

# Maternal and Infant Nutrition Framework (MINF) Evidence Review

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# 1. Introduction

## 1.1 The purpose of this review

The purpose of the review is to provide an update on any relevant studies or reviews that have been published since the publication of the *Maternal and Infant Nutrition Framework* (MINF) in 2011. It is not the purpose of this review to rehearse in detail the recommendations of the *MINF Framework* (2011) or the NICE Guideline *Maternal and Child Nutrition* (2008) that informed it. The recommendations in these documents are evidenced and familiar to those in the field. There may be some overlap of studies cited here and those included in the 2014 update of the NICE Guideline or subsequent surveillance reports.

This review is intended to help inform the current NHS Greater Glasgow & Clyde (NHSGGC) MINF steering group when considering service models and funding decisions for interventions in relation to the topics of interest (as outlined in the MINF, 2011). The review will provide an overview of pertinent issues for consideration and, where available, the effectiveness of tested interventions.

The review focuses mainly on literature published since the *Framework* in 2011 in relation to defined search terms (see Appendix 1). Where useful, reference will be made to older literature.

The topics covered in this review relate to the interests of the MINF steering and include:

Maternal weight in pregnancy	Nutrition & weight in children
Diet in pregnancy	Family diet
Physical activity in pregnancy	Faltering growth
Neonatal and early infant feeding	Complimentary feeding
Breastfeeding support	Overweight in children
Postnatal feeding support	Diet in early childhood
Peer support for breastfeeding	Physical activity in early childhood
Scottish support models	Training in maternity services
Mixed feeding	Training of early years staff

## 1.2 Key documents that inform maternal & infant nutrition activity

Services that support diet and nutrition for pregnant women and mothers of infants have, in recent years, been informed substantially by the NICE Guideline *Maternal and Child Nutrition* (2008, updated 2014). In Scotland, guidance for action to improve services has been driven by the *Maternal and Infant Nutrition Framework*, published in 2011 and was informed by the NICE Guideline.

The NICE guideline was first published in 2008 and covered ‘the nutrition of pregnant women, including women who are planning to become pregnant, mothers and other carers of children aged under 5 and their children’ (NICE, 2008). An update in 2014 replaced the original recommendation on the supplementation of vitamin D among at-risk groups. A full review of the guideline is due in 2018. In the interim, a NICE *surveillance report* based on Cochrane reviews was published in 2017 (NICE, 2017).

This report suggested a revised coverage to remove some topics that have since been discussed in other recently published guidelines (such as diet in pregnancy, obesity in pregnant women, link workers for those whose first language is not English) and the revision of topics (such as effective interventions to: provide advice and education for mothers using infant formula; to increase the uptake of folic acid supplementation; to improve oral health; to increase breastfeeding and healthy eating in pre-school settings; and recommendations on potentially allergenic foods and family nutrition (aged 12-60 months)).

The *Maternal and Infant Nutrition Framework* (MINF) 2011, outlined the policy context around the health and nutrition of children in Scotland and provided evidence based guidance on the diet of mothers in pregnancy, infant feeding in the early months and weaning to solid foods. The *Framework* acknowledged wide socio-economic inequalities that affect parents' feeding choices and encouraged strategies that support all families to provide their young children with nutritionally healthy diets. One of its aims was to broaden the topic to include not only early breastfeeding but also the diet and nutrition of pregnant women and of children beyond milk feeding. It recommended an action plan to encourage appropriate education & training for staff, the development of supportive policies, adoption of the WHO International Code on Marketing of Breast Milk Substitutes, compliance with the UNICEF BFI principles, accessible information for staff and parents, antenatal education for parents and their significant others that is 'inclusive and responsive' enough for those with additional needs, structured support for breastfeeding, the provision of information on safe formula feeding to support families who choose this feeding option, information on appropriate age for weaning and healthy eating for toddlers and young children (Scottish Government, 2011).

### 1.3 Method

Topics of interest were agreed in the MINF sub-group, divided into two broad topics: weight in pregnancy and the postnatal period; and infant feeding. The search strategy took a 3-strand approach:

- 1) knowledge specialist led search of the published peer reviewed and grey literature
- 2) knowledge specialist led search of the grey literature and
- 3) researcher led searches.

- 1) Search criteria were discussed with NHS Knowledge Management specialists who then structured and undertook the searches and provided the results to two members of the MINF sub-group.

Six separate searches were undertaken as follows:

Search	Search title	Final no of items retrieved from search
1	Weight in pregnancy. Weight / obesity in pregnancy - impact on mother/baby	86
2	Weight in pregnancy. Interventions re healthy weight in pregnancy – weight loss	16

3	Weight in pregnancy. Interventions re healthy weight in pregnancy – healthy weight	88
4	Infant feeding. Interventions to improve maternal knowledge of good infant feeding	20
5	Infant feeding. Interventions to improve actual infant feeding practices (including improving maternal diet)	49
6	Infant feeding. Women's decision-making re infant feeding choices	10

Data sources included: Cochrane Library, Medline reviews, Cinahl, MIDIRS, Kings Fund, Royal Colleges, Scottish Government, WhatWorks, NHS Academy of Fab Stuff

- 2) A separate series of grey literature searches was requested of the Public Health, Publications & Information specialist to cover topics: breastfeeding; mixed feeding; initiating breastfeeding; and supporting sustained breastfeeding.

Search	Search topic/question	Final no of items retrieved from search
1	What evidence is there from hospitals/services that the implementation of UNICEF baby friendly initiative (BFI) standards has resulted in increased breastfeeding rates?	14
2	What evidence is there demonstrating either benefit or detriment from mixed feeding in the first 6 months of life. Looking for clinical outcomes for baby and mother – including maternal wellbeing	8
3	Evidence of effective interventions to support women to initiate breastfeeding	8
4	Evidence of effective interventions to support sustained exclusive breastfeeding	6

Data sources included: Department of Health; Government; Healthcare Improvement Scotland; Health Foundation; Joseph Rowntree; Kings Fund; Knowledge Scotland; NICE; Royal College of Midwives; Scottish Government; UNICEF; World Health Organisation (WHO); and Google.

- 3) Supplementary ad-hoc searches were conducted by the reviewers as sub-topics or questions arose.

All search terms used and a breakdown of each individual search is available on request.

The review uses headings designed to reflect the interests of the MINF group and the potential for intervention and development locally. The text is structured to follow the journey of women and children through maternity and early years services.

#### 1.4 Exclusions

This review takes a whole population approach and so excludes literature on specific groups such as adolescent mothers or mothers of specific ethnic/racial groups. Literature relating to the feeding of preterm/low weight babies has been included as this relates to an area of MINF spending.

## 1.5 Brief Summary of the Literature

The literature on infant feeding has focussed strongly on feeding in the early months of life concentrating mainly on issues related to breast and complementary feeding, the latter often in the context of child obesity concerns. Since 2011 it has been dominated by reviews with few reports of new trials or impact evaluations. Discussions in the literature reviewed here were as much about the quality of information and support offered to women/families as about when or how it was delivered and there was frequent reference to the mother-led/baby-led dichotomy that characterises infant feeding choice and experience. There was general agreement across the literature that support should be appropriate to individual need and be delivered within a partnership model where the agenda is driven by the women rather than the service providers. The literature made frequent reference to UNICEF Baby Friendly Initiative (BFI) as the most effective structural initiative to improve breastfeeding. Reflective of its place in the literature, the role of the BFI features in this review from the start.

Across the works reviewed a number of questions for debate have been raised , not least a fundamental one about the ultimate aim of maternal and infant feeding support services. It may be prudent to revisit this debate as a prerequisite for investment in service development.

## 2. Maternal Nutrition

### 2.1 Introduction

The *NICE Public health guideline: Maternal and child nutrition* (2008, updated 2014) is the key guidance document informing services in relation to maternal nutrition. It is explicit that 'a pregnant woman's nutritional status influences the growth and development of her fetus and forms the foundation for the child's later health' and that this depends on her being well-nourished before, during and after her pregnancy. It highlights that children's eating behaviours are influenced by their environment including parental diet and food choices, thus underpinning the benefits in encouraging women to consider their diet from at least the earliest stages of pregnancy. NICE recommends that professionals discuss women's diets with them early in pregnancy, inform them of the benefits of a healthy diet (including folic acid and vitamin supplements), offer practical advice on maintaining a good diet and address any concerns the women may have. In addition, eligible women should be informed about the benefits of taking up the maternal Healthy Start vitamin supplement and should be offered an application form as early as possible in pregnancy. Socio-economic inequalities are acknowledged with evidence indicating that women from disadvantaged groups are less likely to take folic acid and vitamin supplements during pregnancy, and are more likely to have poor diets, give birth to low weight babies, and be obese or show low weight gain during pregnancy (NICE, 2014)

In 2010, weight during pregnancy was the subject of a guidance document by the Royal College of Obstetricians & Gynaecologists, *Management of Women with Obesity in Pregnancy* (RCOG, 2010), evidence from which featured in the NICE guideline, *Weight management before, during and after pregnancy* (NICE, 2010) as well as in *Maternal and child nutrition* (NICE, 2014). NICE (2010) recommends that women with a BMI of over 30 should be encouraged to consider losing weight before or after pregnancy but weight loss during pregnancy is not recommended in this guideline. Advice on how to lose weight should be tailored to women's circumstances and take cognisance of the barriers that she may face. The benefits of combining healthy eating with exercise (taken for 30 minutes on 5 days per week) should be outlined. Moderate exercise is also recommended for obese women who are already pregnant: they should be encouraged to exercise at this level and be assured that it will not harm their baby. Referral to a dietician or appropriately trained health professional for assessment and personalised advice on healthy eating and how to be physically active is recommended (NICE, 2010). Support should be offered for as long as it takes to make lifestyle changes.

