant mothers and mothers who spoke other languages (not English) at home were more likely to initiate and continue breastfeeding. In the US, shorter length of residence was associated with higher breastfeeding initiation⁴³, but no such association was observed in the UK study⁴³.

The process of acculturation is complex and can work at both the individual level and group level⁴⁵. Furthermore, measuring the concept of acculturation is complex. Length of residency (in a new country), ethnicity, and country of birth all interact to influence acculturation in a new social environment and may in turn be associated with different health outcomes. For instance, analysis from the MCS of migrant mothers showed that length of residency influenced some aspects of health status and health behaviour (e.g. use of antenatal/health services) while ethnicity was a more important factor in predicting other aspects of health behaviour (smoking/alcohol consumption)⁴⁶. Migrant mothers with longer residency who had higher educational attainment, higher 'occupational status' jobs and better English fluency levels were less likely to be economically inactive or live in areas of high minority ethnic density. English fluency levels increased with length of UK

residency for Indian, Bengali, Black African and other white mothers, while economic inactivity decreased for all minority ethnic groups. Furthermore, ethnic minority mothers were not a homogenous group but varied in health behaviour/outcomes by ethnicity, length of stay and socio-demographic characteristics. Significant associations for worse health outcomes were attenuated when other factors were taken into account⁴⁷.

Ethnicity has also been found to influence the breastfeeding practices of white mothers, suggesting that the cultural traditions of ethnic minorities can also influence the breastfeeding practices of the dominant culture at the country level. Findings from the MCS (n= 11,286 natural mothers) found that ethnicity of the partners, and proximity of residence to areas of greater ethnic density or ethnic wards, positively influenced breastfeeding practices of white mothers. For example, results from the survey showed that white lone mothers were more likely to initiate breastfeeding if they lived in areas of high ethnic minority density and white mothers with a partner of different ethnicity were 14 times more likely to breastfeed than those with a white partner. A similar association was observed in 'non-white' mothers with a 'white' partner although this effect was not statistically significant after adjustment for educational and socioeconomic characteristics. Findings by Pickett et al from the MCS suggest that areas with higher 'non-white' ethnic density may exert a 'protective effect' on population health and health behaviour due to shared cultural characteristics, social networks and social capital. This protective effect may be eroded by the process of acculturation⁴⁷.

5.6 Maternal health/health behaviour: smoking

Maternal smoking is associated with low birth weight babies, deprivation and maternal age particularly mothers aged 20 years or younger^e and is an important factor in the non-initiation and early cessation of breastfeeding⁴⁸. About 25% of pregnant women in developed countries smoke³³. This is likely to be an underestimation as most studies depend on the self-reported status of mothers. In a recent Scottish survey, deprived mothers had a higher prevalence of smoking, while greater rates of underreporting were observed amongst more affluent mothers⁴⁹.

Women who smoke are less likely to initiate breastfeeding and are more likely to wean early, by ten weeks, possibly due to a perception of poor milk supply or fear of contamination. Smokers have a lower breastfeeding volume and lower fat component in breast milk at six months, which may be because of the effect of nicotine on the mother's hormonal system⁴⁸. A dose-response relationship has been associated with smoking: the heaviest smokers are least likely to establish exclusive breastfeeding⁴⁸.

The home environment is also important. Mothers living in households where more than ten cigarettes were smoked daily were more likely to discontinue breastfeeding than those living in a non-smoking household³³. To improve infant feeding patterns, achieving a smoke free environment was found to be a more effective intervention compared to providing smoking cessation activities for parents⁵⁰. The recent Scottish Government smoking ban appeared to reduce exposure to cigarette smoke in the home⁷².

^e ISD Scotland. Births: www.isdscotland.org.uk/ (accessed 02/08/2010)

5.7 Maternal health/health behaviour: physical and mental health

Obstetric experience may influence breastfeeding behaviour. Maternal distress during labour has been associated with delayed initiation of breastfeeding⁵¹. Some studies have found a negative association between mode of delivery and breastfeeding initiation (but not *duration* once breastfeeding has commenced). Mothers who have had a caesarean section may delay initiation of breastfeeding due to pain/discomfort or neuro-behavioural depression caused by analgesia use, and may require more support to establish feeding^{52,53,32}. Spontaneous child birth is significantly associated with breastfeeding practice compared to epidural birth. Other studies have, however, shown no association between breastfeeding outcomes and the use of epidurals/analgesia with local anaesthetics/opioids³³.

In a small sample of self-selecting women, post partum anaemia (haemoglobin less than 95g/L) was associated with shorter duration of breastfeeding. Post partum fatigue has been associated with low iron status and fatigue is one of the main reasons for discontinuing breastfeeding⁵⁴.

