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Evidence Check

Review of effective strategies to promote breastfeeding

An **Evidence Check** rapid review brokered by the Sax Institute for the Department of Health. May 2018

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Executive summary

Purpose of the Evidence Check

Babies who are not breastfed, and women who don't breastfeed, are at an increased chance of many health risks in both the short and long term, including in high-income countries such as Australia.[1, 2] Studies in countries such as the US, Britain and Australia have also shown that the economic and health treatment costs of prevailing low rates of breastfeeding are high. Globally, interventions to support breastfeeding are among the most effective and cost-effective childbirth and postnatal interventions for reducing maternal and newborn morbidity and mortality. The health importance of breastfeeding for both mother and infant has been used to support viewing breastfeeding as a human right of the mother–child dyad.[3, 4]

The purpose of this review is to provide evidence that indicates the effectiveness of key strategies for an enduring Australian National Breastfeeding Strategy (ANBS-E). This is undertaken through a review of academic and grey literature during a period of 10 years (2007–2017).

The global public health recommendation of the World Health Organization (WHO) is that infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Thereafter, to meet their evolving nutritional requirements, infants and young children should receive nutritionally adequate and safe complementary foods while breastfeeding continues until up to two years of age or beyond.[5] In Australia, national dietary guidelines recommend that infants are exclusively breastfed until about six months of age, when solid foods are introduced, and that breastfeeding is continued until 12 months of age and beyond, for as long as the mother and child desire.[6]

However, only about one in 10 Australian children are breastfed according to national dietary guidelines, and only about one in 20 meet WHO optimal breastfeeding recommendations. Virtually all children (92%–96%) in Australia initiated breastfeeding in 2010–11, but one in three received non-human milk or formula before one month of age.[3] Median duration of breastfeeding is less than 7–9 months, though 60% of babies still breastfeed at six months of age. About 18% of mothers continue to breastfeed their child beyond 12 months, and 7% are still breastfed at 19–24 months. However, the gap between the most disadvantaged and least disadvantaged families has widened.[7]

At the end of 2015, the Australian Health Ministers' Advisory Council (AHMAC) requested that the Department of Health develop a high-level enduring breastfeeding strategy. The previous Australian National Breastfeeding Strategy (ANBS) 2010–2015 was a recommendation from a 2007 Senate inquiry that reported on the health benefits of breastfeeding. During consultations by the Department in 2017, stakeholders identified key strategies for the enduring Australian National Breastfeeding Strategy (ANBS-E). Potential ANBS-E strategies to be covered in this review included:

- Public awareness and acceptance campaigns
- Restriction of advertising of infant formulas, including full implementation of the WHO International Code of Marketing Breastmilk Substitutes and subsequent World Health Assembly (WHA) resolutions
- Antenatal and postnatal education and support
- The Baby Friendly Health Initiative (BFHI), previously called the Baby Friendly Hospital Initiative
- Training of health practitioners (general practitioners, midwives, nurses, pharmacists, dietitians, students, etc.) on the benefits of breastfeeding and providing support for mothers who choose to breastfeed
- Influence of support person/people

- Culturally sensitive and appropriate interactions/communication
- Continuity of care, referral pathways and support networks
- Targeted/specialist breastfeeding support services
- Peer support programs
- Influence of returning to work and access to childcare
- Any other additional strategies that have been proven to increase breastfeeding identified during the review process.

Evidence Check questions

The review aimed to address the following questions agreed with the Australian Department of Health:

Question 1:

What does the literature report on the effectiveness of strategies to influence optimal infant and young child feeding (IYCF) practices in OECD countries?

Question 2:

What does the literature report on whether the effectiveness of these strategies differs for specific population groups?

Strategies were broadly defined as any single or multi-component intervention aimed at promoting, supporting and/or increasing breastfeeding rates in a specified target population. Intervention outcomes of interest included breastfeeding initiation, exclusivity and duration, namely:

- Reducing exposure to non-human milk and foods < 6 months
- Increasing exposure to any breastfeeding > 6 months.

Optimal breastfeeding is defined as breastfeeding within one hour of birth, exclusive breastfeeding for the first six months of life, and continued breastfeeding beyond six months and at least up to two years of age or more with the introduction of nutritionally adequate and safe complementary foods.[8]

Key findings

Question 1: What does the literature report on the effectiveness of strategies to influence optimal infant and young child feeding (IYCF) practices in OECD countries?

Breastfeeding is a modifiable behaviour, and a range of feasible and effective strategies are available to Australian governments to increase the practice of breastfeeding. Being a biocultural behaviour, breastfeeding is influenced in complex ways by its social and economic context, as well as by opportunities and barriers to its practice in specific settings, and by the social or other characteristics of individuals. Cultural norms and IYCF practices can also be influenced by institutional rules and practices, such as whether breastmilk is socially valued as part of the national food system, how infant growth is monitored, or by health authority guidelines indicating social norms on breastfeeding duration or avoidance.

Hence, some strategies are directed at changing cultural and social norms about infant and young child (IYC) feeding, while others focus on individual women, their families or health workers in health system, workplace or other settings. How to design national strategies to improve complex biocultural behaviours is increasingly researched within a 'complex adaptive systems' framework.[9] The emphasis in recent literature is turning towards 'scaling up' effective interventions to the system level including in the context of sustainable development goals for promoting early childhood development through nurturing care.[10] Without wide-scale as well as targeted and coordinated implementation to ensure benefits flow to marginalised groups, interventions to promote breastfeeding may end up enabling some mothers but in the process may widen health inequalities. Essential to strategies for improving breastfeeding are factors such

as political will, legislation and policy, and funding and resources.[11] Also identified as crucial elements are effective advocacy (including social mobilisation); improving quality coverage of training and program delivery; national breastfeeding promotion and public awareness programs; and research, evaluation and monitoring systems.

This Evidence Check examined the relevant literature between 2007 and 2017, using several search strategies and systematic screening strategies, focusing on countries or settings that provided relevant evidence for Australia. Most of the systematic reviews and randomised controlled trial (RCT) studies that were identified were of interventions conducted in health systems and services. A small number of systematic reviews considered interventions delivered more widely in home and family, community, work or policy environments, or in a combination of settings, referred to as 'enabling policies'. Enabling policies address barriers to breastfeeding in the cultural, social and economic policy environment, and may be considered a precondition for effective program interventions.[12] Few systematic review or RCT studies were available for strategies or interventions for socially at-risk women and children, such as young, low socioeconomic status, incarcerated, or Indigenous Australian mothers.

Improving the environment for breastfeeding

Enabling policies

In the literature reviewed, integrated, coordinated strategies were found to work better than uncoordinated single interventions because of the need to maximise beneficial synergies between components. For example, a recent major systematic review confirmed the validity of what is known as the 'Breastfeeding Gear' model.[13] This 'complex adaptive systems' approach involved strategies that protected, promoted and supported breastfeeding throughout a life-stage continuum from pre-pregnancy to birth, the postnatal period and childhood, and in multiple settings (such as outpatient services, clinics and other health facilities). Effective strategies involved, for example, increasing community awareness regarding breastfeeding, hospital or health-system support through the BFHI approach, and home and family support through counselling. Counselling by peers or health personnel, baby friendly hospital support and community mobilisation were identified as key interventions for promoting optimal breastfeeding practices. Similarly, a recently published systematic review by Graziose and colleagues[4] found that when in-person nutrition education was combined with mass media, participants generally reported greater improvements in breast and complementary feeding practices, whereas in three studies where mass media was the only approach, there were no significant improvements in IYCF practices.

More efficient use of economic resources, and stronger incentives

Economic studies show there can be substantial cost savings from improving suboptimal breastfeeding practices. This points to the potential feasibility and benefits of financing ANBS-E from anticipated health cost savings. For example, the 2009–2010 value of the lifetime cost of treating maternal breast cancer attributable to low breastfeeding rates in Britain has been estimated at £959 million[14], while in Australia the hospitalisation costs of treating acute infectious illness associated with premature cessation of exclusive breastfeeding were previously estimated at $60 million to $100 million annually.[15, 16] On the other hand, such fiscal savings rely on women making substantial time investments in breastfeeding, which may have adverse effects on gender pay gaps and economic inequalities.[17-19] Extending Australia's paid maternity leave benefits to align with exclusive and continued breastfeeding recommendations would follow a proven strategy for increasing breastfeeding duration and health equity, and also improve gender equality.[20]

There are few identified cost-effectiveness studies of breastfeeding interventions in Organisation for Economic Co-operation and Development (OECD) countries. Most such studies investigate the cost consequences of interventions to increase human milk feeding or breastfeeding among socially or medically at-risk infants. In Britain, recent studies support the cost-effectiveness of proactive and reactive calls to

mothers living in disadvantaged areas, and for enhanced lactation support in in neonatal intensive care units (NICUs) for low-birthweight infants.[19, 21]

Studies from other areas of public health and nutrition, such as tobacco control or food systems, can inform choices about cost-effective approaches to increasing breastfeeding. For example, financial incentives are emerging as an effective strategy for encouraging health-related behaviours (such as smoking cessation among pregnant women). Research published in 2017 shows that offering financial incentives has potential to improve breastfeeding practices. For example, experimental studies in the US and Britain offered low-income women small cash inducements for continuing breastfeeding to certain time points, and showed that altering price incentives can increase breastfeeding, as well as reduce smoking.[22, 23]

Taxes can also alter prices and financial incentives, and help finance supportive programs for low-income households. In Australia, any future reforms to remove Goods and Services Tax (GST) exemptions for food (including commercial IYC food products) would reduce existing financial incentives for using commercial packaged baby food products and improve incentives for continued breastfeeding supplemented with home-prepared meals. Additional GST revenues could be earmarked to fund ANBS-E programs for low-income households.

The literature also provided examples of effective reforms to health institution incentives. For example, a study in Hong Kong of a change in hospital policy to pay retail price for milk formula supplies significantly increased breastfeeding rates.[24] Breastfeeding initiation within the first hour increased and in-hospital exclusive breastfeeding rates more than doubled.

Economic incentives for maternal employment participation are also important, but are considered separately under ANBS-E Strategy 3 below.

A summary of how proposed Strategies might improve the broader environment for breastfeeding or apply in specific settings is provided below. The literature on each of the proposed ANBS-E strategies is reported in numerical order in the report, but below they are summarised in a general way and not necessarily in sequence.

ANBS-E Strategies 1–2: Marketing influences on socio-cultural norms

Momentum is increasing globally to better align human rights instruments and corporate conduct through clarifying the scope and responsibilities under the WHO International Code, improving transparency, and developing constructive engagement between civil society and business to improve compliance, monitoring and enforcement.[25] A 2013 rapid evidence review commissioned by WHO's Western Pacific Regional Office (WPRO) found exposure to advertising to be similar before and after self-regulations were implemented.[26]

Media and advertising influence socio-cultural norms, which shape IYCF decision-making, and such marketing is known to be well resourced by manufacturers and distributers of commercial IYC food products. Studies show that both social and commercial marketing interventions can influence IYCF practices, though with contrasting results for optimal breastfeeding. Industry marketing strategies are intended to favourably influence caregiver and health-worker attitudes towards the use of commercial IYC food products, in practice motivating higher sales of breastmilk substitutes and reducing breastfeeding. On the other hand, social marketing campaigns (such as a South Australian campaign that targeted negative cultural attitudes to breastfeeding in public, or social mobilisation to challenge the sexualisation of breasts) are effective in raising community awareness of breastfeeding's importance.[27, 28] However, governments find social marketing campaigns too costly to sustain within their more limited budgets. Effective public regulation of food marketing may therefore be less costly than funding social marketing campaigns directed at redressing the commercial marketing that creates difficulties for breastfeeding. The literature, including cross-country experience documented in expert reviews, suggests there are significant implementation challenges to regulating food marketing that targets early childhood. Nevertheless, where legislated,

monitored and enforced, measures to constrain industry marketing activities that undermine optimal IYCF decision-making are effective. Such strategies may include comprehensive legislation or other legal measures reflecting WHO International Code provisions. For example, making all IYC food products intended for use for children over one year of age 'designated products'; banning the use of nutrition and health claims on such products; prohibiting their public advertising and promotion; and prohibiting the provision of free or low-cost supplies to health facilities, or giving financial or material benefits to health workers or their family members. Policy measures such as paid parental leave (PPL) also reduce caregiver vulnerability to commercial marketing of breastmilk substitute by reducing maternal–child separation and time pressures on families. This also strengthens the salience of breastfeeding promotion and social marketing messages.