Overweight is a risk factor for gestational diabetes. Screening for gestational diabetes using risk factors is recommended in a healthy population. At the booking appointment, the following risk factors for gestational diabetes should be determined: body mass index above 30 kg/m<sup>2</sup>, previous macrosomic baby weighing 4.5 kg or above, previous gestational diabetes, family history of diabetes (first-degree relative with diabetes), family origin with a high prevalence of diabetes (e.g, South Asian, black Caribbean, or Middle Eastern). Women with any one of these risk factors should be offered testing for gestational diabetes (NICE, 2008).

Weight in pregnancy continues to be a matter of concern and so forms the main topic in relation to maternal nutrition in this review. Most of the literature cited in the rest of this section was published after the *Maternal and Infant Nutrition Framework*, 2011.

Safe levels of weight gain for obese pregnant women is a topic of debate. There is consensus that overweight/obese women are at increased risk of adverse outcomes for themselves and their foetuses including gestational hypertension, risk of gestational diabetes mellitus (GDM), risk of caesarean section and shoulder dystocia in the baby. In 2013 Furber, et al. stated that 'until the safety of weight loss in obese pregnant women can be established, there can be no practice recommendations for these women to intentionally lose weight during the pregnancy period' (Furber, et al., 2013). Offering greater reassurance, the 2017 surveillance review of the NICE Guideline: *Weight management before, during and after pregnancy* suggested that 'dieting (eating a healthy diet that may lead to weight loss in someone who is overweight or obese) during pregnancy does not lead to harm to the mother or unborn child' (NICE, 2017b). A study of pregnant women in Australia concluded that excessive weight gain in pregnancy is a higher risk factor than pre-pregnancy weight and women may benefit from being given guidance on safe weight gain levels (de Jersey, et al., 2015). Currently, the US Institute of Medicine (IOM) provide guidelines for gestational weight gain but there are no UK recommendations for health professionals or pregnant women in relation to safe weight gain levels. Studies have found that women who were overweight/obese were more likely to gain weight in pregnancy in excess of IOM guidelines (Kaar, et al., 2014; Faucher & Barger, 2015). A systematic review and meta-analysis in 2017 suggested that gaining weight beyond these guidelines presents a higher risk of adverse outcomes for mothers and their babies (Goldstein, et al., 2017; Luke, et al., 2016). These findings were reported in 2017 by the Royal College of Obstetricians & Gynaecologists which noted that 'these findings have relevance in the UK as one in five pregnant women are obese and [they] illustrate the importance of maintaining a healthy lifestyle through a well-balanced diet and exercise before, during and after their pregnancy to reduce associated complications.' (RCOG, 2017).

- **Interventions**

Much of the literature on this topic refers to 'lifestyle' interventions that include both dietary and physical activity elements. This makes it difficult to assess the relative contributions of diet or physical activity alone to weight management in pregnancy.

- **Physical activity**

A Cochrane review in 2015 looked at high-quality evidence and concluded that 'diet or exercise, or both, during pregnancy can reduce the risk of excessive gestational weight gain....Exercise appears to be an important part of controlling weight gain in pregnancy' and that more research is needed to establish safe guidelines (Muktabhant, et al., 2015).

Studies have shown that physical activity in the form of regular exercise is safe in pregnancy (Perales, et al., 2016a; 2016b; Barakat, et al., 2014; Bain,

et al., 2015). Bisson, et al. (2015) reported that a supervised exercise programme for obese women allowed them to maintain fitness and limit weight gain. A review of RCTs in 2015 found that exercise based interventions targeted at weight loss reduced weight gain in pregnancy but did not impact on weight gain postpartum. (Elliott-Sale, et al., 2015). Physical activity has been implicated in lower rates of depression and CVD associated conditions (Perales, 2016b) as well as decreased risk of caesarean delivery (Tinloy, et al., 2014; Muktabhant, et al., 2015) but this was not borne out in all studies: Seneviratne, et al. (2016) found that moderate, non-weight bearing exercise improved fitness but had no impact on clinical outcomes.

- **Diet**

Reporting in 2012, a large study of over 182,000 participants concluded that dietary interventions in pregnancy are the most effective in reducing gestational weight gain (Thangaratinam, et al., 2012).

An evidence review in 2014 (Martin, et al., 2014) reiterated findings from other studies and suggested that dietary interventions were more effective than physical activity. It recommended more research to look at the impact of physical activity on fetal growth and birthweight. One such study in 2016 indicated that interventions providing advice on 'lifestyle changes' can slow the rate of adipose tissue deposited in foetuses compared with standard care (Grivell, et al., 2016).

- **Combined diet & physical activity**

Combined diet and exercise interventions have been shown to reduce excessive weight gain in pregnancy (Bain, et al., 2015) and the risk of preterm birth but not the risk of gestational diabetes mellitus (GDM). The UK UPBEAT trial, which had a study site in Glasgow, ran from 2010-2014 and focussed on preventing GDM in women with a BMI of  $>30 \text{ kg/m}^2$  in early pregnancy. Using a multicentre RCT methodology, participants in the intervention group attended individualised or group sessions with a health trainer where they set SMART goals and were provided with information on diet and exercise, recipes, an activity DVD, and log books to record their weekly goals. The study reported modest lowering of weight gain and fat mass levels but no impact on risk of GDM or insulin sensitivity among participants. Reluctance to participate and attrition rates led authors to conclude that the intervention encouraged healthy dietary and physical activity behaviours but that effectiveness was predicated on individual motivation to change. They also recommended further research on universal testing for GDM among obese pregnant women comparing criteria used by NICE and that of the International Association of Diabetes and Pregnancy Study Groups. (Poston, et al., 2015)

Studies have shown that among women who received healthy lifestyle counselling in pregnancy (including diet and exercise advice) fewer exceeded the IOM guidelines on gestational weight gain than in a control group (Rauh, et al., 2013).

- **Summary – maternal nutrition & weight**

Advice and information for pregnant women to limit gestational weight gain, eat healthily and take the recommended vitamin supplements can impact positively on outcomes for them and their baby's ongoing development.

NICE now recommend that controlled dieting in pregnancy for overweight or obese women is not harmful.

Guidelines for safe levels of weight gain in pregnancy may help women to limit gestational weight gain.

Exercising at safe levels in pregnancy can help obese women retain fitness and limit weight gain but diet and combined diet/physical activity have been shown to be a more effective means of reducing weight gain in pregnancy.

### **3. Infant Feeding & Nutrition**

#### **3.1 Introduction**

Services in relation to infant feeding and nutrition in hospital are influenced by NICE clinical guideline *Postnatal care up to 8 weeks after birth* (NICE, 2014, updated from 2006) and the NICE public health guideline *Maternal and child nutrition* (NICE, 2014, updated from 2008). The clinical guideline outlines the activities professionals should undertake to provide a supportive environment for postnatal women including active support for breastfeeding women and tailored advice and information on formula feeding for those who choose this feeding method. The NICE guideline (2014) covers advice and support from the antenatal period through to the child's early years. Activities in relation to the key priorities recommended in this guideline include: the promotion of the Healthy Start scheme by the provision of tailored information support and advice by health professionals at every opportunity to help address inequalities; delivery of a multifaceted or coordinated programme of interventions to increase breastfeeding rates (including staff training, a clear breastfeeding policy, peer-support initiatives, joint working between professional and peer supporters, education for women and proactive follow-up support); use of well-trained peer supporters as part of a multidisciplinary team who will contact mothers to offer ongoing support within 48 hours of hospital discharge; and encouragement for women at every opportunity (including before and during pregnancy) to take folic acid supplements.

The underlying principle of this section is an acknowledgment of the basic principles outlined in the guidelines and, specifically, the general consensus that human milk contains the best nutritional balance for all babies and, in particular, preterm/low weight babies and/or those with additional medical needs. There are many scientific studies to support this consensus, some of which underpin the recommendations in clinical and public health guidelines and the MINF report of 2011. Findings from these studies, or more recent similar studies, have not been rehearsed in this review. The starting point of the review is the acceptance that – with few exceptions - supporting women to provide human milk by breastfeeding is to support the best start for babies from a nutritional perspective.

### 3.2 Early infant feeding

The NICE guideline *Maternal and child nutrition* (2014) recommends that health professionals and support workers should be trained to provide accurate information on breastfeeding to pregnant women and their partners. Breastfeeding women should be given one-to-one support in hospital where required and, once home, signposted to community based organisations for ongoing support.