Attitudes to infant feeding may also be associated with maternal mental health. Results from a study in Barbados⁵⁵ investigating post partum attitudes to infant feeding and maternal mood (226 mother-infant dyads) found significant correlations between maternal feeding attitudes and maternal moods (despair, depression and trust) before and after adjustment for socioeconomic variables. Mothers who had more symptoms of depression/anxiety were less likely to believe breastfeeding was better for the infant and more likely to report breastfeeding as being 'restrictive'. Similar observations of maternal psychological distress (worried about baby or body image) have been associated with shorter breastfeeding intention and duration⁵¹. Experimental studies of breastfeeding women have that shown acute mental and physical distress may impair milk ejection by influencing hormones required for the let down mechanism⁵¹.

A larger Australian⁵⁶ study found a similar relationship between postnatal depression and breastfeeding duration. The proportion of breastfeeding women who reported depressive symptoms (based on the Edinburgh Postnatal Depression Scale and psychological interviews) decreased rapidly with time. Although the study established that onset of postnatal depression preceded discontinuation of breastfeeding, it did not specify whether onset of depression was independent of breastfeeding experience (i.e. breastfeeding problems may have led to reduced levels of self esteem/confidence and onset of depression). In the study, significant associations were also found between duration of breastfeeding and parity, separation of the infant at birth, date of discharge, return to work, smoking and infant admission to hospital before six months.

5.8 Maternal knowledge, choice and other factors

The choice of infant feeding cannot be imposed or governed by opinions, recommendations or policies on infant nutrition. Rather, the decision is determined by a multiplicity of factors²⁶, enclosed in the concept of maternal identity⁵⁷. These factors, which shape attitude and intention, could be influenced by the social acceptability of breastfeeding, the influence of social networks/health professionals and the perceived outcomes (sufficiency/insufficiency of feeding, reinforced by the infant's weight gain)^{58,8,62}
⁵⁹.

Feeding intentions and the timing of the decision have also been associated with breastfeeding practices. Women who intended to breastfeed were more likely to initiate

and continue breastfeeding for longer compared to those who were indifferent, undecided or who planned to bottle feed.¹⁶ The earlier the decision was made, the greater the likelihood and duration of breastfeeding³³. First time mothers were more likely to intend to breastfeed¹⁶. Second time mothers who had breastfed for six weeks or more, or mothers who were themselves breastfed or had a friend who breastfed, also had higher intentions to breastfeed¹⁶.

The benefits of breastfeeding are key factors cited by mothers as the reason to breastfeed. Findings from the Infant Feeding Survey (2005)⁵, confirmed that most mothers (80% of those surveyed) had knowledge of the health benefits of breastfeeding. In particular, Scottish mothers (Northern Irish mothers also), older mothers or mothers with managerial or professional occupations were more likely to be aware of the benefits of breastfeeding. From research based in Scotland, parents who chose to breastfeed were more aware and knowledgeable of the benefits of breastfeeding. There was no difference in breastfeeding knowledge between mothers who breastfed and those who bottle fed.⁶⁰ Other reasons given for initiating breastfeeding from a study in Mexico included the perceived cost of bottle feeding or other benefits to the child and deference to a husband's opinion⁶¹.

Mothers have also reported breastfeeding as being '*painful*', '*restrictive*', '*tiring*' (references to diet, time), '*inconvenient*', or adversely affecting the figure^{8, 59, 57, 58}. These perceptions confirm the importance of 'embodied' knowledge in determining breastfeeding practice⁶², as mothers who may not have seen a child suckled before, would have no model or support network to validate their experiences²³.

Studies have shown that mothers who were confident and less anxious were more likely to initiate breastfeeding and continue for longer³³. Where the prevailing social environment was not supportive, breastfeeding mothers required additional resources to succeed such as the need for privacy, prior experience/knowledge, links to supportive networks and helpful health professionals. These features were reflected in a qualitative study of teenage mothers reported by Dyson et al (2010)⁶³ and an earlier study conducted in Glasgow⁶⁰.

6. Health services

Support from the health services – or perceived lack of it – also influences feeding practices. Hospital policies and practices before, during and after delivery can influence infant feeding practices independent of socio-demographic contexts^{64, 65}. Health workers have also been noted as sources of information on infant feeding.

Dusdieker et al (1985)⁶⁶ suggest that health care providers have little influence on the infant feeding choices in women with strong beliefs against breastfeeding or those with many worries. The strongest influence was on mothers who were '*undecided*' or had '*weak convictions*'.

Mothers who attended antenatal care after their first trimester and mothers who had no prenatal care at all had lower rates of exclusive breastfeeding on discharge³⁹. Although information at the antenatal stage is important, the quality of the information and how it reflects the expectations of mothers is of even more importance. A focus on the healthy development of the infant reportedly reinforced a first time mother's confidence; however, mothers have described feeling that health professionals were more interested in the benefits of breastfeeding⁵⁸ and provided insufficient antenatal information or conflicting

advice on issues such as managing breast/bodily pain, feeding on demand, feeding in public and 'leaking breasts'^{58,68,35,67}. Appropriately trained (and empathic) health care professionals⁶⁸ who were 'available' or had 'sufficient time' positively influenced the mother's post natal experience and breastfeeding habits^{67, 68}.