ANBS-E Strategy 3: Influence of returning to work and access to childcare

Maternal–infant separation is highly disruptive to breastfeeding initiation, exclusivity and continuation. BFHI Step 5 includes showing mothers how to maintain lactation if they are separated from their infant, but such circumstances extend outside the hospital. They may include temporary separation in disaster and emergency events, such as during the Christchurch earthquake in New Zealand.[29] A recent report in South Australia also points to the applicability of such quality standards of care for all birthing dyads as a support for human rights where the mother is incarcerated.[30] Here the opportunity for ongoing breastfeeding may be denied due to institutional policy, or lack of prison nursery access.[31] More commonly, learning skills and techniques to manage separation from the infant during the breastfeeding period is relevant for mothers of infants working outside the home. This highlights that Step 5 helps avoid early separation and supplementation in health facilities, but other approaches are needed to avoid and manage separation in other settings post-discharge (see *ANBS-E Strategy 10: Other strategies* below).

In Australia, several studies have shown shorter and less exclusive breastfeeding duration among mothers employed during the first 12 months postnatally.[32-34] The type of childcare used also affects breastfeeding, with parental care associated with higher breastfeeding rates of about 10% among employed parents of infants aged four-to-12 months after adjusting for job characteristics.[35] A recent systematic review[8] found interventions in US work settings, such as a lactation space or work breaks, improved breastfeeding outcomes. Employer acceptance is also evident, including in an evaluation of a South Australian breastfeeding support program implementing the Breastfeeding Friendly Workplace (BFW) package of workplace support interventions (workplace policy, facilities and time flexibilities) delivered by the Australian Breastfeeding Association.[36]

However, programs in individual workplaces cannot be relied on to provide equitable access to breastfeeding support for employed women, because the most at-risk mothers, confronted by multiple barriers to breastfeeding, may be less likely to be employed in the breastfeeding-friendly and supportive work settings and occupations evaluated in such studies. There is strong evidence from diverse country settings and systematic reviews and experimental studies that longer duration of paid maternity leave increases breastfeeding duration and maternal health. Employment policies ensuring access to suitable and flexible hours of employment also enable longer breastfeeding, including exclusive breastfeeding. A 2017 *Lancet* Early Childhood Development Series study on scaling up support for early childhood development cited the need for policies that afford families time and financial resources to provide crucial 'nurturing care' for young children. Globally, effective policies to promote early childhood development include paid parental leave and breastfeeding breaks at work.[37-39]

Breastfeeding of infants or young children is likely to be higher in childcare settings where there are specific and active support strategies in place. However, such strategies are not widely implemented in most countries, including in Australian childcare services, and cannot be relied on by policy to provide equitable

access to breastfeeding education and support. Nor will interventions in these settings provide sufficient support to at-risk mothers and children.

ANBS-E Strategy 10: Other strategies

During emergency and disaster events all infants and young children are particularly at risk for suboptimal feeding. Policy formulation and wider implementation of IYCF-Emergency guidelines will facilitate best practice responses to protect women and support their capacity to breastfeed in safety. Among the lessons learnt from recent experience of IYCF in emergencies in Australia and other countries is the need to formulate suitable policies before such events occur, and to ensure wide dissemination and communication of IYCF-E guidelines. These will include ensuring access to formula for those infants who need it, while protecting breastfeeding and encouraging relactation and/or wet nursing where appropriate.[40, 41] Specific IYCF-E training of relevant agency personnel will also promote best practice responses in the field.

Another issue for consideration during formulation of the ANBS-E is the (re-)emerging practice of milk sharing or cross-nursing. US and Australian studies suggest milk sharing may be motivated by mothers wanting to help other mothers who are temporarily or permanently unable to breastfeed, or tiding mothers over breastfeeding difficulties. No systematic review or experimental evidence was available on how milk sharing or cross-nursing affected breastfeeding outcomes. Like milk banking, milk sharing has the potential to displace as well as support breastfeeding, and is less advantageous to the recipient mother's health than maternal breastfeeding. The Academy of Breastfeeding Medicine recently issued milk-sharing guidelines to inform health professionals providing advice to mothers considering cross-nursing or milk sharing.[42] These acknowledge the potential contribution of the practice as an intervention to support breastfeeding, but discourage 'internet-based' milk sharing, and provide information to assist the hygienic handling and storage of milk.

ANBS-E Strategies 4–7: BFHI and quality standards in healthcare systems

Biologically and physiologically, mothers and newborns are primed to breastfeed, but a variety of barriers create difficulties for innate behaviours in contemporary healthcare systems. The UNICEF/WHO Baby Friendly Hospital Initiative (BFHI) is a quality-of-care intervention based on the evidence-based Ten Steps to Successful Breastfeeding. Each step addresses an organisational or clinical practice within the hospital system: from creating organisation-wide breastfeeding policies and practices that are disseminated to all staff, through to individualised support that addresses pregnant, birthing and postnatal women and babies' needs and culminating in a seamless transition into community services. Individually and more so in combination, these Ten Steps reduce such barriers and create a more enabling environment in which a mother–baby dyad can establish breastfeeding and lactation. The recent WHO guideline reports a formal review of 22 systematic reviews that confirmed the importance of key management and clinical practices ('steps'), such as early skin to skin contact, support from adequately trained and skilled health workers, and avoidance of unnecessary supplementation.[43] Institutional compliance with the WHO International Code has also been identified as a crucial management practice in a 2018 WHO guidance document on BFHI.[44]

There is a substantial literature base establishing that quality of care practices to support breastfeeding in maternal and newborn care facilities based on the BFHI Ten Steps program are effective. The research identified in this Evidence Check also shows that if more of the Ten Steps are implemented, improvements in breastfeeding are greater. Foundational evidence for the effectiveness of the BFHI Ten Steps was provided by a major cluster randomised trial in Belarus involving more than 17,000 children, which found a seven-fold increase in exclusive breastfeeding at four months among children born in hospitals implementing an intervention package based on the BFHI Ten Steps.[45]

There is also a growing literature, mainly based in the US, that shows BFHI implementation may be more effective if enacted comprehensively, through accreditation systems. BFHI care practices may require full integration into health systems and health professional educational curriculum. Integration will ensure that:

- Access is equitable
- It does not reinforce social disadvantage and vulnerability
- It does not widen existing inequalities in opportunities for breastfeeding and optimal women's and children's health.

An important BFHI Step is health worker education and training. Experience in implementing BFHI globally has been that in-service staff training costs are an important impediment to its wider implementation. There is some limited US evidence that improved pre-service education curriculum for health professionals coming into contact with breastfeeding dyads can be effective.[46] In-service training of health workers such as through the WHO UNICEF BFHI package is shown to improve their skills and knowledge to support breastfeeding effectively, though it is not clear which training packages are most effective in improving breastfeeding outcomes.[18, 47, 48]

There has been considerable interest and expansion in donor milk banking (DMB), including as an element of the BFHI focused specifically on neonatal intensive care units (NICUs). The use of human milk (HM), provided by the baby's own mother or a donor, in healthcare settings where breastfeeding is delayed or prevented, and provision of specialised lactation support, are likely to be both effective and cost-effective interventions for at risk infants and mothers in healthcare settings. However, there remain concerns that DMB can compete with resources for lactation support and may displace provision of mothers' own milk (MOM) or breastfeeding. Studies from the US and Europe show use of donor milk (DM) rather than MOM is expensive and reduces the cost-effectiveness of enhanced staff contact to support HM feeding in NICUs.[49, 50] Conversely, NICU interventions to optimise maternal lactation improve the economics of exclusive HM feeding of vulnerable infants. A US study documented the substantial maternal time costs of providing milk for vulnerable infants.[51] This highlighted that providing the care and practical support needed to sustain mothers' efforts is crucial in order that expansion of DMB replaces commercial formula in NICUs, rather than MOM or demotivating a transition to maternal breastfeeding.

ANBS-Strategy 12: Continuity of care and referral to support networks

Strategies to promote continuity of care and referral to support networks based in healthcare settings (BHFI Step 10) are reported by WHO (2017) to be supported only by weak evidence. Low rates of exclusive breastfeeding (< 6 months) also suggest that post-discharge planning and referral to professional or peer breastfeeding support is inadequate. Evidence on the effectiveness of health visitors is also mixed. Nevertheless, exclusive breastfeeding at four months was improved by a motivational interviewing approach to breastfeeding support delivered in an Australian primary care (GP) setting, where specific training was provided to a practice nurse.[52]

ANBS-E Strategy 7: Education and support

Recent research confirms numerous systematic reviews over the past decade showing that breastfeeding education, counselling and support are effective interventions, especially if extending well into the postnatal period and combining professional with lay support. Evidence from the most recent comprehensive systematic reviews highlights that additional education or support for mothers of any kind within the healthcare system, compared with usual care, increases the likelihood of breastfeeding by at least 10%, but this can be higher — up to 30% in some settings. Interventions that include peer counselling are more effective than those without peer counselling. Studies also confirm face-to-face care is more effective than other contact, including printed materials. Interventions involving technology as an adjunct to other postnatal support have recently been found to increase exclusive breastfeeding.[53]

ANBS-E Strategy 8: Breastfeeding peer counselling

Interpretation of academic studies on peer counselling is complicated by the diversity of real-world settings for such support, and varying definitions of what it involves.[53, 54] Hence, this Evidence Check distinguished health system-initiated peer support programs from breastfeeding peer counsellor support such as that delivered by the Australian Breastfeeding Association (ABA). Such community-based breastfeeding peer counselling support is well established as improving breastfeeding duration and exclusive breastfeeding, particularly in countries where substantial training is provided for peer counsellors to achieve core competencies, such as in Australia.[55] A 2010 Australian systematic review led by Hector concluded there was overwhelmingly strong evidence that peer counselling is effective in improving all aspects of breastfeeding.[53] Peer counselling may be less effective in preventing premature weaning in countries where breastfeeding is not the cultural norm, where commercial milk formula is affordable and pervasively marketed, and where women commonly rely on healthcare providers for information and support on breastfeeding challenges. A 2012 evaluation of the national telephone helpline operated by trained ABA volunteer breastfeeding counsellors found high levels of satisfaction among callers and reports of improved breastfeeding experiences. The service was cost-effective from the health funder perspective, but there was no evaluation of the sustainability and long-term impact of this service delivery model.[54]

ANBS-E Strategy 9: Influence of support person/people

This Evidence Check identified interventions that improve social support for breastfeeding. For example, a focus on involving fathers in breastfeeding education may be effective for some demographic groups.[56, 57] Education and training that equipped and motivated grandmothers to support the breastfeeding self-efficacy of their teenage daughters was effective in increasing breastfeeding in an urban Thai community.[56] An Australian study also showed mothers were more likely to cease breastfeeding if they attended a support group with low breastfeeding norms.

Question 2: What does the literature report on whether the effectiveness of these strategies differs for specific population groups?

Some socially or medically at-risk population groups, such as indigenous or young mothers, those from socially disadvantaged or low-education backgrounds, or mothers and babies with certain medical or health issues (premature or low-birthweight babies, caesarean section, maternal obesity, smokers, drug and alcohol use), have a distinctly lower prevalence of breastfeeding. The health gains from improving opportunities for breastfeeding may be especially important for such women and children. A human rights framework is increasingly used to develop public policy or institutional responses to addressing these health inequalities.