A multifaceted approach to interventions in support of breastfeeding should be adopted. Interventions should include peer-supporters and professional workers, operate across different settings and seek to raise awareness of the benefits of breastfeeding and how to overcome barriers to breastfeeding. Support programmes should be structured and subject to external evaluation.

Peer supporters should attend an externally accredited training course in breastfeeding. They should contact mothers within 48 hours of transfer home and offer them individually tailored support either face-to-face, by phone or through local groups.

Breastfeeding women should be shown how to hand express and how to store milk safely.

Women who choose to formula feed should be provided with information by a qualified health professional on how to make up a feed and how to reduce the risk of infection and over- or under-concentrated feeds.

The NHS information website, NHS Choices, reflects the received view that breastfeeding brings benefits to the baby stating that breastfeeding reduces the risk of:

- infections, with fewer visits to hospital as a result
- [diarrhoea and vomiting](#), with fewer visits to hospital as a result
- [sudden infant death syndrome \(SIDS\)](#)
- childhood leukaemia
- [type 2 diabetes](#)
- [obesity](#)
- Cardiovascular disease in adulthood <sup>1</sup>

The NHS position is underpinned by international consensus enshrined in the UNICEF Baby Friendly Initiative (BFI) programme that conforms to recommendations made by the World Health Organisation (WHO). Levels of BFI implementation are high across the UK and all maternity services, community health teams and relevant educational institutions serving NHSGGC have reached either full or Stage 2 (BFI) accreditation.<sup>2</sup> This means that they have put in place an infant feeding policy and a training plan for all staff that is in line with BFI standards and includes ensuring that there is no promotion of breastmilk substitutes, bottles, teats or dummies in any part of the facility or by any of the staff (UNICEF UK, (undated)).

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<sup>1</sup> NHS Choices [ URL: <http://www.nhs.uk/Conditions/pregnancy-and-baby/Pages/benefits-breastfeeding.aspx> Accessed: 26/09/2017]

<sup>2</sup> UNICEF Award Tables [URL: <https://unicefbfi.secure.force.com/Events/Awards> Accessed: 18/09/2017 ]

Recent articles from various countries where the BFI has been implemented acknowledged the positive role of structural support in hospital and community services in relation to the initiation and/or duration of breastfeeding (Baerug, et al., 2016; Perez-Escamilla, et al., 2016; Spaeth, et al., 2017) although the underlying mechanisms by which BFI impacts on 'maternal breastfeeding decisions remains unclear' (Munn, et al., 2016).

BFI recommendations are reflected in the various guidance reviews and practice statements that inform service activity in the UK (Royal College of Midwives, 2012; NICE, 2014, 2015a & 2015b; Royal College of Nursing, 2016; Balogan, et al., 2016; McFadden, et al., 2017; RCPCH, 2017). The need to support women to initiate and sustain breastfeeding is widely accepted as the focus of infant feeding activity among health professionals and health improvement teams. This forms the core of practice around early infant feeding and has been the driving force behind the deployment of resource across the NHS GGC health board alongside the MINF report of 2011.

The literature on infant feeding in the first year of life consulted for this review was dominated by research reports, reviews and articles on breastfeeding. Many lamented low breastfeeding rates, acknowledged the range of influences on feeding decisions, or encouraged the promotion and/or support for breastfeeding as the only healthy infant feeding option in the early months (Schmied, et al., 2011; Laantera, et al., 2011; Kaunonen, et al., 2012; Haroon, et al., 2013; Wong, et al., 2015; Roll & Cheater, 2016; Sriraman & Kellams, 2016). Published research investigating the experiences of mothers who do not initiate breastfeeding has always been relatively sparse (Atchan, et al., 2011) and mothers who formula feed described as an under-represented, understudied population (Tarrant, et al., 2013). This remains the case today. A qualitative study in Tayside (2014), based on interviews and focus groups, reported strong perceptions among women that implementation of the BFI creates pressure on women to breastfeed by focussing less on the needs of mothers than of babies and restricting antenatal discussions about infant feeding. It called for better provision of advice for those who choose not to breastfeed (Lagan, et al., 2014). Similar findings were reported from a maternity staff survey in Greater Glasgow & Clyde in 2013<sup>3</sup> with explanations including low staffing levels and the exigencies of BFI accreditation. These points were echoed again by the Royal College of Midwives in 2014 (Royal College of Midwives, 2014).

Poor access to infant feeding information in general can present an increased risk to babies and this applies to those who are breast or formula fed (Lakshman, et al., 2009, 2014; Battersby, 2010; Tarrant, et al., 2013; Lagan et al, 2014). It was suggested that addressing the support and information needs of women who choose to formula feed should be given greater consideration including practical information, for example on safer equipment (Brown & Magnuson, 2000)<sup>4</sup> and advice on

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<sup>3</sup> Survey findings are reported in internal documents. Please contact the authors of this review for access.

<sup>4</sup> This could include information on equipment and feeding practice based on published evidence (E.g. see Brown & Magnuson, 2000 URL: <http://www.sciencedirect.com/science/article/pii/S016558760000330X> ). For example, there is evidence to suggest that feeding in the supine position and the vacuum created in bottles of standard

sterilisation and formula reconstitution in order to 'ensure optimal health and safety for their infants' (Tarrant, et al., 2013; Lakshman, et al., 2014). This was also recommended in the NICE *Quality Standard for Postnatal Care* (2015b).

The BFI is widely acknowledged as having a positive impact, particularly on breastfeeding. The programme also advises parents that if they choose not to breastfeed then health care professionals will support them in that choice. The UNICEF UK guidance to the BFI standards advises that health professionals should ask if the parents want to be taught how to make up a bottle properly, and should be on hand to answer any questions the parents have during the antenatal and postnatal periods (Unicef UK Baby Friendly Initiative, 2017). The need to acknowledge the different choices women make and deliver services that are equitable and inclusive of all, is clearly stated:

*'The Baby Friendly Initiative [also] advocates for all parents and babies regardless of feeding type by challenging the way in which debates around feeding are framed. All too often, conversations about infant feeding turn to individual judgement and blame, undermining mothers' confidence and ability to seek support. We aim to change the conversation around infant feeding, moving it away from individual mothers and instead recognising it as a major public health issue whereby both bottle feeding and breastfeeding mothers require sustained support at every level to make optimal feeding choices and enable their babies to thrive.'* (UNICEF UK Baby Friendly Initiative, 2017)

The Royal College of Midwives *Pressure Points. Infant Feeding* reported in 2014 that up to a third of final year student midwives had insufficient practical experience to support women who used formula feeding. This was attributed to low midwifery staffing numbers whereby students spend less time on postnatal wards.

Challenges to the 'breast is best' message on clinical grounds do not appear in the scholarly literature although arguments countering some of the relative benefits of breastfeeding have been posed within the context of wider debate, study reviews, or aired in the press and other literature (Lee, 2007a; 2007b; 2011; Wolf, 2007; Groskop, 2013; Colen & Ramey, 2014; BPAS, 2015). The sociological perspective offers a powerful critique describing a cultural backlash to 'breast is best' where women feel judged within a divisive understanding of 'good motherhood' that privileges breast over formula feeding (Lee, 2007, 2011; Wolf, 2010; Andrews & Knaak, 2013; Thomson, et al., 2015). Thomson et al described the negative emotions that frequently accompany infant feeding for both breast and bottle feeding mothers, including feelings of shame, blame, humiliation and guilt (Thomson, et al., 2015). Even within the rigour of scholarly reviews, the latter sentiment was alluded to in qualitative data provided by women who chose to formula feed and those who discontinued breastfeeding.

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design contribute to the risk of otitis media. Use of bottles designed to minimise negative pressure can prevent this. Such bottles are readily available.

- **Structural change – policies**

Part of the rationale for the BFI is the need to challenge barriers to breastfeeding at institutional and policy level. Barriers to breastfeeding include an acknowledged culture of easy access to formula in hospital that is very readily exploited by women when struggling with breastfeeding and by professional staff who support them. The provision of free formula milk in postnatal wards can be seen as systematically undermining intention to breastfeed, condoning formula feeding and failing to ensure that women who formula feed are practised in preparing feeds safely and hygienically.

- **Policy - provision of formula in hospital**

In recent years, a number of hospitals in England have implemented a 'no provision' policy alongside working towards BFI accreditation. In 2010 UNICEF UK published a statement in response to hospitals who linked their policy to the BFI standards making it clear that the requirement for mothers to supply their own infant formula is not, and never has been, part the BFI standards.

*'The standards state only that mothers who have chosen to bottle feed be shown how to prepare a feed correctly before discharge home and that the hospital does not allow any advertising of formula milk, bottles, teats and dummies to parents' (UNICEF, 2010).*

The statement goes on to list 5 potential advantages for mothers and babies as a result of 'no provision' policies including: mothers and staff being more competent at preparing feeds correctly; babies being less likely to face a transition to different bottles and teats at home; undermining the image of easy (free) feeding with bottles; and cost saving to hospitals.

A published paper reported findings from a cohort study in Hong Kong before and after the implementation of a policy to pay full market price for formula in hospitals. After 12-month follow up it noted that rates of exclusive, in-hospital breastfeeding and duration after discharge increased in the post implementation cohort (Tarrant, M, et al., 2015).