Hospital practices such as antenatal care, early initiation of breastfeeding following delivery, early skin to skin contact, help with positioning and attachment, rooming in to ensure frequent unrestricted access (and continued production of milk), consistent and timely advice, trained and supportive health care staff, mode of delivery, hospital discharge and the content/provision of hospital discharge packs have been associated with initiation of breastfeeding and a better experience for the mother. Health care professionals also play an important role in supporting breastfeeding duration^{8,20,28,69}.

The implementation of the ten steps recommended by WHO/UNICEF Baby Friendly Initiative (BFI) for successful breastfeeding improves initiation of breastfeeding in accredited hospitals. Studies on women giving birth in Scotland between 1995 and 2002²⁰ found women were more likely to breastfeed seven days after birth if they gave birth in a BFI accredited setting (average breastfeeding rate of 52% in 2002) compared to those who gave birth in non BFI setting (47%). This association was significant after adjustment for confounding factors (parity, deprivation and mother's age).

The effect of early discharge on infant feeding patterns has however been inconclusive^{33, 75}. Early discharge did not appear to have an adverse effect on breastfeeding practices, especially where the policy of at least one nurse visit post discharge was implemented^{50, 65,70}. Some studies suggest that early discharge may aggravate unsatisfactory feeding techniques and a longer post partum stay may increase the proportion of primiparae mothers breastfeeding^{65,69}.

Similarly, there has been controversy surrounding the provision of hospital discharge packs. Some studies have found an adverse effect of commercial packs on exclusive breastfeeding (but not early termination) while others have found the effect was dependent on the contents of the pack i.e. provision of a breast pump increased the duration of breastfeeding at eight weeks post partum^{28,33}.

7. Breastfeeding interventions

There have been several interventions focused on the knowledge and skills of health care professionals or mothers, implementing baby friendly practices and policy interventions (targets/monitoring)^{70, 63}.

Lay support and WHO/UNICEF training have been associated with a significant increase in the duration of exclusive breastfeeding. Similarly, professional support has been associated with an increased duration in any breastfeeding up to nine months. Significant benefits of intervention trials were dependent on:

- the mode of intervention (face to face interventions were more effective than telephone, combination of lay/professional support and/or educational programmes)
- baseline breastfeeding rates in the study area (greater impact in areas with intermediate rates)
- the content of the education/training program (WHO/UNICEF training programs for professionals were found to be effective).

A summary of effective interventions also suggested that multi-faceted approaches applied at different points in time (i.e. spanning the ante and postnatal periods) were the most effective means of improving both the initiation and duration of breastfeeding^{23, 69}.

Multifaceted approaches include full baby friendly accreditation by the maternity and community services^f; consistent support and training to health care staff on breastfeeding techniques and treatment of mother and infant conditions; and culturally appropriate training tailored to the needs of mothers, particularly during the antenatal period. Other interventions shown to be effective include policies on maternity leave and support for breastfeeding on return to work; frequent health care visits and peer/volunteer support during the early post natal period; problem based information on the practice of breastfeeding; routine measurements to reassure the mother on the adequacy of her breast milk and monitor infant growth and engagement of the mass media in promoting the benefits of breastfeeding. Effective interventions require leadership and commitment at the national and local level^{50,69,70,71}.

However there are still information gaps (particularly in Scotland) on the infant feeding practices and effective interventions in deprived areas and the role of public policy and supportive environments in promoting breastfeeding, for example media campaigns, non health sector interventions and flexible working arrangements. Further studies are also required to examine the costs and benefits of breastfeeding to families and the health care sector, clinical management of problems associated with breastfeeding, beliefs and experiences of breastfeeding and the psychosocial issues related to infant feeding^{50,69}.

8. Conclusion

There is considerable evidence and policy support for breastfeeding as the best source of nutrition in the first six months of life. However, the socio-cultural and demographic contexts of the mother are more important determinants of breastfeeding practice than theoretical knowledge of the benefits of breastfeeding.

In a breastfeeding culture, all strands of society would consider breastfeeding as a human right and make it the 'norm' rather than the exception. The mother plays a central role and should be supported in her 'duty' to make the child's 'right' possible but it is not her responsibility solely, as the choice of infant feeding is located within multiple contexts and influenced by inter-related factors. Maternal health in particular is pivotal since the 'issues with the mother' become the 'issues with the child'. Protecting maternal health invariably protects child health and by extension, the future.

A breastfeeding culture makes it a collective responsibility – addressed in multifaceted approaches – to create an environment where the 'best for the infant becomes the best for the rest of us'.

^f Comprising early skin to skin contact; avoiding supplementation, separation of infants from mothers or the provision of promotional material for formula feeding in discharge packs

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