The Evidence Check did not find any studies suggesting that the effectiveness of the above strategies differs among specific population groups. However, a number of studies show some such mothers can face multiple and interacting barriers that can make optimal breastfeeding particularly difficult. They may also face disparities in the quality of care they are offered, or differential access to support including based on race, ethnicity or geographic location. Evidence from high and middle-income countries with indigenous populations, including Australia, indicates specific barriers to optimal feeding for these groups.

Improving breastfeeding opportunities and outcomes for such at-risk populations may require more intensive, enhanced or specialised support of the kind identified above. This support can be tailored to their particular needs, social and health characteristics, or institutional context. However, improving breastfeeding opportunities and practices for these mothers and their young children may require changes to public or institutional policies, or procedures and practices, and not be limited to interventions targeting individual women.

Apart from such enabling policies, ANBS-E strategies of particular relevance to at-risk groups include ANBS-E Strategy 6: Targeted/specialist breastfeeding support services, and ANBS-E Strategy 11: Culturally sensitive and appropriate interactions/communication.

Examples of settings and circumstances or useful policy changes include:

- Facilitating breastfeeding among medically at-risk mothers such as obese mothers, those with particular health conditions, or those whose breastfeeding is affected by obstetric or childbirth complications, including premature, epidural or caesarean section deliveries
- Regulatory, education and training, and clinical interventions are available that may assist mothers or their support persons who are considering using medications or undergoing treatments or procedures that are known to adversely affect breastfeeding
- Strategies or interventions supporting optimal feeding of at-risk infants such as preterm infants or twins, or those affected by maternal drug or alcohol abuse (neonatal abstinence syndrome (NAS))[57]
- In matriarchal cultural groups such as Indigenous Australians and some Asian cultures engaging maternal elders will facilitate breastfeeding support[53, 55]
- For some demographic groups, a focus on involving fathers in breastfeeding education may be effective.[58, 59]

Gaps in the evidence

There are many unaddressed knowledge gaps on breastfeeding interventions. A selection of key areas for further research is outlined, covering, in particular, policies for enabling environments and addressing structural barriers, interventions in particular settings, and at-risk populations.

Discussion and limitations

In line with the project proposal and draft protocol and changes agreed with the client, this Evidence Check has identified 110 systematic reviews or reviews of reviews, RCTs and comparable quality key papers from the published peer-reviewed studies and grey literature, with 430 studies identified and summarised to inform our report on evidence answering the research questions.

The approach to compiling evidence with such wide scope and complexity included searches through several relevant databases combined with a systematic process for identifying and filtering the literature. It summarises and synthesises a large and diverse literature and confirms there is evidence for a range of strategies or interventions, in varied settings and targeting diverse populations, which can be effective in improving breastfeeding by 10%–30%.

The review has limitations arising from the fact that it has been designed and conducted with a very wide scope and within a very short time frame. It is tailored for the Australian policy environment. The review used a systematic approach to peer-reviewed academic literature, which was mostly relevant to interventions in health settings, but, where necessary, included grey literature for lesser-studied interventions at the system level, or for high-risk populations.

As a result, this Evidence Check uses a balance of a priori and pragmatic, iterative approaches to locating studies relevant to the research questions. This strategy was informed by an overarching interdisciplinary conceptual framework from the social sciences and public health, which helped to organise the interventions and data on their effectiveness. The scope of the study was wide, with heterogeneous interventions used alone or combination, in a variety of settings, for healthy mothers and babies (Q1) and at-risk groups (Q2).

Several relevant systematic reviews provided information on the effectiveness of interventions within health settings, targeting healthy mothers and babies. Systematic review evidence on effective interventions such

as in workplace settings is also available, although existing research may not cover the diversity of workplaces and occupations in which women are employed. However, for other interventions, including enabling policies and those targeting some at-risk populations, systematic reviews are not available so we used evidence from individual studies and reports.

More broadly, it should be noted that a limitation of any review is that it can only identify research that has been undertaken. Interference with natural breastfeeding physiology and behaviours can arise from conventional clinical and social practices. As a consequence, an 'intervention' is often a modification or removal of these disruptive practices. In contrast, research is rarely undertaken on what makes the home, community or healthcare environment naturally friendly to breastfeeding. These gaps in research on what facilitates breastfeeding are likely to provide answers as to what all mothers and children need to optimally breastfeed, in line with their mammalian blueprint.

To meet the required time frame and wide scope of this Evidence Check with the resources available, it was necessary for quality assessment to rest on study design and expert judgement, rather than on detailed analysis of included study methodologies. It was also necessary to prepare the report based on less detailed data extraction and analysis than in a systematic review. The depth of analysis and critical review was also necessarily reduced, in the interests of achieving a wide scope, timeliness and policy relevance, particularly to identify what works for the most at-risk population subgroups.

Mothers and babies in socially at-risk groups may be in most need of support for breastfeeding, but in reality have the least opportunity to breastfeed. They are most likely to be left out of strategy formulation; as systematic reviews for the most relevant interventions are least likely to be identified in easily accessible online databases of peer-reviewed literature.

The Evidence Check found no studies that showed the effectiveness of the above strategies for improving optimal infant and young child feeding, including breastfeeding, differs for specific population groups, despite their lower prevalence of breastfeeding. Such population groups face multiple social or other barriers to optimal breastfeeding. Improving breastfeeding opportunities and influencing breastfeeding outcomes for these at-risk groups of mothers and children may require improved access or more intensive, or additional or specialised support addressing particular settings or circumstances, or may require changes to public or institutional policies or procedures and practices.

Conclusion

Breastfeeding practices can be improved through a range of proven interventions in health settings. The BFHI Ten Steps approach is central to strategies for increased breastfeeding rates. However, only modest improvements can be expected without a more enabling systematic approach that ensures wide access to maternity care practices and other policies that protect, support and promote breastfeeding. Employment, workplace and childcare strategies are also important, as are policies and programs addressing marketing and social marketing influences on cultural norms and attitudes to breastfeeding. With suitable policies, annual increases in exclusive breastfeeding of 1% or more are demonstrably achievable.[60]

Exclusive and extended breastfeeding has not been widely practised in Australia, and there has been little improvement in breastfeeding duration since the 1990s. Achieving large gains in optimal breastfeeding will require more broad-based strategies including addressing the structural determinants of premature cessation of optimal breastfeeding. Regular collection and publication of key data on breastfeeding practices is needed to reinforce its relevance and underpin effective strategies, including to maintain and generate the focus and commitment of policy makers facing conflicting policy objectives.

Organisations such as the World Bank now recognise that investments in breastfeeding can demonstrate high economic payoffs in terms of health system savings and economic productivity.[14] Achieving WHO recommended levels of breastfeeding in Australia would represent a more than doubling of the national

supply of human milk, and potential for substantial health cost savings.[61, 62] Such a scenario requires proactive, innovative and 'joined up' strategies[2], including to scale up and coordinate health system interventions with wider strategies to change the wider social environment. It could also involve changing social norms on the value of breastfeeding by counting it as part of the food system. It would also require specific investments to support mothers to breastfeed in difficult circumstances. Without changing the broader environment for breastfeeding, interventions may improve breastfeeding opportunities for some, but worsen rather than improve social inequities in health for those facing multiple barriers to breastfeeding.

Background

The purpose of this review is to provide evidence that indicates the effectiveness of key strategies identified by stakeholders for the enduring Breastfeeding Strategy. The review was prepared for the Preventive Health Policy branch of the Department of Health and associated stakeholder groups, including the Breastfeeding Expert Reference Group and the Breastfeeding Jurisdictional Officers Group, to inform the breastfeeding policy agendas of Australian governments.

Evidence shows babies who are not breastfed, and mothers who don't breastfeed, are at an increased chance of many health risks in both the short and long term.[1] It is well established that breastfeeding is relevant to the health and mortality of mothers and children in high (HIC) as well as middle and low income (LMIC) country settings. There are a number of well documented improved health outcomes associated with following breastfeeding recommendations. These include lowered risk of respiratory and gut infections, otitis media and type 1 diabetes.[6,7] Inversely, there is a heightened risk of breast cancer and SIDS among mothers and infants who wean from breastfeeding prematurely.[1, 2]

Interventions to support breastfeeding are among the key childbirth and postnatal interventions that have a beneficial impact on maternal and newborn outcomes.[63] A global study of evidence-based interventions during the postnatal period found early initiation and continued breastfeeding were among the interventions associated with a decrease in maternal and neonatal morbidity and mortality.

The WHO/UNICEF Global Strategy for Infant and Young Child Feeding (GSIYCF) states: *"as a global public health recommendation, infants should be exclusively breastfed for the first 6 months of life to achieve optimal growth, development and health.[3] Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to 2 years of age or beyond."* The GSIYCF recommends *"the widest possible use of indigenous foodstuff"*, so that complementary foods are readily available and affordable, while industrially processed complementary foods should be considered *"an option for some mothers who have the means to buy them and the knowledge and facilities to prepare and feed them safely"*. As well as being timely, complementary foods should be adequate, meaning that they should be given in amounts, frequency, consistency and using a variety of foods, to cover the nutritional needs of the growing child while maintaining breastfeeding.[64]

Breastfeeding practices in Australia

There was little change in breastfeeding initiation and duration in Australia between 1995 and 2004–05, and the gap between the most disadvantaged and least disadvantaged families widened considerably.[6] While breastfeeding initiation in Australia is currently high, exclusivity is very low, and duration of both exclusive and any breastfeeding is short. In 2004–05, breastfeeding initiation was 87.8%, and the proportions of infants breastfeeding at six and 12 months were 50.4% and 23.3%, respectively.[65] Breastfeeding initiation increased slightly between 2004–05 and 2010–11; virtually all children (92%–96%) in Australia now initiate breastfeeding. Still, however, only 15%–18% of children are exclusively breastfed to at least six months[6, 65] and one in three children receive non-human milk or formula before one month of age.[5] Median duration of breastfeeding is less than seven-to-nine months, though 60% of babies still breastfeed at six months of age. A recent study found continuation at 12 months increased from 26% to 30% after the introduction of paid maternity leave in 2011.[20] About 18% of mothers continue to breastfeed their child beyond 12 months, and 7% are still breastfed at 19–24 months. Overall, about one in 10 Australian children are fed according to national dietary guidelines, and about one in 20 meet WHO optimal breastfeeding recommendations, though there have been small improvements in initiation, exclusivity and duration in the past decade.

Methods for collecting national statistics on IYCF in Australia are inconsistent over time and across jurisdiction, and do not align with national and WHO indicators. It is not clear from successive Australian Health Surveys in 2011–12 and 2014–15, whether or not the rates of exclusive breastfeeding have changed.

Amid global concerns at rising chronic disease prevalence, the WHO's member states (including Australia) have endorsed global targets for improving maternal, infant and young child nutrition to identify priority areas for action and catalysing global change. The target for breastfeeding is increased exclusive breastfeeding in the first six months up to at least 50% by 2025. This exclusive breastfeeding target is included in the Regional Plan of Action for Nutrition endorsed by countries in the WHO Western Pacific Region, including Australia, in Brisbane in October 2017.[66]

The Australian National Breastfeeding Strategy

The previous Australian National Breastfeeding Strategy 2010–2015 was a recommendation from a 2007 Senate inquiry into the health benefits of breastfeeding.[67] Following the strategy's conclusion at the end of 2015, the Australian Health Ministers' Advisory Council (AHMAC) asked the Department of Health to develop a high-level enduring breastfeeding strategy. During consultations led by the Department, stakeholders identified the following as key strategies for the enduring Australian National Breastfeeding Strategy (ANBS-E):

- Evidence-based breastfeeding education and training for health professionals — undergraduate curriculum and continuing professional development
- Funding for clinical support of breastfeeding research to add to the evidence base
- National marketing campaign on breastfeeding (as the normal, healthy and easy way to feed a young child)
- Strengthen implementation of the WHO Code on the Marketing of Breast Milk Substitutes and subsequent World Health Assembly (WHA) resolutions
- Breastfeeding education and support during the antenatal and postnatal periods
- Baby Friendly Health Initiative (BFHI) accreditation for maternity hospitals and community health services
- Breastfeeding-friendly workplaces and childcare settings — written policies to support breastfeeding, maternity protection legislation/paid parental leave
- Peer support
- Targeted specialist support (led by healthcare professionals) for those with complex breastfeeding needs
- Local milk banks and safe milk sharing networks.