Scoping for an internal briefing paper for NHSGGC in 2015 gathered anecdotal evidence from Infant Feeding Advisors and midwives in English hospitals where 'no provision' policies were in operation. They expressed acceptance of the policy and highlighted pros and cons from their experience but breastfeeding figures were either unavailable, showed no positive impact or were not reliable.<sup>5</sup>

Examples of the policy in action in England suggest that non-provision of formula policies can be implemented in different ways. Details of policy implementation can impact on cost, safety and inequalities and should be considered carefully. These issues have been outlined in internal NHSGGC papers.<sup>6</sup>

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<sup>5</sup> Dougall, R, 2015, 'Provision of formula milk in hospital – note on policy and implementation' NHSGGC Briefing Paper (internal). Please contact author for access.

<sup>6</sup> Ibid. See also, NHSGGC Public Health 'Consultation Feedback. Provision of formula milk in maternity hospitals.' (undated – c.2015/16)

- **Policy – the role of infant feeding support**

The NICE (2014) recommended that NHS managers implement structured programmes to support breastfeeding women and so these feature strongly within NHS infant feeding service policies. As a leading support organisation outside the NHS, the National Childbirth Trust (NCT) has a clear focus on the promotion of breastfeeding and supporting breastfeeding women. As such, it is an unlikely place to find a perspective that balances the needs of women who formula feed as well as those who breastfeed. In their article published in 2014, Trickey & Newburn offered a very useful insight into the current landscape and why the promotion of breastfeeding can still feel contentious when striving to provide mothers with balanced information from which to make their choices. Making use of ‘theory of constraints (TOC)’ methodology, they reminded the reader that the overarching goal of supporting a mother/family was to help them enjoy ‘a good infant feeding experience’ and that while this may include breastfeeding it did not necessitate it. They concluded that models of support should include formula as well as breast feeding women and consider approaches that are more mother-centred (Trickey & Newburn, 2014).

Policymakers have a role to play in actively addressing the status quo in services supporting infant feeding. There is strong argument that ‘policy needs to be disentangled from the promotion of a particular orientation towards motherhood and family life’ (Lee, 2011) but this requires a degree of flexibility. In their case study of six health institutions in Quebec, Canada, Groleau et al acknowledged the BFI as the ‘gold standard model of care’ but also the need for flexibility in its implementation and concluded that ‘health institutions aiming to promote and support breastfeeding need to focus on empowering breastfeeding women rather than simply achieving performance-oriented outcomes’ (Groleau, et al., 2016). Reflecting on this and on Trickey & Newburn’s point above, highlights the importance of practical support being led by the women involved and not the goals of hospital or community services. This fits well with services if their aim is to support mothers to a positive and smooth transition into the practicalities of parenthood with more attention paid to ‘the diverse values, meanings and emotions around infant feeding within families’ (Hoddinot, et al., 2012).

- **Neonatal**

Low birth weight is a major determinant of infant mortality and morbidity. It may result from preterm birth (before 37 weeks gestation), poor intrauterine growth or from a combination of the two. Each year in the UK approximately 8,000 babies are born very preterm.

Very preterm/low weight babies are unable to feed on milk. Optimal feeding methods and milk types for preterm babies are still a matter for debate. Human milk (mother’s or donor) has advantages but formula is often given to support the level of growth required. Mother’s milk improves neurodevelopment and decreases the risk of necrotizing enterocolitis (NEC), a severe bowel disease affecting preterm/low weight babies fed with formula, but is associated with lower growth rates. Type of feeding is a clinical decision and not within the scope of this review.

Breastfeeding rates are lower in mothers of preterm/low weight babies but there was evidence to suggest that use of donor milk in neonatal intensive care units (NICU)

'increases breastfeeding rates at discharge for very low birth weight infants' (Bertino, et al., 2013).

- ***Breastfeeding support - General***

*NICE guideline: Maternal and child nutrition* (2008, updated 2014) recommends the delivery of programmes to support the increase of breastfeeding rates that take a multidisciplinary approach and are delivered across settings. They should utilise joint working between health professionals and peer supporters and can include trained volunteers.

Women often encounter problems that lead them to stop breastfeeding earlier than they intend or would like. A Cochrane Collaboration systematic review undertaken in 2017 noted that 'good care and support may help women solve these problems so that they can continue to breastfeed' (McFadden, et al., 2017). It also pointed to a high level of heterogeneity in the studies reviewed where variations in methodology, poorly described definitions of standard care, support interventions and diverse settings meant that the quality of evidence could only be considered as 'moderate'. Nevertheless, it concluded that 'providing women with extra organised support helps them breastfeed their babies for longer' (McFadden, et al., 2017). This echoes research findings more generally that point to the potential improvement in breastfeeding rates through education and counselling support that is delivered concurrently across a range of settings and readily available at point of need.

- ***Pregnancy and the first weeks – initiation***

There is consensus that the intention to breastfeed is largely formed in the antenatal period and that women are influenced in their choice by many concerns 'driven by both moral and personal factors intrinsic to their view of the maternal role' (Roll & Cheater, 2016; Oakley, et al., 2014; Rollins, et al., 2016). Recommendations suggest that women should not be asked directly about feeding intention when pregnant and so a 'stage of change' measurement to assess motivation towards breastfeeding in the antenatal period was tested in a Glasgow setting in 2013 using a short questionnaire before and after a brief and structured infant feeding conversation. It was found to predict initial feeding choice with some accuracy (Dougall, 2014). Intention to breastfeed has been associated with postpartum depression when the intention is not fulfilled (Borra, et al., 2015) and so early identification of intention may be helpful if a targeted approach to supportive interventions is adopted as suggested in a separate Scottish study looking at the relationship between intention and satisfaction. Satisfaction with infant feeding practice was found to be higher when personal goals were ultimately met, whether breast or formula feeding. This was demonstrated using a 13-item questionnaire (based on the theory of behavioural change) to assess intention to breastfeed followed by a 12-item satisfaction tool to match stated intention to experience (Symon, et al., 2013). Women who fed their babies in line with their intention when pregnant had highest satisfaction scores. The lowest satisfaction scores were found among those who intended to breastfeed but did so for less than 3 weeks. A range of problems were cited as reasons for stopping breastfeeding including pain, tiredness, not knowing how much the baby was taking, and lack of support. The same anxieties were expressed by women who sustained breastfeeding for longer but who kept going due to what they described as 'sheer determination and perseverance'.

(Symon et al, 2013) Women who didn't breastfeed (or did so for less than three weeks) were generally younger and women who lived with parents were more likely to formula feed from the start. The association between intention and satisfaction was explored further in a study of the ARCS (Attention, Relevance, Confidence, Satisfaction) design model (Stockdale, et al., 2014). In an effort to align women's motivation and expectation in pregnancy with their postnatal experience and sense of achievement, an education/support programme conceived 'common problems' as 'mastery-orientated goals'. The idea was to shift understanding away from 'performance-orientated goal structures' where encountering breastfeeding problems was experienced as failure or inability to reach the goal. Instead, during pregnancy, difficulties were presented as 'normal challenges' and overcoming them associated with learning and mastery. In this model, difficulty and challenge were seen as normal, motivation to overcome them was high and the resulting perception of success was more likely to result in continued breastfeeding. Although the study was small, authors reported a significant increase in breastfeeding rates at discharge where the ARCS approach to breastfeeding education had been adopted (Stockdale, et al., 2014).

The level of support from family and peers is one of the factors women cite when deciding how they will feed their baby and the views of partners are increasingly recognised as influential (Atchan et al, 2011; Sherrif & Hall, 2011; Feldman-Winter, 2013; Negin, et al., 2016; Radzaminski & Callister, 2016; Namir, et al., 2017). The positive impact of familial influence is mixed and study quality is low but there is some evidence to suggest that the ability of grandmothers and fathers to support the breastfeeding choice can be achieved by brief training and discussion, if they already view breastfeeding as beneficial. In their systematic review Kaunonen et al found that where fathers had completed a 2-hour course this had a positive impact on initiation of breastfeeding – though not necessarily duration – and suggested that breastfeeding education for partners and grandmothers should form part of parenting support programmes (Kaunonen, et al., 2012).

Improved education, knowledge and support for women, beginning in the antenatal period and aimed at increasing initiation rates, featured in several studies but reviews of the evidence were not consistent. Peer support in pregnancy and postpartum (commonly delivered 1-1) was found to increase initiation in hospital but not duration beyond 6 weeks postpartum (Kaunonen, et al., 2012). A Cochrane review of studies looking at telephone support in pregnancy and the first six weeks postpartum found inconsistent results in relation to increased initiation although there was some evidence that it may increase breastfeeding duration (Lavender et al, 2013).

A more recent systematic review of 24 studies (10,056 women) in high-income countries (including the UK) concluded that education and support in pregnancy to encourage the initiation and duration of breastfeeding had no positive effect (Lumbiganon et al, 2016). A separate review published in the same year looked more promising. It included interventions for promoting initiation delivered in pregnancy - or before the first breastfeed – and included promotional campaigns and counselling delivered in formal settings or in support groups. The review found some evidence of improved breastfeeding initiation for two conditions compared to standard care: 1) breastfeeding education and support delivered by healthcare

professionals (doctors/nurses/midwives) and 2) similar intervention delivered by non-healthcare professionals (trained volunteers). It concluded that education delivered by doctors and nurses and counselling and peer support delivered by trained volunteers improved the number of women who began breastfeeding their babies. However, authors acknowledged that the quality of the evidence was low due to variation in interventions and poorly defined variations in standard care (Balogan, et al., 2016).

A systematic review and meta-analysis published in 2017 suggested that community-based peer support (including 1-1 antenatal and postnatal contacts, home visits and in one study, telephone contacts) increased initiation of breastfeeding within the first hour of life and decreased the risk of prelacteal feeding. A positive impact on duration of breastfeeding was also found but this was much reduced in high-income countries such as the UK and did not apply in the one Scottish study included in the analysis. It offered the view that in Scotland, the fact that formula is easy to access and regarded as the socially acceptable norm may contribute to lack of effect of peer support (Shakya, et al., 2017).

The work of Kaunonen (2012) suggested that 'postnatal support was not effective, if no support existed during pregnancy or hospitalisation'. To maximise effectiveness, professionals and peers should be educated together using the same materials and they should adopt a facilitative style. Their input should be combined in a programme to provide continuous support from pregnancy through to weaning (Kaunonen, et al., 2012; Sinha, et al., 2015).

- **Postnatal - duration**

The received health message promotes exclusive breastfeeding (EBF) for the first 6 months of life but evidence for interventions to promote and improve exclusive breastfeeding in high-income countries is inconsistent (Skouteris, et al., 2014).

Interventions to increase the duration of breastfeeding should provide an 'authentic presence' by developing good trusting relationships, support that is appropriate for individual women's needs and a 'facilitative style' focused on working in partnership, being realistic and putting woman in control of decision-making. (Schmied, 2011). This will resonate with many midwives, health visitors and others who already take this approach in practice but service planning must also take the variation in women's support needs into account (Rozga, 2014). If it is to maximise effectiveness, support must be appropriate, timely and accessible. This suggests that combined approaches may be required offering support at different times, by different people and in different forms.

- **Peer support**

The positive impact of peer support for breastfeeding is not consistent. The detail included in published findings varies especially around definitions of what constitutes a 'peer', descriptions of the model of their deployment (e.g. their place within a professional team) and the type of intervention they provide.

An evidence review of the impact of breastfeeding support in 2013 noted that extra support to women (defined broadly to include support provided by volunteers or professionals as well as organisational measures such as staff training) was more

likely to have a positive effect if it was tailored to women's needs, offered proactively, delivered face-to-face on a scheduled basis and operated in a setting with high initiation rates (Renfrew, et al., 2012 cited in Thomson & Trickey, 2013). A systematic review looking at studies of peer support (defined as that offered by someone with personal experience of breastfeeding or from the same locality or ethnic or socio-economic background, working either as a paid or volunteer supporter) indicated lower positive impact in high-income countries and that it was ineffective in the UK (Jolly, et al. 2012a): and concluded that universal antenatal and postnatal peer support did not improve duration to six months in the UK (Jolly, et al., 2012b cited in Thomson & Trickey, 2013).

A study among low-income women in the US showed the impact of peer counselling through combined telephone and face-to-face home visits, and concluded that effectiveness was reduced if the optimal contacts for individual women were not reached. Here, the term 'optimal' was not fixed because the balance of home visit and phone contacts was generally related to feeding duration postpartum: for example, those who sustained breastfeeding for one month were more likely to have more home visits while those who continued to 6 months benefitted as much from phone contacts in the later weeks because the counsellor/client relationship had been established.

Although ultimately inconclusive, a systematic review showed that both group and individual professional antenatal education had some effect on extending breastfeeding duration and exclusivity for 'vulnerable' groups but had no impact on more educated women (Wong, et al., 2015). Using logistic regression of survey data, Oakley et al acknowledged the multiple influences on women's decisions to discontinue breastfeeding and concluded that support by non-health professionals (peer support) helped prevent cessation in the early days (up to 10 days) and that support through attending baby cafes and using specialist clinics was associated with continuation to 6 weeks (Oakley, et al., 2014). This highlights the broader point that support needs to be accessible and delivered appropriately. (Schmied, et al., 2011; Rozga, 2014; Wong, 2015)

Variations in findings reflect an inherent heterogeneity in the nature and delivery of support for breastfeeding as well as the population of women involved in studies. This lends force to the argument that a 'realistic evaluation' approach to breastfeeding support studies that is focussed on 'context-mechanism-outcome' may offer a better understanding of what works (Thomson & Trickey, 2013).

- **Scottish support models<sup>7</sup>**

In 2011 the Scottish Government *Maternal and Infant Nutrition Framework* recommended that 'accredited breastfeeding peer support programmes will be provided in all NHS Board areas. These should be modelled on a nationally agreed framework and be supervised by an appropriately trained and experienced practitioner.' Programmes were to be offered to women before and after birth alongside ante and postnatal support. A nationally agreed framework for peer support was not progressed. However, there is learning to be gained from the

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<sup>7</sup> These reports are internal, unpublished documents. Please contact the authors of this review for further information.

models tried out in various health board areas. The following summaries are based on available reports of peer support projects from five areas: Dundee; Lanarkshire; Highland; East Renfrewshire and Greater Glasgow & Clyde. In each case, further details would be required to assess the quality of the findings but the summaries provide an indication of models tested in the Scottish context in the last ten years.

- 1) In Dundee (2006) seven breastfeeding support workers provided advice and support to women resident within areas of high deprivation. The first contact was during pregnancy (around 28 weeks) with further visits in hospital and in the mothers' homes up to the first 6 weeks after birth. It is unclear whether visits were requested by mothers or provided routinely. Breastfeeding rates were seen to improve significantly with 60% of women still breastfeeding at 6-8 weeks (NHS Tayside, 2006).
- 2) In Lanarkshire (2010) a small team of breastfeeding support workers (BSW) was formed. The workers were drawn from volunteer community mothers and employed at AfC Band 2 (hospital) or Band 3 (community). Their role was to assist midwives and public health nurses in providing information to pregnant women and targeted support and advice to new mothers by developing an individualised plan of care for every woman who had initiated breastfeeding. This was delivered post-partum and immediately following discharge from hospital. Most additional support was given when babies were less than 10 days although a quarter of babies were 2-6 weeks old. The breastfeeding support team in hospital saw an increase in initiation and duration to time of discharge although no improvement at 6-8 weeks (Mavor et al., 2011).
- 3) An Early Years Collaborative (EYC) test of change in Highland Council (2016-17) region funded a service similar to that in the Lanarkshire study and aimed to enhance the midwifery/health visiting handover at 10-14 days. The report of findings claims a resulting increase in breastfeeding rates but the figures supplied do not substantiate this. Further evaluation is currently being undertaken (Mackay & Huc, 2016).
- 4) An East Renfrewshire study (2016-17) was aimed at increasing duration of breastfeeding. A single health care support worker (HCSW) and health visitors made first visits jointly at 10-14 days followed up by HCSW home visits/contacts (3 in week 3 decreasing to 2 from week 4 to week 6). The HCSW was also present at the local weekly Baby Cafe. In this study, participant numbers were very small and too low to assess impact on breastfeeding (Dean, 2017).
- 5) In 2011, a project to test peer support for breastfeeding in all areas of NHSGGC was implemented. Centrally based recruiters contacted all pregnant women at booking clinics to offer information about breastfeeding and Healthy Start. A further offer of peer support after delivery was made and women could opt out at that point. All women who did not opt out were followed up at 30 weeks gestation and after delivery. This was an ambitious project as the small team of Recruiters were responsible for mentoring all voluntary peer supporters. This was very time-consuming and so many fewer

supporters than anticipated were available to deliver the service. Data collection proved cumbersome and time consuming for local area staff. The combination of these factors resulted in poor data quality and compromised the ability to draw conclusions about the effectiveness of the service (NHS Greater Glasgow & Clyde, 2011).

- **Scottish model - professional-led support**

Information was available about a sixth support model tried in Scotland in 2012-13. This was not a peer support model but offered support from dedicated professional staff. A support structure was initiated in one NHSGGC maternity hospital and delivered by five infant feeding advisers (all were trained midwives or health visitors). The intervention aimed to improve women's ability to make informed infant feeding decisions and to improve rates of exclusive breastfeeding at hospital discharge, HV first visit and at 6-8 weeks. It comprised four parts: a 1-1 interview (at 20 weeks gestation) with a project midwife to discuss aspects of parenthood, including infant nutrition; an additional antenatal class, 1-1 support in the postnatal ward and follow-up support in the community if required. There was an increase in initiation and exclusive breastfeeding at discharge that was likely to be attributable to the project. However, data quality was poor due to varied completion across the community health partnership (CHP) areas and this undermined reliability of findings (Dougall, 2014). Qualitative evidence from mothers suggested that the level of support provided contributed to longer duration of breastfeeding. The shift away from breastfeeding was commonly due to the impact of physical feeding problems rather than a considered feeding choice. Women often felt unprepared for the realities of breastfeeding and how to respond to difficulties, even when continued support was available. The overall impression was that while the service model addressed common feeding problems and supported women to persist more confidently with breastfeeding, it did not adequately prepare women nor did it equip them, to overcome common difficulties in the longer term (i.e. after discharge and into the first month or two of their baby's life). The key aspects that women identified as supportive included: information and advice during antenatal period that confronts the difficulties of breastfeeding; early postnatal contact (before hospital discharge); and consistent advice across maternity, community and primary care services.