This review of the current evidence base was prepared to underpin the enduring Breastfeeding Strategy and identify the barriers to establishing and maintaining breastfeeding, and the interventions that may assist in overcoming those barriers.

Evidence Check aim

There is a great deal of literature on breastfeeding interventions, policies and programs, but it is unclear what evidence exists to indicate their effectiveness, including for specific populations. In preparation for formulating an enduring strategy, the Preventive Health Policy branch of the Department of Health commissioned a review of literature in September 2017. The review timelines were for commencement on 11 October with the final report delivered by 3 January 2018.

The specified aim of the study was to review the evidence that indicates the effectiveness of strategies to improve breastfeeding rates. Outcomes of interest include breastfeeding initiation, exclusivity and duration, namely:

- Reducing exposure to non-human milk and foods < 6 months
- Increasing exposure to any breastfeeding > 6 months.

Optimal breastfeeding is defined as breastfeeding within one hour of birth, exclusive breastfeeding for the first six months of life, and continued breastfeeding beyond six months and at least up to two years of age or more with the introduction of nutritionally adequate and safe complementary foods.[3]

Strategies are broadly defined as any single or multi-component intervention aimed at promoting, supporting and/or increasing breastfeeding rates in a specified target population. Strategies may include, for example:

- Public awareness and acceptance campaigns
- Restriction of advertising of infant formulas, including full implementation of the WHO International Code of Marketing Breastmilk Substitutes and subsequent WHA resolutions
- Antenatal and postnatal education and support
- The Baby Friendly Health Initiative (BFHI), previously called the Baby Friendly Hospital Initiative
- Training of health practitioners (general practitioners, midwives, nurses, pharmacists, dietitians, students, etc.) on the benefits of breastfeeding and providing support for mothers who choose to breastfeed
- Influence of support person/people
- Culturally sensitive and appropriate interactions/communication
- Continuity of care, referral pathways and support networks
- Targeted/specialist breastfeeding support services
- Peer support programs
- Influence of returning to work and access to childcare
- Any other additional strategies that have been proven to increase breastfeeding that are identified during the review process

Methods

The ANU review team conducted a rapid review of academic and grey literature published between 2007 and 2017 to answer the research questions. Review procedures, specific research questions, and the scope of the study were discussed and clarified at a teleconference between the review team and Sax Institute on 25 October 2017.

Search strategies

The reviewers used multiple strategies to search for relevant literature. Both peer-reviewed and grey literature were searched for relevant material published between January 2007 and 31 December 2017, using several approaches and databases to maximise comprehensiveness and ensure that enabling interventions (as well as health settings) were covered. These included:

- Search of key academic electronic databases
- Search of industry database
- Expert network
- Desktop searches.

Peer-reviewed literature

Searches of the peer-reviewed literature covered several key databases listed in *Table 1 Information source summary*.

Searches included search terms contained in *Table 3 Keyword groupings used to form database search strategy*. Search results contained at least one keyword form each PICOTS group.

Databases were searched up to February 2018, and were limited to literature published between January 2007 and 31 December 2017 from OECD countries including Korea and Mexico, and high-income countries including Singapore, Hong Kong and Taiwan, and specific comparable settings in (mainly upper) middle income countries such as China, Malaysia, and also Thailand, India, Vietnam and South Africa.

Industry studies were retrieved online from the Euromonitor Passport database.[68] Country reports retrieved from the industry database were for Australia, New Zealand, Japan, Singapore, South Korea, Hong Kong, China, Malaysia, India, Philippines, Vietnam, Brazil, Mexico, Britain, US, Sweden and Norway.

Studies with no strategies or interventions evident, or with a focus on child health or nutrition interventions other than breastfeeding or human milk, or which were not available by the end of December 2017 in full text or in English language, were excluded. Inclusion criteria were modified based on emerging gaps from searches of the peer-reviewed literature *Table 4 Summary of literature inclusion and exclusion criteria*.

Where the reviewers were unable to retrieve high-quality peer-reviewed literature about enabling strategies or policy interventions that addressed the cultural, social and economic policy environment for breastfeeding[10], or interventions outside healthcare settings or those targeting high-risk groups, we included key papers of sufficient quality from both peer-reviewed and grey literature. These 'sufficient quality' studies had been recommended by individual expert panel members on full text review.

Grey literature

An expert network and desktop search was conducted for key papers and relevant grey literature. Relevant guidelines were found in several categories including clinical protocols from the Academy of Breastfeeding Medicine (ABM); WHO guidance on inappropriate marketing of foods for infants and young children[69], on

food marketing harms to children[66], on HIV/AIDS[70], the Baby Friendly Hospital Initiative[71], and quality standards for maternity care[72]; Infant Feeding in Emergencies from the IFE group of agencies[73]; and expert guidelines on establishing milk bank networks.[74]

Evidence grading

To facilitate rapid and comprehensive review within the short timelines for this Evidence Check, evidence was graded according to the study design as below:

- Platinum: Systematic reviews and meta-analysis
- Gold: Randomised controlled trials (RCTs)
- Silver: Descriptive qualitative or quantitative studies, cohort studies, controlled before and after studies (silver level is split between good and moderate quality evidence)
- Bronze: Expert committee guidelines, reports or opinions, commentary/ editorial
- Not quality rated (NQR)

Most included studies were of platinum, gold or silver quality, being systematic reviews, RCTs or well conducted large cohort studies. The Evidence Check also included descriptive quantitative and qualitative studies (silver), key papers of bronze quality and reports that were not suitable for quality review (NQR).

The overall level of the evidence varied considerably for different categories of interventions, with platinum or gold evidence being available mainly for interventions based in healthcare settings. Hence, for important information about some interventions or strategies, it is necessary to draw on well conducted observational studies, before–after and national experimental studies including qualitative data, and on reports of experience, and expert guidelines particularly for interventions outside health settings and enabling policies, and for population groups at social or other risk for not breastfeeding optimally.

It should be emphasised that relying on systematic reviews and randomised trials is inadequate for understanding both the complex behaviour of breastfeeding, and the complex protection, promotion and support activities that influence breastfeeding. As was recently argued in *The Lancet* by Rutter et al.[75], the published evidence base is heavily skewed towards studies that attempt to identify simple often short-term, individual-level health outcomes rather than complex, multiple, upstream, population-level actions and outcomes. Hence:

> *It is important for public health policy to be guided by evidence but if this evidence predominantly supports individual-level interventions that have minimal reach and effect across populations, the benefits of being informed by the existing evidence base might be illusory.*

Included studies

The search strategies retrieved 7246+ studies. After removal of duplicates, screening and full text review, we were left with a total of 430 systematic reviews, RCTs and similar studies. The key papers were within scope and of sufficient quality to inform the two research questions on the 12 specified strategies/interventions. Of the included studies, 110 were of platinum, gold or silver quality. Updating the Sinha and Skouteris systematic reviews yielded most included studies, with other studies sourced from expert research networks, hand searches and reports from industry databases. A flowchart of the literature selection process is included as *Figure 1 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Table 4 summarises the characteristics of these included reviews and key papers.*

A further 320 papers met the criteria for inclusion as key papers, either through updating the search criteria or expert network or hand-search pathways. These were not formally assessed for quality due to the large

number of studies included in the Evidence Check, and limitations on data extraction within resource constraints.

It is not possible or desirable to report the overall level of the evidence because of the diversity of study designs across the different intervention categories or settings, or risk groups. Such diversity in included study design is considered appropriate for enabling strategies or those targeting high-risk groups; and study quality based on design criteria only would exclude studies which usefully inform the key questions.

Most studies were conducted in OECD countries such as the US, or in comparable countries or settings to Australia, such as Singapore (a high-income non-OECD country), or urban health settings in China (a lower middle-income country). A few were in lower middle-income countries such as India or Vietnam. Most were on 'education and support or training' interventions in healthcare settings. Interventions mainly targeted healthy mothers and healthy babies, or health professionals and health workers in healthcare settings.

A small number of studies evaluated interventions involving multiple activities though most evidence was from studies of single interventions.

The Evidence Check also identified several studies of the economic costs of premature cessation of optimal breastfeeding in high or middle-income countries[13, 76, 77], and two very recent large RCT studies of financial incentive interventions in Britain and the US. Only a small number of economic studies provided evidence on the costs or cost-effectiveness of specific strategies or interventions for well mothers and children.[18, 78, 79] Most cost-effectiveness studies were about the cost-effectiveness of breastfeeding or human milk feeding in NICUs, in preventing necrotising enterocolitis (NEC) or similar costly conditions among vulnerable infants.

Limitations

It should be noted that a severe limitation of any review is that a literature search can only reveal research that has been conducted. In practice, this can mean that conducted research focuses on small improvements in practices that interfere with the natural and physiological behaviour of breastfeeding. The research that is not done, on what makes the home, community or healthcare environment naturally friendly to breastfeeding, is less included. It is important to recognise that it may that the answers about what is needed for all mothers and children to optimally breastfeed in line with their mammalian blueprint lie within these evidence gaps.

There is also bias towards types of evidence (e.g. quantitative, RCTs), which skews findings towards interventions and settings in which evidence is obtainable (e.g. in health settings). Because the scope of this study is broad and considers interventions in many settings, this 'evidence bias' favours health settings. In contrast, evidence of interventions outside health settings, such as policies or restrictions on marketing, is deemed to be of lesser quality because it is more difficult to provide comparisons and obtain data. Some study selection bias will have occurred but this will differ between the three broad sources of studies (and types of interventions): (1) electronic searches that were updates of recent systematic reviews provided RCTs, some silver, no bronze and little qualitative evidence and were screened using methods to obtain concordance; (2) expert panel recommendations provided evidence of silver and bronze quality; and (3) electronic and hand searches, mostly for non-health settings and populations for Question 2 (at-risk groups), provided evidence of silver, mostly bronze and NQA quality. Qualitative evidence is used in (1), (2) and (3).

Findings

The scope of the Evidence Check was wide and covered multiple diverse strategies. The literature on the identified strategies in country settings relevant to Australia is extensive. Findings regarding both Question 1 and 2 are therefore organised within the conceptual framework reported in *The Lancet* Series on Breastfeeding, based on extensive systematic review evidence about structural determinants of breastfeeding worldwide.[10] In presenting our findings, we thus distinguish as far as practicable between strategies/interventions that create more enabling public policy, home and work, or community environments for breastfeeding, and those that are conducted within healthcare settings. Evidence summaries for each ANBS-E Strategy are organised loosely within this framework to provide some conceptual coherence for presenting findings about very different types of interventions. We also distinguish those interventions or strategies that appropriately address vulnerabilities arising from sociodemographic or other characteristics of individual women and their families and social networks, focusing in particular on the multiple barriers to breastfeeding faced by some women and children. Such interventions are reported in response to Question 2. The conceptual framework is described in *Appendix 2: Organising framework for interventions and strategies* and *Appendix 3: Conceptual framework mapping of ANBS strategies*/.

The strategies and interventions reviewed were highly diverse in design and method. They also differed greatly regarding whether they were:

a) enabling strategies operating to influence the cultural, social or economic environment for breastfeeding;
b) interventions at the system level; or
c) interventions at the level of an organisational unit.

Some interventions evaluated in the literature are simple, involving a single activity, but others are complex and may involve multiple intervention activities. Some interventions are direct, targeting pregnant or new mothers of infants and young children, while others are indirect, targeting individual healthcare providers or other significant family or community members in order to affect breastfeeding outcomes.

The Evidence Check found some systematic reviews covering multiple and integrated strategies or interventions. The broad conclusions of such major reviews over the past decade increasingly emphasise the importance of enabling policies that influence the wider environment and systems in which specific sectoral interventions or individual programs may be effective.