Staff were generally appreciative of the role played by dedicated breastfeeding support staff: it reduced regular midwives' workload while still offering quality care to mothers, and the presence of staff with specialist breastfeeding knowledge had some positive impact on maternity staff members' understanding of feeding issues. However, there were mixed views on who should deliver breastfeeding support. Some felt that this should only be given by professional staff who are experienced and able to help resolve complex problems while others felt that peer/lay supporters can be trained to a level that offers mothers the support they need (Dougall, 2014).

- **Breast pumps**

In the past, milk expression was practised mainly to support the growth of unwell or pre-term babies. It is now more widely practised among mothers of healthy babies for a variety of reasons. Evidence suggested that the limited time professionals have to engage with women in the effective use of breast pumps rendered the pumps less useful compared to 'social supports, such as education from classes or support groups and friends or relatives' that demonstrated positive associations with longer

breastfeeding duration (Feldman-Winter, 2013; Chen, et al., 2012). A systematic review looked at the prevalence and outcomes of expressing breast milk amongst mothers of healthy term infants but findings were inconclusive. A range of reasons for expressing milk were outlined such as being able to see how much milk the baby receives, allowing others to feed the baby or being able to return to work. Feeding outcomes, when examined, were contradictory and expressing milk has been construed both as potentially beneficial or detrimental to breastfeeding continuation. The outcomes, when examined, were contradictory (Johns, et al., 2013).

- **Mixed feeding**

Mixed breast/formula feeding rates have increased in Scotland over the last ten years. The slight increase in the proportion of babies being breastfed by the time of their health visitor first visit<sup>8</sup> coupled with a slight decrease in the proportion receiving breastmilk only (exclusive breastfeeding), is said to reflect an increase in the proportion receiving mixed breast and formula feeding. This pattern is echoed in Greater Glasgow and Clyde. These national and local figures suggest that mixed feeding is becoming an increasingly popular choice with considerable variation in the amount of formula milk given (ISD, 2017; Dean, 2017). In a systematic review, Still, et al, (2016) explored how this affects accepted definitions of EBF and concluded that professionals should have a clear and agreed understanding of the term 'exclusive breast feeding' in order to communicate it accurately to mothers (Still et al, 2016).

Searches produced scant evidence focused on the health benefits or risks of mixed breast/formula feeding in countries with developed economies or educational or support interventions for mixed feeding. A published commentary in support of promoting exclusive breast feeding noted that 'while research has demonstrated differences in the intestinal micro-biome and body growth between exclusively breast versus exclusively formula-fed infants, very little is known about the effects of introducing formula to breastfed infants either briefly or long term on these health outcomes' (O'Sullivan, et al., 2015).

Studies in recent years sometimes included participants who practiced mixed feeding but discussions tended to focus on results for those exclusively breast-fed (EBF) while combining those who were mixed and formula fed as one. A Scottish study looking at a risk of hospitalisation reported in this way but included data for mixed feeding in their published statistics: these suggested that the risk of hospitalisation for mixed-fed babies, compared to EBF babies as the reference standard, was slightly lower than that of exclusively formula fed babies for most conditions, suggesting something akin to a dose response (Ajetunmobi et al, 2015).

- **Workplaces**

Support for employees who are breastfeeding was discussed in the literature but was more of an issue in countries with lower levels of maternity leave (e.g. USA) and where equipment (e.g. breast pumps) was more costly. Evidence suggests that workplaces that provide options such as on-site childcare, lactation breaks for expressing and/or breastfeeding foster longer term breast milk feeding.

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<sup>8</sup> Among babies born in Scotland in 2015/16, 49.3% were receiving breast milk at first Health visitor visit..

### 3.3 Summary - Infant feeding and nutrition

- **Summary - neonatal**

The use of donor milk in neonatal intensive care units (NICU) can increase breastfeeding rates at discharge for very low birth weight infants.

- **Summary - infant feeding**

Mothers can often benefit from support in relation to feeding their baby and so this stage is an early opportunity to build good relationships with mothers/families that may pay dividends when offering advice at later stages (such as weaning and family nutrition in general).

Women's decisions on how to feed their baby are influenced by the views of family, friends, and professionals and are taken against a complex cultural background. Decisions are not taken lightly, are often emotional and perceived as value-laden. Women can feel pressure to defend their feeding choices as part of creating the family environment that works for them.

The fundamental aim of infant feeding support should be to help all mothers/families to feel positive and become confident in feeding their infant regardless of feeding choice.

- **Summary - infant feeding support**

Interventions to support infant feeding in the early days and weeks are focussed on breastfeeding.

Antenatal feeding intentions are indicative of early feeding practice. Breastfeeding interventions may be more effective if focussed on those who express an early intention to feed but are unlikely to make any difference for mothers who have expressed negative attitudes to breastfeeding from the antenatal period.

Postnatal support in hospital whether opportunistic or in response to emerging difficulties can improve rates of breastfeeding at birth and discharge. There is less evidence that community based support alone extends breastfeeding duration. One model that followed up antenatal and postnatal support in hospital with home visits saw an increase at 6-8 weeks.

Evidence to support the effectiveness of peer support is mixed. Some models of peer support tested in Scotland showed promising results.

Evidence from the literature and learning from local models suggest that the most effective, evidence-based strategy is a combination of health professional and trained volunteer delivering support to women from the antenatal period through hospital stay and into the postnatal weeks at home.

- **Summary - mixed feeding**

Mixed feeding is increasing in NHSGGC suggesting that more women want their baby to receive some breast milk. While acknowledging that exclusive breast feeding is nutritionally the best option for babies, the literature does not offer a clear

qualification of the risks to health for babies in the UK from combined formula and breast feeding compared to exclusive breast or formula feeding. Professionals should have a clear understanding of the term 'exclusive breast feeding' in order to communicate it accurately to mothers.

- **Summary - breast pumps**

Although the use of breast pumps is said to be increasing, there is little evidence for their effectiveness in extending the duration of breastfeeding. Evidence is mostly from the USA.

If funding is an issue then local evaluation of their use and impact should be considered to inform decisions.

## 4. Nutrition and Healthy Weight in Children

### 4.1 Introduction

NICE *Maternal and Child Nutrition quality standard* (2015) outlines the importance of introducing babies to a variety of nutritious foods to compliment breast or formula milks in order to establish a nutritionally adequate and varied diet when milk is no longer given. Discussions regarding starting solid food should be considered at 6-8 weeks advising introduction around 6 months. Encouragement for families to eat together and not to leave infants alone to eat or drink is highlighted in the 2008 NICE *Maternal and Child Nutrition* guideline.

The quality of family diet and eating practices is implicated in concerns over rising adult and childhood obesity. In 2010, obesity in Scotland was described as having 'reached epidemic proportions with around two thirds of adults and one third of children being overweight or obese'.<sup>9</sup> A SIGN guideline *Management of Obesity*, was published that year. It recommended that a treatment programme for managing childhood obesity should incorporate behaviour change components, be family based and involve at least one parent/carer with a view to changing the whole family's lifestyle. The programmes should aim to reduce overall dietary energy intake, increase levels of physical activity and decrease time spent in sedentary behaviours (e.g. screen time) and should last for 6 months. It also recommended that children with obesity-related morbidity requiring weight loss and children with a suspected underlying condition causing obesity should be referred to hospital or specialist paediatric services in the first instance. To help tackle the growing prevalence of obesity the Scottish Government have set HEAT targets for weight interventions since 2008 and published the *Obesity Route Map* in 2010 followed by a related Action Plan in 2011. The *Obesity Route Map* was reviewed in 2015 and recommended taking a full life course approach, addressing the needs of young people and prioritising early years. Local action should be led by the Director of Public Health and include senior leadership from all local partnerships.

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<sup>9</sup> SIGN *Management of obesity* URL: <http://www.sign.ac.uk/sign-115-management-of-obesity.html>  
Accessed: 21 May 2018

The review proposed that if food and physical activity are to have an effective role in managing weight and preventing overweight and obesity, it must not be assumed that this will be achieved as a by-product of interventions aimed at improving health more generally.

Recognising the impact of inequalities the review pointed to the relationship between behaviours and the wider environment. Societal factors and determinants of health were recognised with their complex inter-relationships described as the 'obesogenic environment'. It recommended that opportunities should be created for a coordinated approach within communities using co-production and asset-based approaches.

Complementing the Scottish guidance, a NICE public health guideline *Weight management: lifestyle services for overweight or obese children and young people* was produced in 2013. This concurred with SIGN (2010) as regards the core components of weight management programmes and recommended that they should be age appropriate and take account of different cultural backgrounds and specific individual needs. They should be available as part of a community-wide, multi-agency approach and include the option of groups with individual support where necessary. All those who work with children should be aware of the need to take action, raise the issue or refer to services where healthy weight is compromised.