A large volume of relevant literature was assembled through several broad-ranging search strategies. The Evidence Check included consideration of more than 110 systematic reviews, RCTs or comparable quality studies. For strategies or interventions in health settings, there is a focus in the evidence summaries on systematic review findings, informed by any more recent studies that were available. We also highlight relevant Australian studies. For interventions or strategies outside of health settings, where systematic review or experimental evidence is less available, the evidence presented is based on information from key papers with a variety of study designs and methods; if a systematic review is available, key papers supplement available systematic review evidence.

Due to the large volume of studies informing the research questions, detailed information on studies for each ANBS-E Strategy is provided in Appendix 4, rather than in the main body of the report. Because of the volume of systematic reviews related to healthcare interventions such as the BFHI and its component Ten

Steps, Appendix 5 provides supplementary information on the many other RCT and comparable quality studies of interventions in health settings.

Question 1:

EVIDENCE SUMMARY — Major recent reviews

The WHO recommends, as a public health measure, early initiation (within one hour from birth), exclusive breastfeeding to six months and continued breastfeeding to two years and beyond as optimal for maternal and child health. In Australia, early exclusive initiation rates are unknown but, overall, 96% of mothers breastfeed at least initially. However, rates of premature weaning from exclusive (< 6months) and continued breastfeeding (6–23 months) are very high. Only about 70% of Australian women are exclusively breastfeeding as recommended at one month postnatally and only 15% are doing so to six months. Good data is not collected on continued breastfeeding rates but about 7% of women breastfeed during the second year of their child's life. An emerging issue is how to describe the variety of practices involving human milk feeding but which do not involve the mother breastfeeding the child, as is optimal from various perspectives.

Recent systematic reviews have found that:

- There is strong evidence, from multiple systematic reviews based on RCT studies, that premature cessation of breastfeeding as defined above can be reduced two-to-threefold by interventions delivered in a variety of settings. Multifaceted and integrated programs are more effective than single interventions delivered individually because of synergistic effects.
- Evidence from the most recent comprehensive systematic reviews also highlight that additional education or support for mothers of any kind within the healthcare system, compared to usual care, increases the likelihood of breastfeeding by at least 10%, but can be higher — up to 30% in some settings.
- Interventions that include peer counselling are more effective than those without peer counselling. Peer counselling may be less effective in preventing premature weaning in high-income countries where breastfeeding is not the cultural norm, where commercial milk formula is affordable and pervasively marketed, and where women commonly rely on healthcare providers rather than family and social networks for information and support for any breastfeeding challenges.
- These most recent comprehensive systematic reviews confirm the accumulated evidence of the effectiveness of BFHI implementation, and of implementing most of its Ten Steps individually:
    - Baby friendly hospital support at health system level is the most effective intervention to improve rates of any breastfeeding
    - The greatest improvements in optimal breastfeeding are from interventions such as BFHI, which involve counselling or education provided concurrently in health systems and community, or in health systems and home settings, respectively
    - WHO International Code compliance, referral to community breastfeeding support and avoiding unnecessary supplementation appear to be key components of BFHI
    - Evidence for BFHI practices reducing premature cessation of breastfeeding, particularly ensuring early initiation and skin to skin contact, remain strong
    - In some countries, it has been identified that in facilities initially designated as BFHI by the national authority's accreditation process, the degree of implementation has subsequently lapsed. BFHI designation, in the absence of compliance with the WHO Code and Ten Steps, is less effective in preventing premature weaning than implementation of the full package of BFHI interventions.

- Education and training of health professionals is also confirmed to be effective, though there remains little evidence about what training or education is most effective. There is evidence that interventions that expand pre-service medical education about the importance of breastfeeding, management of breastfeeding challenges, and about providing breastfeeding support in a way that supports women's self-efficacy, may be more cost-effective and effective at increasing breastfeeding than in-service training.
- A mix of professional and peer support is more effective than health professional support alone, though one-on-one support is effective in increasing breastfeeding among socially disadvantaged mothers. Education and support of mothers that spans antenatal and postnatal periods is more effective than interventions occurring in just one period. Longer duration and more structured interventions involving several contacts are more effective than interventions of short duration and limited contacts, and interventions spanning the postnatal period are more consistently effective than interventions that do not span the postnatal period.
- Technologies such as telephone, message, email or internet can faceplate provision of breastfeeding education and support, but effective interventions will include the possibility for face-to-face contact.
- Evidence is emerging for interventions in the home or community that increase social support for breastfeeding, though there is also evidence, including from Australia, that inadequate post-discharge planning and linkages to postnatal support is an ongoing problem for continuity of maternal and newborn care. The effectiveness of baby friendly initiatives that extend the BFHI principles to health services in the community remains largely unevaluated but the evidence base for BFHI principles is strong, and limited evidence supports its potential effectiveness in community settings, if sustained long term.
- Little is known about what interventions or strategies might influence the cessation of continued breastfeeding (6–23 months), though there is limited evidence that cultural norms can be influenced through mass media and social marketing campaigns.
- National dietary or other guidelines such as growth monitoring and evaluation, or commercial marketing interventions can also influence the duration of any and exclusive breastfeeding and the timing of breastfeeding cessation through influencing cultural norms.
- There is growing evidence as to the benefits of addressing structural barriers facing employed women for exclusive breastfeeding and breastfeeding duration. Limited systematic review evidence supports the effectiveness of workplace interventions, and there is literature supporting the effectiveness of breastfeeding-friendly childcare (BFCC) measures. However, there is also evidence that the most disadvantaged mothers and babies have the least access to such opportunities for breastfeeding; hence system-level and policy support is a more effective intervention and it also reduces health inequality.
- Few studies address economic aspects of such breastfeeding interventions, and while there are review studies focused on low- and middle-income countries, there is little addressing the economic costs and benefits in high-income countries. Even in high-income countries such as Australia, the economic value of breastfeeding as measured by market values is very large, and breastfeeding as recommended by health authorities generates large economic gains from a food system and food security perspective.

Findings — Major recent comprehensive systematic reviews

Due to time constraints and the wide scope of the Evidence Check, the review aimed to be comprehensive rather than exhaustive. The findings should be interpreted as updating and synthesising previous evidence rather than replacing it. The Evidence Check identified several large and comprehensive systematic reviews evaluating multiple strategies or interventions that have been published since 2007. These were mainly based on RCTs or similar studies conducted in high-income OECD countries. Most studies included in these reviews were conducted in healthcare settings, targeting mothers or, less commonly, health workers. A smaller number of systematic reviews or studies included in these reviews examined interventions or

strategies (such as BFHI implementation, medical education, NICU clinical practices, or Supplemental Nutrition Program for Women, Infants, and Children reforms) at the system level. A few of these systematic reviews were based on a more limited number of studies addressing the effectiveness of enabling interventions such as changes to the policy environment. Some focused solely on particular breastfeeding outcomes such as exclusive breastfeeding, or on high, middle- or low-income countries, or healthcare settings.

Below is an overview of the main conclusions of the comprehensive systematic reviews identified for the period since January 2007. A weakness of systematic reviews and reviews of reviews is that they can be based on quite dated primary evidence. Therefore, this report indicates the time point each major systematic review goes to, and then provide information from primary study updates in Appendices 4 and 5. These considered multiple interventions and breastfeeding outcomes. Further detail on the conclusions of these systematic reviews regarding individual strategies or interventions is included under the headings for each of the 12 ANBS-E strategies that were within the scope of this Evidence Check. In particular, as the effectiveness of each BFHI Ten Steps intervention was recently systematically reviewed by WHO[80], these are considered initially under ANBS-E Strategy 4 regarding the BFHI. They are then considered in more detail under the most relevant ANBS-E strategy headings. Due to time and resource constraints, and the detailed review of BFHI-related systematic reviews by the WHO in 2017, the Evidence Check did not describe how the systematic reviews we identified assessed the quality of studies they reviewed or assess the quality of the systematic reviews. A framework for assessing the quality of systematic reviews is outlined in the 'review of reviews' by Sutton, et al.[81]

A major EU-wide breastfeeding promotion project funded by the European Commission updated an earlier evidence review in 2008. The review explicitly recognised that many aspects of the protection, promotion and support of breastfeeding, in particular those not specifically related to the healthcare sector, *"are not amenable to the rigorous evaluation of effectiveness implicit in the concept of evidence-based medicine"*.[82] The review categorised interventions under 'policy and planning'; 'information, education and communication'; 'training'; and 'protection, promotion and support of breastfeeding'. In each category, interventions were graded by the quality of the evidence base. Evidence in 2008 supported the following:

- The combination of several evidence-based strategies and interventions within multifaceted integrated programs seems to have a synergistic effect.
- Multifaceted interventions are especially effective for targeting initiation rates as well as duration and exclusivity of breastfeeding, using media campaigns, health education programs adapted to the local situation, comprehensive training of health workers and necessary changes in national/regional and hospital policies.
- The effectiveness of multifaceted interventions increases when peer support programs are included, particularly in relation to exclusivity and duration of breastfeeding.
- Interventions spanning antenatal and postnatal periods, including crucial days around childbirth, seem more effective than interventions focusing on a single period.
- The BFHI is an example of a wide-ranging intervention of proven effectiveness, and its extensive implementation is highly recommended.
- Health sector interventions are especially effective when there is a combined approach involving the training of staff, the appointment of a breastfeeding counsellor or lactation consultant, having written information for staff and clients, and rooming-in.
- The impact of health education for mothers on initiation and duration of breastfeeding is significant only when current practices are compatible with what is being taught.
- The provision of breastfeeding information to prospective parents or new mothers, with no or brief face-to-face interaction (i.e. based on leaflets or telephone support), is less effective than the provision

of information with extended face-to-face contact. The use of printed materials alone is the least effective intervention.

- The effectiveness of programs that expand the BFHI beyond the maternity care setting to include community healthcare services and/or paediatric hospitals, currently being implemented in some countries, had not been evaluated. However, these programs rest on a combination of initiatives that are well evidence-based on their own.
- The development and enforcement of laws, codes, directives, policies and recommendations at various levels (national, regional) and in various situations (workplace, hospital, community) represent important interventions. However, it is currently difficult to gather strong evidence for their effectiveness (there are few studies, and they are mainly within multifaceted interventions).
- Workplace interventions are especially effective when mothers have the flexibility to opt for part-time work and have guaranteed job protection along with provisions for workplace breastfeeding/lactation breaks. These provisions, whether in response to a legislative requirement or as part of a breastfeeding-supportive workplace policy, involve time off without loss of pay during the working day to breastfeed or express breast milk, with suitable facilities being provided by the employer.

The EU review observed also that decision-making required considerations of feasibility and cost as well as effectiveness; these were country and area-specific, depending on local economic, social and cultural conditions. More fundamental to success was political commitment. Political commitment could overcome budgetary cost constraints standing in the way of implementing public health intervention, which might be high cost but benefit from economies of scale, with a more favourable benefit-to-cost ratio. Importantly, the EU review noted that some strategies and interventions may be recommended even if they are not strongly evidence-based; in particular the effects of legislation and general policies are not easily amenable to rigorous scientific evaluation but expert opinion and experience may show that these initiatives do have long-term benefits for mothers in successful breastfeeding. This review, like later reviews, concluded that maximising the combined and cumulative effect of a program for protection, promotion and support of breastfeeding involved a multifaceted, interrelated and integrated approach rather than implementing a list of separate interventions. Moreover, the effect also depended on continuity: *"a change in the behaviour of mothers, families and health workers, and of the infant feeding culture in a given society, requires that interventions and programmes be sustained for a sufficient length of time"*.[82]

Dyson[83] provided a narrative summary of the findings of a 2006 evidence review conducted alongside extensive stakeholder consultations in Britain, which informed the country's National Institute for Health and Care (NICE) guidelines. The authors concluded that to be effective, interventions needed to be implemented within an enabling public health policy environment, mainstreamed into clinical practices, and alongside implementation of local interventions that responded to specific characteristics and needs of high-risk groups. Further details on these aspects of their findings are considered under relevant headings below.

AUSTRALIAN STUDY: In Australia, a 2010 study by the Physical Activity Nutrition and Obesity Research Group (PANORG) at the University of Sydney updated the evidence base to October 2010 on the effectiveness of interventions to support breastfeeding, to support formulation of the NSW Health Breastfeeding Policy.[51] This study confirmed previous NSW reviews showing there was evidence of effective interventions focused on three areas:

- Hospital practices
- Education of health professionals
- Breastfeeding support and maternal self-efficacy.

Regarding hospital practices, the rapid evidence appraisal by Hector et al. found there was strong evidence for the effectiveness of the Baby Friendly Hospital Initiative (BFHI) as a whole, and for many of the individual Ten Steps. The study found there was *"insufficient evidence surrounding what works best in terms of health*

professional education". Hector et al. also considered interventions in the areas of 'support and self-efficacy of mothers'; support in any form was identified as a core component of programs to ensure good breastfeeding outcomes: *"the evidence is very strong"*.[51] Regarding provision of professional support alone, the review found the evidence was mixed and was stronger for postnatal than antenatal support. Evidence backed specific breastfeeding support from a single professional targeted to women of lower socioeconomic background in order to increase their rate of exclusive breastfeeding. It found good evidence that a mixture of professional and peer support was most effective, particularly support that spanned all periods, i.e. antenatal, perinatal and postnatal. A clear working arrangement and relationship should be established between peer counsellors and professionals to ensure the success of any combined support program. This study also highlighted the limitations of the evidence base for enabling interventions, and urged attention to the authors' earlier documentation of key case studies to illustrate the potential effectiveness of such under-researched measures.

A systematic review of evidence up to September 2015 on the benefits and harms of breastfeeding interventions in US primary health care services was conducted by Patnode and colleagues[84] for the US Preventive Services Task Force, to update 2008 recommendations on primary care interventions to support breastfeeding. The previous review had indicated the need for system-level strategies along with senior level support for interventions to be sustainable.[85] The updated review included 57 publications (covering 66,757 participants). The review update found:

- Some evidence of effectiveness of system-level interventions in increasing breastfeeding rates
- Studies suggesting primary care breastfeeding interventions could create harm, such as by increasing maternal anxiety, decreasing confidence and raising confidentiality concerns
- Individual-level breastfeeding interventions were associated with about a 10% increase in any breastfeeding (for < 3 months, and at 3 to < 6 months). Such interventions had greater effectiveness (about a 20% increase) on exclusive breastfeeding (for < 3 months, 3 to < 6 months, and at 6 months). It found no evident effect of interventions on breastfeeding initiation.

An 'overview of reviews' published up to December 2015 was conducted for the Irish Department of Health by Sutton et al. to facilitate the preparation of a new Breastfeeding Action Plan, in a context where only 55% of children are ever breastfed.[81] It aimed to identify interventions that promote increased breastfeeding rates and breastfeeding duration among healthy mothers of healthy full-term babies. Thirty-six studies were included in a narrative synthesis. The review showed the evaluated breastfeeding interventions were associated with increases in breastfeeding but no meta-analysis was conducted to quantify the potential effect size. Education, counselling and/or support was found to be the most tested intervention; the review concluded that such interventions were effective in the antenatal, extended postnatal period, and both periods combined, and that there was evidence of ongoing one-to-one education/counselling/support, especially in the postnatal period, being effective over a long duration. It also found one-to-one needs-based counselling and support may be effective for low-income and adolescent mothers, and internet support may be a useful adjunct to face-to-face care.

The Sutton et al. study identified reviews showing peer support was most effective in low- or middle-income countries and was not effective in high-income countries, particularly where there was well-organised community midwife care after the birth. However, the authors noted there were considerable differences in study populations, definition of peers, definition of counsellors, peer counsellor training protocols, peer visit schedules and outcome ascertainment methods between trials, which might modify the effect of peer counselling. Because of the enormous diversity in the reviewed studies, the authors concluded it was not possible to say precisely in which period of time it would be most beneficial to provide education, counselling or support; who should provide it; or what component of these interventions might be the most beneficial in increasing breastfeeding rates.

A 'realist review' of one-to-one breastfeeding peer support experiments conducted in developed country settings emphasises that such interventions are highly complex and poorly evaluated in conventional systematic reviews. Sutton et al. further noted that education, counselling and support interventions are contained in three of the Ten Steps of the Baby Friendly Health Initiative (BFHI). Four of the nine effective and promising 'other' interventions identified by the Sutton et al. review are included in the BFHI Ten Steps (see ANBS-E Strategy 4 below). These are: structured programs to promote breastfeeding, promoting early skin-to-skin contact, having the practice of rooming-in for mother–infant dyads, and avoiding supplementary infant feeding.

McFadden and colleagues[86] conducted a systematic review and meta-analysis to update previous Cochrane reviews[87] to February 2016 on breastfeeding support for healthy breastfeeding mothers with healthy term babies based in healthcare services. The study reviewed RCT evidence on the effectiveness of different settings and different modes of offering similar supportive interventions (such as offering proactive or reactive support face-to-face or over the telephone), whether interventions containing both antenatal and postnatal elements were more effective than those implemented only postnatally, and the effectiveness of different care providers and training. This study also explored the interaction between background breastfeeding rates and the effectiveness of support, finding interventions were more effective in increasing exclusive breastfeeding to six months in country settings where breastfeeding initiation was high (i.e. more than 90%). The updated review included 73 studies (58 individually randomised trials and 15 cluster randomised trials) on 74,656 mother–infant pairs in 29 countries. Results confirmed that any extra support for breastfeeding beyond usual care decreased the likelihood of mother–baby pairs ceasing breastfeeding at four-to-six weeks or up to six months by about 10% (relative risk (RR) of .86 and RR .89 respectively). This was also effective in reducing cessation of exclusive breastfeeding before six months (RR .89), and at four-to-six weeks (.79). Extra support by both lay people and professionals improved breastfeeding outcomes. Lay support was more effective than professional or mixed support in increasing exclusive breastfeeding to six months. Interventions with a face-to-face component and a schedule of four-to-eight contacts improved women's likelihood of exclusive breastfeeding. Whether support was postnatal only or also contained antenatal components made no statistically significant difference to outcomes.

Sinha[88] set out to update evidence published up to July 2016 from RCTs, quasi-experimental and observational studies on the effect of interventions on early initiation of and exclusive and continued breastfeeding rates in low- and middle-income countries. This systematic review and meta-analysis examined interventions delivered in five settings (or a combination of settings) to improve early initiation, exclusive, continued and any breastfeeding rates. Settings were categorised as 'health system', 'home and community' or 'combined' settings. Reporting on 61 studies, the review found exclusive (< 1 and 1–5 months) and continued (6–23 months) breastfeeding rates improved significantly, two-to-threefold, as a result of interventions delivered in health systems, in the home or community, or in a combination of these. Interventions delivered concurrently in a combination of settings showed the largest improvements (increased odds ratio of two to more than sevenfold). Initiation of breastfeeding was most improved by counselling or integrated interventions (three-to-sevenfold increases). Counselling provided in any setting and baby friendly support in health systems were the most effective interventions to improve initiation and exclusive breastfeeding, though effects were not statistically significant for continued breastfeeding at six to 23 months. Overall, the meta-analysis showed the likelihood of breastfeeding initiation, exclusivity or continuation increased on average two-to-fivefold in intervention groups. In concordance with previous BFHI reviews that included developed countries[89, 90], this systematic review and meta-analysis found BFHI interventions and counselling through peer support had 'immense' potential to promote breastfeeding in developing countries.

The 2017 review by Sinha et al. updated a 2015 systematic review of interventions that included all-country income groups.[91] The earlier review in turn expanded and updated a review of breastfeeding initiation and

exclusivity[92] to include continuation (6–23 months). The 2014 systematic review also categorised interventions within the evidence-based conceptual framework applied in *The Lancet* Breastfeeding Series,[1, 10] but somewhat more specifically, as follows:

- Home and family environment
- Community environment
- Health systems and services
- Work environment
- Policy environment or a combination of any of above.

The 2015 study by Sinha et al. found intervention delivery in a combination of settings had higher improvements in breastfeeding rates. The overall effect of all interventions improved breastfeeding rates by 30%. Greatest improvements in optimal breastfeeding (early initiation, exclusive and continued breastfeeding), were when counselling or education was provided concurrently in home and community, health systems and community, and health systems and home settings, respectively. BFHI support at health-system level was the most effective intervention to improve rates of any breastfeeding.

The most recent major systematic review of evidence, which focused on increasing exclusive breastfeeding to six months, was published in 2017.[93] This systematic review of evidence updated a previously published systematic review to December 2016. It synthesised evidence to promote exclusive breastfeeding up to six months in (mainly) high-income countries. The review found ambiguous effects on exclusive breastfeeding overall, but a significant increase in the duration of exclusive breastfeeding past four months postpartum in four of the 12 newly included studies. All four successful interventions had long-duration postpartum programs implemented by telephone, text message or through a website. Some successful interventions also included prenatal education or in-hospital breastfeeding support. Overall, breastfeeding interventions were associated with a 5%–32% increase in exclusive breastfeeding at six months, with the most successful intervention combining education and ongoing support. Odds of exclusively breastfeeding to six months were three-to-four times higher for women in the successful interventions. The earlier study, which was updated by this 2017 review, had identified 17 studies, most using supportive or educational approaches, of which eight reported significant increases in the duration of exclusive breastfeeding.[94] Interventions in pregnancy had focused on educating mothers about the benefits of exclusive breastfeeding. Fifteen interventions took place, at least in part, in the postnatal period and provided educational and emotional support to mothers. Of the eight successful interventions, five took part in the postnatal period in the mothers' own homes.

Findings — Individual strategies and interventions

Most systematic reviews identified between 2007 and 2017 examined individual strategies or interventions in particular settings, and were direct or indirect interventions rather than enabling. The following distinguishes between strategies or interventions influencing the wider social context to better enable breastfeeding (through changing the broader environment), and those that take place at sites, such as health or education facilities, and are more feasible to evaluate through experimental studies.

The evidence on effective ways to create an enabling environment for breastfeeding is highly diverse and is summarised and synthesised below under the heading 'other (enabling environment) strategies'. Interventions in health and other settings are considered in the subsequent sections.

ANBS-E Strategy 10: Other (enabling environment) strategies

EVIDENCE SUMMARY — ANBS-E Strategy 10: Other (enabling environment) strategies

Evidence is most available for interventions that lend themselves to evidence-based medicine approaches, while effective enabling interventions are less researched. Potentially the most transformative enabling strategies are not covered by the many studies on small-scale interventions such as in health settings.

The effects of enabling policies and system-level interventions including across maternity and newborn care and maternity protection systems can be substantial and are necessary and effective to reduce social inequalities in breastfeeding opportunities. Enabling interventions include policies, statutes or common law addressing the cultural or social context for IYCF practices, and influence what is permissible, encouraged or prohibited in various contexts. There is evidence from comprehensive systematic reviews of cultural and structural determinants of breastfeeding that such environmental factors are influential for individual women's decision-making about breastfeeding. There is also evidence that countries' exclusive breastfeeding rates can be increased substantially by multifaceted and integrated programs and a more enabling environment for optimal breastfeeding. As Brazil has shown, exclusive breastfeeding prevalence among infants aged less than six months can be increased substantially, by 1%–2% a year at the national level, with multifaceted and integrated programs.[60] Recent evidence indicates that enabling policies and system-level interventions are necessary if governments intend to reduce social inequalities in women and children's opportunities for breastfeeding and health.

Over the past decade, there has been an accumulation of breastfeeding research emphasising the important influence of structural and systemic factors on women's breastfeeding practices, and the need for enabling public health policies. This trend is in accord with most recent public health research, which increasingly emphasises the importance of environmental and systemic factors in contributing to rising obesity and chronic disease prevalence. Food systems influence individuals' health behaviours and dietary choices. Breastfeeding is an outcome of mammalian biology and physiology but it is also a biocultural behaviour. So, while lactation follows from childbirth, successful establishment and maintenance of optimal breastfeeding is sensitive to cultural context and social norms, and to addressing the 'upstream', structural or system-level factors that generate barriers to its practice.