Despite the concerns expressed in guidelines since 2010 there has been a significant decline in the prevalence of the risk of obesity in children between 2014 (17%) and 2016 (14%), representing a return to the lowest recorded rate of 14% in 1998. At 29%, the proportion of children at risk of being overweight (including obesity) in 2016 was similar to previous years (Scottish Government, 2016).

- ***Establishing healthy family diet***

Nutrition in the early years of life is a major determinant of growth and development and it also influences adult health. The benefits of a healthy diet in the early years are widely accepted and can help to establish healthy eating habits that persist into later childhood and adulthood. For example, there is some evidence that if infants are exposed to fruit and vegetables early this leads to better acceptance of these foods later (Barends, et al., 2013; Coulthard, et al., 2014). Further evidence from a longitudinal study of a large sample of children/parents in the UK suggested that children introduced to home-cooked fruit and vegetables more often at 6 months are more likely to continue eating a higher proportion of them at 7 years of age (Coulthard, et al., 2010). It is therefore important to inform parents/carers on the timely introduction of appropriate foods and how best to provide a healthy and nutritious diet for their families. Information on healthy diet for infants is available to families in various forms and at various points: in pregnancy and early postnatal period women are informed about the benefits of breastfeeding and safe formula feeding, babies' weight and growth are recorded in the early days and professionally endorsed information and advice is available from health professionals and online. Midwives and health visitors are asked to discuss nutrition and diet in home visits and they remain key sources for parents although it is difficult to assess the quality of information given in one-to-one encounters. Guidance for professionals is provided in *Maternal and child nutrition. Public health guideline* (NICE, 2014) and a range of

professionally produced, national resources are available for families (e.g. *Ready Steady Baby*; *Fun First Foods*).

Interventions, as opposed to routine advice and information, are generally in response to difficulties or risks identified either by professionals or families themselves. Issues tend to focus on concerns over weight faltering in the first year, the introduction of complementary feeding, or overweight in babies and young children.

- ***Faltering growth***

The term 'faltering growth' is used to describe a pattern of slower weight gain than expected for age and sex in infants and preschool children. In the absence of an underlying health condition, faltering growth is commonly due to inadequate nutritional provision/intake. NICE guideline *Faltering growth: recognition and management of faltering growth in children* (2017c) suggests that initial interventions should include strategies to increase energy intake and advice on managing feeding and eating behaviours (Gonzalez-Viana, et al., 2017) .

If infants lose more than 10% of their birth weight in the early days or weeks of life, a clinical assessment should be undertaken and observed feeding should be considered to ensure that feeding practice is effective. Where babies fail to thrive in the early weeks, mothers should be supported to continue breastfeeding even if supplementary formula is required to help growth. For babies and infants, interventions should provide advice on healthy foods, encourage a relaxed approach to meals and mealtimes and advise on diets to include appropriate foods that provide the required levels of energy and nutrient density (NICE, 2017c).

- ***Complimentary feeding / Weaning***

Weaning is a topic of concern to mothers and questions relating to it appear regularly and often in postings on websites aimed at mothers of young children (e.g. netmums.com). A recommendation to delay weaning to 6 months was introduced in the UK in 2003: by 2010 the national *Infant Feeding Survey* reported that the average age of starting solids had increased and the proportion of infants starting solids before 4 months had dropped markedly. This trend continued and the 2017 *Infant Feeding Survey* showed that 96% of respondents reported waiting until their infant was at least four months old before introducing complementary foods, with 46% waiting until six months or later. Only 3% of respondents reported introducing solid foods before their baby was four months old. This demonstrates the effectiveness of clear consistent advice on this topic (McAndrew, et al., 2012). Knowledge does not ensure compliance as seen in an online survey of 1,348 first time mothers in the UK (2012) where delayed weaning was lower than the reportedly high levels of knowledge of guidelines in relation to weaning. It reported that mothers sought advice from a variety of sources including family, professionals and websites. Formal sources of information (such as professionals and health related websites) were associated with delayed weaning: poor understanding of guidelines and young maternal age were predictors of early weaning (Moore, et al., 2012).

The recommendation to delay weaning until 6 months is not upheld consistently by all staff groups. The British Dietetic Association (BDA), whose current guidance informs the practice of professional dietitians, cites 'little evidence that

complementary feeding before 6 months is harmful' (BDA, 2013) and recommends that weaning should begin no earlier than 4 months and no later than 6 months (BDA, 2013; 2016). A recently prepared report (currently in draft) by the Scientific Advisory Committee on Nutrition (SACN), while acknowledging that some babies may be developmentally ready before 6 months and that earlier weaning is influenced by many 'valid personal, social and economic reasons', concluded emphatically, that weaning to solid foods should not begin until around 6 months (SACN, 2017). SACN represents an authoritative voice and so the message that around 6 months is the healthiest time to begin weaning is likely to prevail on publication of its final report.

'Baby-led' weaning – the practice of responding to baby's feeding cues - is explained in public health literature and websites aimed at mothers and is now practised by many families. In baby-led weaning, babies are presented with 'whole' foods to explore and try at their leisure as opposed to being spoon fed purees. There is some evidence to suggest that this approach 'may lead to positive health outcomes' (Rapley, 2015) including less 'food fussiness' (Taylor, et al., 2017). This may be because advice around the baby-led approach encourages less reliance on commercially prepared purees. Pureed foods, whether home-cooked or commercially prepared, do not encourage chewing and swallowing and so, while they are more convenient in some respects, they undermine a baby-led approach to weaning. Commercially prepared purees are often recommended by the producers as suitable for babies of 4 months but they are notably sweet and portrayed as 'poor value for money' in some expert public information literature (see for example, (First Steps Nutrition Trust, 2017a; 2017b). Although most have an energy content similar to breast milk, a review of their nutritional content concluded that they are not as high in nutritional value and 'would not serve the intended purpose of enhancing the nutrient density and diversity of taste and texture in infants' diets' (Garcia, et al., 2013).

- **Overweight**

Childhood overweight is a public health issue and there is concern that for some children this will set them on a path of lifelong overweight/obesity. The prevalence of overweight and obesity increases with age and a child with a high BMI at one year or beyond is likely to remain obese for at least the next few years. However, being overweight for many will be reversible: not all children who are identified as overweight in the early years or at primary one school age, will become an overweight or obese teenager, although overweight and obese young people are more likely to become overweight adults.

Identification of overweight in the early years is based solely on weight gain. This can identify children who may go on to become normal weight in due course and so suggests that intervention, as a public health approach to prevent obesity, is likely to be ineffective or inappropriate. However, raising the issue of weight as part of routine enquiry and providing ongoing weight monitoring and infant feeding advice as part of universal support services is key to helping families establish a healthy diet in the early years as well as identifying babies who are 'overfed'.

Guidelines recommend a targeted approach for those identified as obese, the need for a skilled workforce, and increased access to interventions. Recommendations

include the provision of age appropriate, lifestyle weight management services and that these should be available as part of a community-wide, multi-agency approach to promoting a healthy weight and preventing and managing obesity (SIGN, 2010; NICE, 2013; Kerr, 2015).

A number of cross sectional studies suggested preschool aged children spent considerable proportions of the waking day in sedentary activities (sitting, lying, or being restrained in car seats or pushchairs) and limited time being physically active (Vale, et al., 2010; Reilly, et al., 2004; Goldfield, et al., 2012). In 2013, a small study monitoring the physical activity and motor skills of 4-year olds concluded that physical activity is critical to the development of fundamental motor skills in the early years (Livonen, et al., 2013) and a review of studies found positive outcomes in relation to levels of adiposity, improved bone health, development in terms of better agility and balance, better cardio-metabolic health and improved psychosocial health and behaviour but no evidence on the optimal frequency and duration of physical activity (Timmons, et al., 2012). An evidence review in 2013 noted that active children are less likely to suffer the adverse health consequences of physical inactivity in adulthood and recommended that evidence based interventions to promote activity should be targeted at children in the early years (Jones, et al., 2013).

A growing area of research highlights the positive effects of physical activity on cognitive development for early years, mainly in terms of language development and executive function. One review cited seven published studies where physical activity was shown to have significant beneficial effects. In one example, 67% of the cognitive development outcomes assessed were in the executive function domain and 60% in the language domain (Carson, et al., 2016).

- ***Interventions re early year – nutrition, healthy weight and physical activity***

- > **Nutrition**

- Interventions to modify parental feeding practices tend to be aimed at encouraging weaning at an appropriate time, improving the nutritional content of infant diets and reducing the risk of excessive weight gain in infancy. Their success has not been consistent (Schroeder, 2015; Overby, et al., 2017; Taylor et al, 2017). An Australian RCT, the *NOURISH* trial, provided six fortnightly parent education and peer support group sessions to deliver anticipatory feeding guidance to parents of babies at 4-7 months and 13-16 months, followed by six months of regular maintenance contact. Findings suggested that this can positively influence protective feeding practices that may, in turn, reduce the risk of later obesity (Daniels, et al., 2012; Daniels, et al., 2014). However, a trial in New Zealand providing additional education and support to mothers of babies (0-24 months) did not improve nutritional behaviours when the children were aged two (Fangupo, et al., 2015). In 2015, evidence of an intervention to encourage breastfeeding duration and delayed weaning to 6 months found 'it had no impact on growth or prevalence of overweight at age 4 to 7 years' (Schwartz, et al., 2015). An RCT of a similar intervention delivered by trained community nurses during the antenatal period and at 7 further points (until children were aged 24 months) in families' homes, found that this was effective in reducing mean BMI for the intervention children at aged two (Wen, et al., 2012).