This wide-ranging review of what works to improve breastfeeding and more optimal IYCF practices has identified evidence about the important role of policies that create more enabling environments for breastfeeding, and that also address social and gender inequalities. Studies in high-income country settings indicate that social policies that improve gender equality and reduce social and health inequalities are also associated with policies that address cultural, structural or systemic barriers to more optimal breastfeeding practices. There is evidence that public health and nutrition policies, including the absence or presence of appropriate national policies, regulations, guidelines or guidance relevant to IYCF can influence breastfeeding practices considerably at the level of individual women and their young children. Countries that value and protect breastfeeding and human milk feeding through their food and nutrition policies and regulatory systems, and/or have more gender-equal social protection, employment or welfare policies, also tend to have increased likelihood of more optimal breastfeeding practices.

Research has shown a relationship between countries' compliance with the WHO/UNICEF initiatives on breastfeeding and the extent to which their welfare policies support women in both their productive, and reproductive, labour. A study in the US has shown supportive state laws were associated with higher breastfeeding initiation and duration rates. Laws enforcing provision for workplace expressing/pumping or jury duty exemptions for breastfeeding mothers were associated with twice as many infants in that jurisdiction breastfeeding at six months than in jurisdictions that did not legislate to enforce such protections.

On the other hand, there is also evidence from such studies that the current unequal access to the protection offered by these laws could widen inequalities in breastfeeding opportunities. This was because there was unequal access to the protection offered by such laws as a result of the different employment situations and breastfeeding practices of African-American and Mexican-American women relative to white women. Policies for family friendly women's prisons and prison nurseries help in meeting countries' obligations for protecting women's and children's human rights, as well as their opportunities for breastfeeding, and have particular benefits in improving social and health equity for disadvantaged groups such as indigenous, African-American, or highly traumatised, socioeconomically disadvantaged and vulnerable women, who are disproportionately represented among the incarcerated population.

Similarly, leading national accounting experts have pointed out that excluding the value of human milk production and breastfeeding from economic statistics can bias policy priorities towards market production, such as commercial baby foods, and away from unmeasured household production of goods and services, such as parental childcare and breastfeeding. In Norway, where the practice for many decades has been to count human milk in national food statistics, policies support high levels of breastfeeding and human milk production, in contrast to countries such as Britain, where cultural norms favour commercial milk formula, and breastmilk contributes much less to the country's food production system than do commercial baby foods.

National dietary or other guidelines or protocols, such as for infant feeding or growth monitoring, also interact with healthcare delivery systems and health professional education and training to strongly influence individual women's IYCF practices. For example, this Evidence Check identified RCT evidence that rates of full breastfeeding at six months varied considerably depending on the type of infant growth chart used. It also found evidence that a re-emerging social practice of milk sharing and cross-nursing among women has the potential to support maternal breastfeeding, and that appropriate planning can protect breastfeeding and the health and survival of children in disasters and emergencies. During such events, or when women experience difficulties in breastfeeding, the presence or absence of suitable guidelines or policies such as on disaster planning or milk sharing can determine whether or not breastfeeding is the likely outcome.

Such examples of enabling interventions or strategies illustrate how national policies and guidelines may seem very remote from the breastfeeding decisions of individuals, but are strategies that can influence population-level feeding practices and strengthen women's autonomy to act on intentions or preferences for breastfeeding or human milk feeding.

A number of economic studies indicate the cost-effectiveness of reducing premature breastfeeding cessation, and several economic studies published since 2007 have calculated the health-system cost savings from improving breastfeeding practices in high-income countries. Economic costs of premature cessation of optimal breastfeeding calculated for high-income countries have been shown in key studies to derive substantially from avoidable paediatric morbidity and mortality associated with SIDS and NEC, as well as from avoidable infectious gastrointestinal and respiratory illness in term infants and maternal mortality and morbidity from breast cancer. There is also evidence that the longer-term economic costs of cognitive disadvantage, especially in high-income countries, are large — for Australia this cost is estimated at $6 billion a year.[10]

Evidence about the cost-effectiveness of investing in individual interventions or strategies to reduce premature reduction or cessation of breastfeeding in high-income countries (HIC) is very limited, though well established for lower middle-income (LMIC) settings. Experience has been that mass media or social marketing campaigns to raise awareness about breastfeeding will not be sustained due to fiscal cost constraints. The example of tobacco control in Australia and WHO Code implementation in some LMIC

countries provides evidence that fiscal constraints on funding breastfeeding interventions can be reduced by legislation or regulatory measures that limit marketing or provide legislative protection for breastfeeding women and children within a human rights framework. Recent economic studies in HICs provide consistent evidence supporting the health system cost-savings of supporting maternal lactation and human milk provision for vulnerable infants in NICU care. Economic studies also support that there are important time costs of breastfeeding and human milk provision, and that these costs include the forgone earnings and career opportunities of women who invest their time in exclusively breastfeeding.[20] There is very recent RCT and quasi-experimental evidence including from Australia that reducing the economic and social costs of breastfeeding through extending paid maternity leave or altering financial incentives for breastfeeding increases breastfeeding duration among low-income or socioeconomically disadvantaged women.[21, 95]

Economic studies also provide evidence that women's investments of time in providing human milk by breastfeeding as recommended have a very substantial economic value measured using market prices. The only study of the maternal time cost of providing human milk for vulnerable infants in NICUs shows that notional accounting for women's time expressing milk for their infants approximately doubles the economic cost of providing human milk to infants in NICUs, suggesting the importance of investing in lactation support to match the substantial commitment by the mother.[49]

> For more detailed information refer to evidence for *ANBS-E Strategy 10: Other (enabling environment) strategies*

Against this background on the broader context and determinants of IYCF practices, evidence on specific enabling strategies or interventions identified for the ANBS-E is summarised below.

A. Public awareness/marketing

ANBS-E Strategy 1: Public awareness and acceptance campaigns (social marketing)

EVIDENCE SUMMARY — ANBS-E Strategy 1: Public awareness and acceptance campaigns

There is overall evidence that mass media or social marketing campaigns can be effective in raising awareness. There is mixed evidence about the effects of such interventions on IYCF practices in isolation from other effective strategies. There is evidence of challenges in sustaining programs long enough to effect behaviour change because of high costs and public resource constraints. Such programs may be ineffective if structural barriers are not addressed, or if individual capacity for behaviour change is overemphasised. Some studies identify negative impacts.[12, 88]

> For more detailed information refer to evidence for *ANBS-E Strategy 1: Public awareness and acceptance campaigns (social marketing)*.

ANBS-E Strategy 2: Restriction of advertising of infant formulas, including full implementation of the WHO International Code of Marketing Breastmilk Substitutes and subsequent relevant WHA resolutions

EVIDENCE SUMMARY — ANBS-E Strategy 2: Restriction of advertising of infant formulas

Fully implementing the Code into law or regulation is necessary and can be effective in restricting the marketing of breastmilk substitutes. Reviews and expert consensus indicate self-regulation is ineffective and legislation is necessary. However, effective enforcement and public monitoring of compliance is also necessary. Adequate sanctions and penalties for noncompliance are important, including loss of public reputation.[10, 96] Current levels of partial Code implementation in most countries are insufficient to counter inappropriate commercial marketing activity, and compliance does not appear to be appropriately reflected in company share values. Social activism and mobilisation can play an important role in monitoring violations but effective monitoring and compliance requires government resourcing for adequate monitoring of national and international compliance with the WHO Code.

For more detailed information refer to evidence for *ANBS-E Strategy 2: Restriction of advertising of infant formulas, including full implementation of the WHO International Code of Marketing Breastmilk Substitutes and subsequent relevant WHA resolutions*

B. Public law and regulation

ANBS-E Strategy 3A: Influence of returning to work and access to childcare (support for breastfeeding in the workplace and support for breastfeeding in early care and education)

EVIDENCE SUMMARY — ANBS-E Strategy 3A: Influence of returning to work and access to childcare and ANBS-E Strategy 3B: Workplace settings

There is strong evidence from diverse country settings and systematic reviews and experimental studies that longer duration of paid maternity leave increases breastfeeding duration and maternal health.[20, 36, 68, 97 98] Overall evidence is that employment policies ensuring access to suitable and flexible hours of employment enable longer breastfeeding, including exclusive breastfeeding. Evidence from systematic reviews supports the effectiveness of specific interventions in workplace settings.[34, 37] Social support for breastfeeding in workplace settings is associated with improved breastfeeding practices. However, there is evidence that limited access to workplace support may widen social inequities in opportunities for breastfeeding, supporting a policy and regulatory approach.

For more detailed information refer to evidence for *ANBS-E Strategy 3A: Influence of returning to work and access to childcare (support for breastfeeding in the workplace and support for breastfeeding in early care and education)*

ANBS-E Strategy 3B: Workplace settings

ANBS-E Strategy 3C: Childcare settings

EVIDENCE SUMMARY — ANBS-E Strategy 3C: Childcare settings

Evidence from the US, Britain and Australia supports the effectiveness of specific interventions in childcare service settings.[99-102] However, no studies provide information on the effectiveness of system-level strategies to improve the breastfeeding of children in childcare. There is some evidence for Australia that in the absence of enabling policies and strategies ensuring breastfeeding support is embedded in childcare services standards, support for breastfeeding continuation is ad hoc and not equally accessible for all women and children using childcare services.

For more detailed information refer to evidence for *ANBS-E Strategy 3C: Childcare settings*

Infant and young child feeding practices may be affected by deliberate or inadvertent interventions within various settings, including at healthcare facilities, in educational institutions or in public settings, as well as at home with family and at places in the community. Interventions in workplace or childcare settings have been discussed above, along with strategies for creating enabling environments for breastfeeding. However, for some caregivers and children, decisions on infant and young child feeding are influenced by being in a prison setting, or being situated within the child protection or welfare, family law or criminal justice systems; in these cases, having support from prison staff or welfare case workers as well as from family and friends is crucial for breastfeeding and related outcomes. The evidence about the effectiveness of available interventions or strategies proposed for the ANBS-E in these various settings is identified in turn below under the headings of welfare, justice and healthcare systems, and then home and community settings below.

C. Welfare, justice and healthcare systems

Few systematic reviews or similar studies were identified in settings or institutions relating to child protection or welfare, to family law or to the criminal justice system. There is evidence supporting expanding prison nursery programs and related education and training programs as a cost-effective and promising approach to protect the health and welfare and breastfeeding opportunities of incarcerated women and their infants and young children.[29, 103-116] Evidence about interventions or strategies of this kind is discussed in relation to Question 2 on at-risk population groups. The focus of Question 2 is on ANBS-E Strategy 6: Targeted/specialist breastfeeding support services, and ANBS-E Strategy 11: Culturally sensitive and appropriate interactions/communication.

For more detailed information refer to evidence for ANBS-E Strategy 6: Targeted/specialist breastfeeding support services (access to professional support)

Most systematic reviews or randomised controlled trials identified in this Evidence Check were in healthcare settings. Many of these focused either on the BFHI or its Ten Steps, or on breastfeeding promotion in the form of education and training interventions for pregnant or new mothers or for their health professional support people (ANBS-E Strategies 4, 5, 7). Some are about continuity of care and referral pathways, including health system-based peer support programs (ANBS-E Strategy 12), and are considered below under ANBS-E Strategy 4: The Baby Friendly Health Initiative (BFHI), and related health setting interventions. Community-based breastfeeding peer counsellor programs implemented in home and community settings are considered under ANBS-E: Strategy 8: Peer support programs.