A systematic review looking at the association between types of food used during the complimentary feeding period and the risk of childhood overweight or obesity yielded very inconsistent findings. It was unable to offer a robust conclusion as to the relationship between high energy intake in the first year and obesity in childhood. However, the review offered a clearer perspective on the benefits of developing healthy diets within families as a whole, noting that the weaning period (within a child's first 12 months) is important, not so much in itself but to establish healthy dietary habits for later childhood. It emphasised the benefits of a balanced diet throughout childhood and concluded that adherence to (UK) dietary guidelines during infancy may represent a greater likelihood of a healthy family diet, and growth of lean mass (as opposed to fat mass). It recommended that research focuses on fat/lean mass as well as BMI when investigating diet and the risk of childhood obesity (Pearce & Langley-Evans, 2013). The evidence supporting interventions to impact on children's BMI is poor but there is some evidence to suggest that early educational interventions by health professionals and regular follow-up contact improves maternal knowledge and confidence around family nutrition (Scheiwe, et al., 2010; Schroeder, et al., 2015).

In NHS GGC, the evaluation of weaning fayres has shown limited reach with one quarter to one third of those eligible/invited to participate actually attending and an average attendance of 22 adults across 150 events. Data collected from two areas where sessions were delivered in 2016/17 showed that 51% and 73% participants (respectively) were from areas with overall higher levels of deprivation (SIMD 1 or SIMD 2). Note: there are some caveats in relation to this data – see original document.<sup>10</sup>

There is no robust data on the effectiveness of NHSGGC weaning fayres as they are currently delivered.

#### > **Healthy weight and physical activity**

Although there is growing evidence to show the positive health impact of maintaining a healthy weight in the early years of childhood, there is limited evidence to support recommending physical activity interventions as an isolated intervention strategy for overweight pre-school children.

The UK guideline “Start active, stay active” (2011) recommended the encouragement of physical activity from birth making use of floor-based play and water environments, physical activity for around 3 hours across the day and a minimising of sedentary time for pre-school children (Department of Health, 2011).

Physical activity is associated with healthy weight and this can be encouraged in babies, for example as ‘tummy time’. An RCT with first time mothers from areas of socioeconomic deprivation in Sydney, Australia looked at a home-based early intervention delivered by trained community nurses. It showed significant improvements in some infant feeding practices and resulted in earlier daily practice of ‘tummy time’ (Wen, et al., 2011; Wen, et al., 2012).

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<sup>10</sup> Weaning Fayre’ SBAR. (no date) NHSGGC internal document – please contact authors of this review for further detail.

NICE guidelines on weight management (2013) provide guidance on how to develop and implement programmes and provide a structure for the engagement of participants. Recommendations include the provision of lifestyle weight management within age appropriate services as part of a community-wide, multi-agency approach to promoting healthy weight, preventing and managing obesity. Group based interventions are further recommended with the added provision of individual support where necessary. It is also recommended that all health professionals and/or other organisations who work with children and young people are aware of the need to take action, raise the issue and signpost or refer to services (NICE, 2013).

- **Summary – complementary feeding, diet & exercise**

In Scotland, higher levels of delayed weaning have been seen in recent years. Delayed weaning to 6 months is more likely among women who seek information and advice from professional-led sources.

The development of a healthy balanced diet in families is an important factor in risk of childhood obesity. The weaning stage is a good opportunity to promote whole family nutritional advice that can influence longer term family feeding practices (i.e. weaning practice *per se* need not be seen as the ultimate goal).

The forthcoming New Universal Pathway (NUP) means that all women will have several more contacts with their health visiting team. While intensive interventions may not be replicable during these contacts, they provide more opportunities for individualised advice and information about weaning and family nutrition.

‘Weaning fayres’ are not universally attended but reach a fair proportion of families in areas of high deprivation who may be less likely to access professionally endorsed advice elsewhere. The ‘weaning fayre’ model should reflect up to date evidence relating to the baby-led approach. Further research into the effectiveness of weaning fayres is advised.

The development of a healthy balanced diet in families is an important factor in risk of childhood obesity. Inappropriate complementary feeding and level of physical activity are implicated in early risk of overweight/obesity in childhood and later years. All health professionals should be aware of risk factors for obesity and know how to signpost to age-appropriate services.

## **5. Training**

### **5.1 Maternity Services**

Previous sections of this review have identified areas of potential tension between current practice and recommendations for change arising from evidence reviews. One example is the seemingly conflicting need to strengthen and increase the exclusive breastfeeding message while ensuring an equitable, patient centred approach to all women in relation to their infant feeding decisions. This is not to challenge the ‘breast is best’ message but rather to consider the impact it has on

equity of service and the psyche of new mothers, alongside the limited time resource available to midwives and understandings of how best to implement the BFI to achieve and sustain accreditation status. The literature has identified the need for improved messages in preparing new parents for the realities of being parents to new-born and infants. While this is not new to midwives and early years staff, it may require a slight shift in approach. A review of training to meet these demands may be beneficial.

In 2012, a study of preregistration midwifery education in the UK (including Scottish educational institutions) identified knowledge of the public health role as a gap in education, training and in practice. While acknowledging the tension between the individualised approach to midwifery care and the overarching concerns of public health at population level, it highlighted the 'need to capitalise on the opportunity [for midwives] to deliver evidence based public health interventions' and that training should encourage midwives to understand public health concepts and to see it as a 'core to the philosophy of care' (McNeill, et al., 2012).

With specific reference to weight management Brown & Flint (2013) recommended that midwives and other healthcare professionals would benefit from training and sufficient resources in order to empower them with the knowledge and skills needed to effectively communicate and support women within the limited time and resources they have. As overweight and obesity prevalence is high amongst the NHSGGC population, including pregnant women, there may be benefit in developing recommendations in relation to gestational weight gain, as suggested in the literature. Heslehurst et al (2015) concluded that women are not averse to weight management intervention during and after pregnancy but such interventions need to be well communicated and offer constructive, individualised advice and support. To ensure the most effective delivery this would require training for midwifery staff. (Heslehurst, et al., 2015)

A survey in Tayside including 241 midwives explored current practices and midwives views on future weight management approaches (MacLeod, et al., 2012). It identified that confidence in discussing weight management and knowledge of the subject was low. In a qualitative study, Heslehurst, et al., (2013) interviewed 46 community and hospital based midwives and found that issues relating to obesity communication were commonly expressed and recommended a systematic approach to training. The report of a pre & post design, feasibility study described how a health board in Wales developed and delivered a compact training package for midwives comprising evidence-based advice on nutrition, physical activity and weight management in pregnancy (Basu, et al., 2014). The training was positively received by midwives who found it relevant to midwifery practice. It was shown to improve midwives self-reported knowledge and confidence.

There is an acknowledged need for midwives to be educated on how to deliver motivationally-designed, theoretically-informed instruction. This approach was supported by an Australian study that looked at women's experiences of being overweight and pregnant. It concluded "women are at different stages on a 'continuum of change', and midwives need to be cognisant of opportunities for motivating women in relation to exercise and diet even though pregnant" (Mills, et al., 2013).

Wahedi (2016) conducted a literature review and found that many midwives lack the knowledge and interpersonal competence to address psychological well being and would benefit from person-centred counselling techniques. Foster & Hirst (2014) conducted a small survey amongst 9 midwives exploring their attitudes to weight related advice to obese pregnant women and recommended that the midwives need to address personal issues related to body image and develop effective communication techniques. Heslehurst, et al. (2013) concluded that midwives required further training on effective obesity communication and management but also recognised that there are challenges to midwives' engagement regarding professional development on a systematic scale.

## 5.2 Early years staff

A scoping exercise was undertaken by the MINF Pre 5 group in conjunction with the Infant Feeding Advisor, Growth & Nutrition Service and with representation from Dietetic services. With reference to the health visiting New Universal Pathway (NUP) guidance document, the group assessed the current training for the NUP looking at the core issues of interest. They found that many of the proposed aspects to be covered during home visits already featured in existing training opportunities including those delivered by the Infant Feeding Advisor and the Growth & Nutrition Service but they also identified gaps. These related to the introduction of solid foods, physical activity and weight management.

## 5.3 Summary – training

The training requirements identified for the maternity and early years workforce primarily relate to the adoption of a patient centred approach, utilising enhanced communication, motivational communication skills and tailoring ongoing support throughout the points of contact. Professionals should feel equipped to: strengthen and increase the exclusive breastfeeding message while ensuring an equitable, patient centred approach to all women in relation to their infant feeding decisions; and to prepare new parents for the realities of being parents to new-born and infants. There is a substantial lack of awareness and focus on weight management advice and associated topics particularly physical activity. Staff knowledge should be around physical activity and weight management messages for women before, during and after pregnancy should be included in training.

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