ANBS-E Strategy 4: The Baby Friendly Health Initiative (BFHI), previously called the Baby Friendly Hospital Initiative (maternity care practices)

EVIDENCE SUMMARY — ANBS-E Strategy 4: The Baby Friendly Health Initiative (BFHI)

There is strong evidence from multiple systematic reviews and expert reviews and guidance on the effectiveness of individual components of BFHI in protecting breastfeeding initiation, duration and exclusivity in the early postnatal months.[1, 43, 51, 71, 83, 86, 88, 90, 93, 117, 118] This evidence also supports that the more BFHI steps are experienced by mothers birthing in maternity facilities, the greater the effect on improved breastfeeding outcomes. Evidence also supports the particular importance of discouraging supplementation and of ensuring mothers are connected to breastfeeding support in the community after hospital discharge. Recent quasi-experimental studies, particularly from the US, indicate the effectiveness and social equity implications of system-level programs to implement the BFHI more widely.

There is evidence that the expansion of donor human milk banking is increasing the access of vulnerable infants to human milk feeding. Systematic review evidence supports human milk banking as an intervention that facilitates transition towards breastfeeding. However, there is also some evidence that donor human milk banking may reduce access to mother's own milk or displace breastfeeding. There is also expert evidence that donor human milk banking can compete with lactation support for funding, and potentially displace fresh maternal milk feeding or breastfeeding rather than displacing commercial cow's milk-based formula.

For more detailed information refer to evidence for *ANBS-E Strategy 4 (Question 1): The Baby Friendly Health Initiative (BFHI), previously called the Baby Friendly Hospital Initiative (maternity care practices)*

D. Education and support, training in health systems

ANBS-E Strategy 5: Training of health practitioners (general practitioners, midwives, nurses, pharmacists, dietitians, students, etc.) on the benefits of breastfeeding and providing support for mothers who choose to breastfeed (professional education)

EVIDENCE SUMMARY — ANBS-E Strategy 5: Training of health practitioners

Systematic review evidence supports that education and training of healthcare workers results in improved knowledge of breastfeeding.[46] The type of education and training that is most effective remains unclear. Evidence of translation into improved practices and breastfeeding outcomes is more mixed and may depend on the attitudes and values of healthcare staff, and perceived constraints in the hospital work setting.

There is some limited evidence that improved medical curricula improves breastfeeding knowledge and advice by physicians, which is otherwise based on personal experience and opinions.[44] However, a more recent follow-up study showed that improved medical education about breastfeeding was associated with reduced confidence among physicians about advising women on managing breastfeeding issues.[119]

For more detailed information refer to evidence for *ANBS-E Strategy 5: Training of health practitioners (general practitioners, midwives, nurses, pharmacists, dietitians, students, etc.) on the benefits of breastfeeding and providing support for mothers who choose to breastfeed ('professional education')*

ANBS-E Strategy 7: Antenatal and postnatal education and support (access to breastfeeding education and information)

EVIDENCE SUMMARY — ANBS-E Strategy 7: Antenatal and postnatal education and support

Any additional education or support antenatally and postnatally increases breastfeeding initiation and duration, especially if delivery includes peer counselling support and a schedule involving several contacts postnatally. Antenatal and postnatal support over a longer duration is more effective than over a shorter duration and can be enhanced by technology.[86, 93]

For more detailed information refer to evidence for *ANBS-E Strategy 7: Antenatal and postnatal education and support (access to breastfeeding education and information)*

Table 1 The Milky Way program - interventions to prolong breastfeeding[120]

KEY AUSTRALIAN STUDY #1: **The Milky Way — a multimodal, multi phased intervention to prolong breastfeeding**

The Milky Way program was developed to enable women to breastfeed with little professional intervention after birth. The program consisted of three antenatal breastfeeding classes, followed by two postnatal lactation consultation phone calls. The program used multiple, dynamic and relational strategies to contextualise content from the WHO Baby Friendly Hospital Ten Steps and strengthen women's breastfeeding self-efficacy using *"verbal persuasion, visualization of breastfeeding success, observation of breastfeeding photos, hands on activities and role playing"*. A controlled but non-randomised (quasi-experimental) study of 366 women pregnant with their first baby and who planned to breastfeed showed that compared with standard care, women in the Milky Way group had higher rates of any breastfeeding at one month (83.7%, n = 144 versus 61.3%, n = 119, p < 0.001), four months (64.5%, n = 111 versus 37.1%, n = 72, p < 0.001) and six months (54.3%, n = 94 versus 31.4%, n = 61 p < 0.001). Women were also encouraged to develop social supports that included family and friends with experience of prolonged breastfeeding. Take-home resources included a breastfeeding calendar, DVDs and a booklet of motivational postcards. Postnatal phone calls at 10 days and three months after the birth were chosen as critical times for early weaning. The results of this trial are particularly notable given the setting in South Western Sydney Area Health Service, which included high proportions of women at risk of low breastfeeding duration: one-third aged 24 or younger, half born outside Australia, half with incomes less than $50,000 and about 10% who were single mothers.

E. Relationships and networks

ANBS-E Strategy 12: Continuity of care, referral pathways and support networks

EVIDENCE SUMMARY — ANBS-E Strategy 12: Continuity of care, referral pathways and support networks

Although most Australian mothers initiate breastfeeding, exclusive initiation rates are not known and a substantial proportion are not exclusively breastfeeding by the time of hospital discharge; about a third of new mothers have ceased exclusive breastfeeding at one month postnatally. There is only weak evidence from a small number of systematic reviews, detailed in the 2017 guidance document on Step 10, regarding the effectiveness of health system-based interventions to improve continuity of care and referral to support networks. Low rates of exclusive breastfeeding (< 6 months) suggests that the extent of post-discharge planning and referral to professional or peer breastfeeding support is inadequate to prevent premature reduction or cessation of exclusive breastfeeding. Evidence on the effectiveness of health visitors is mixed, with a recent systematic review showing poorer breastfeeding outcomes for a greater number of home visits. Providing postnatal support from health workers in the community was not effective in increasing breastfeeding in a 2016 Australian cluster RCT.[121] Nevertheless, exclusive breastfeeding at four months was improved in an RCT of a motivational interviewing approach to breastfeeding support, delivered in a primary care (GP) setting, involving provision of specific training to a practice nurse, as described in Table 2 below.[50]

For more detailed information refer to evidence for *ANBS-E Strategy 12: Continuity of care, referral pathways and support networks.*

Table 2 Training nurses in rural general practice to motivate breastfeeding mothers[50]

KEY AUSTRALIAN STUDY #2: **Training nurses in rural general practice to motivate breastfeeding mothers**

Low rates of breastfeeding duration are difficult to shift, and women in regional Australia are disadvantaged by limited access to specialised lactation support. However, a primary care intervention that educated GP nurses in southern NSW doubled the rate of exclusive breastfeeding at four months. Nurses in rural family doctor's offices were trained to speak with mothers using motivational interviewing techniques when they brought their baby for immunisation at two, four and six months. The intervention included a flowchart, training, resources and support for nurses through workshops on breastfeeding management, counselling skills, motivational interviewing and reflective practice. In this cluster randomised controlled trial of 15 rural family doctor's offices and 330 breastfeeding women, twice as many mothers breastfed exclusively (OR 1.9; 95%CI 1.01–3.5; p = 0.047) and predominantly (OR 2.0; 95%CI 1.03–3.7; p = 0.040) at four months in the intervention group than in the control group, after adjustment for the mother's plans for paid work or study. This was the first time a motivational interviewing approach had been used to increase breastfeeding duration.

F. Family and other support

ANBS-E Strategy 8: Peer support programs

EVIDENCE SUMMARY — ANBS-E Strategy 8: Peer support programs

While there are a number of studies of peer support interventions, interpretation is made difficult by the variety of settings and definitions of peer support that are used by different researchers.[51] Conventional systematic review methodologies and categorisations of 'peer support' may not be suitable for addressing the complexities involved. Hence, this Evidence Check distinguished health-system-initiated peer support programs from breastfeeding peer counsellor support by discussing the former 'top down' approaches under 'continuity of care' (ANBS-Strategy 12)) and the latter as 'peer support programs' under ANBS-E Strategy 8.

Community-based breastfeeding peer counselling support is well established as improving breastfeeding duration and exclusive breastfeeding, particularly in countries with high initiation rates and where substantial training is provided for peer counsellors.[51, 52]

An Australian evaluation of the telephone helpline provided by trained ABA volunteer breastfeeding counsellors, which was described as leveraging off extensive organisational infrastructure, found high levels of satisfaction and reports of improved breastfeeding practices. Economic evaluation provided evidence supporting the cost-effectiveness of the volunteer service from the health funder perspective, but there was no evaluation of the sustainability and long-term impact of this service delivery model on the organisational infrastructure.

For more detailed information refer to evidence for *ANBS-E Strategy 8: Peer support programs*

ANBS-E Strategy 9: Influence of support person/people

EVIDENCE SUMMARY — ANBS-E Strategy 9: Influence of support person/people

Limited systematic review and quasi-experimental evidence supports the effectiveness of interventions to improve social support for breastfeeding, such as by male partners or female relatives such as

grandmothers. Education and training that equipped and motivated grandmothers to support the breastfeeding self-efficacy of their teenage daughters was effective in increasing breastfeeding in an urban Thai community.[56]

> For more detailed information refer to evidence for *ANBS-E Strategy 9: Influence of support person/people*

G. Other strategies in settings

ANBS-E Strategy 10: Other strategies

EVIDENCE SUMMARY — ANBS-E Strategy 10: Other strategies

Milk sharing and cross-nursing social and online networks

No systematic review or experimental evidence is available on the effectiveness of milk sharing or cross-nursing in improving breastfeeding outcomes. Like milk banking it has the potential to displace as well as support breastfeeding and has less advantage to health than maternal breastfeeding. Studies in Australia and the US show this is a re-emerging social practice that is reported to be motivated by mothers wanting to help other mothers who are temporarily or permanently unable to breastfeed, or tiding mothers over breastfeeding difficulties. There is evidence that women involved in milk sharing implement multiple and diverse strategies to reduce risks to acceptable levels, and that the practice is consistent with improving social equity in infants' access to breastmilk.[122, 123] The Academy of Breastfeeding Medicine recently issued milk sharing guidelines to inform health professionals providing advice to mothers considering cross-nursing or milk sharing. The guidelines acknowledge the potential contribution of the practice as an intervention to support breastfeeding, but discourage 'internet-based' milk sharing, where the donor is unknown to the recipient and/or medically unscreened. They also provide information to assist hygienic handling and storage of milk.[38]

Infant and young child feeding in emergencies (IYCF-E)

The fundamental means of preventing malnutrition (over and under-nutrition) and mortality among infants and young children is to ensure their optimal and appropriate infant and young child feeding (IYCF) practices, adequate access to health services, and nurturing childcare practices. IYCF is essential in promoting resilience to the potential negative impacts of shortfalls in the days following a disaster.i During emergencies, breastfeeding is a shield that protects infants by providing food security, comfort, warmth and protection. Therefore, the protection, promotion and support of optimal breastfeeding practices and support of artificial feeding need to be continued, especially during emergencies. However, response related to infant and young child feeding and breastfeeding, particularly during emergencies, is often less than adequate.[40, 41, 73]

> For more detailed information refer to evidence for *ANBS-E Strategy 10: Other (enabling environment) strategies*

[i] UNICEF. Nutrition in Emergencies. Module 13: Management of Severe Acute Malnutrition. 2011.

Question 2:

The secondary question for this Evidence Check was:

> *What does the literature report on whether the effectiveness of these strategies differs for specific population groups?*

ANBS-E Strategy 6: Targeted/specialist breastfeeding support services (access to professional support)

EVIDENCE SUMMARY — ANBS-E Strategy 6: Targeted/specialist support services

The most recent systematic reviews identified no evidence that the interventions examined affected 'any breastfeeding' differently for subgroups, but that interventions should be tailored to the setting and needs of the population group.[81, 86] Evidence suggests additional support targeted to at-risk mothers may increase breastfeeding.[124, 125] Effectiveness is greater if peer counsellor support is also provided alongside health professional support.[126, 127] Support is most effective if delivered one on one and face to face.[128] Women experiencing multiple social or other risk factors for breastfeeding cessation may be assisted by additional or more intensive support.[129] Health workers such as nurses or midwives with specialist skills or training, including in sensitive and appropriate interactions, may be effective in facilitating breastfeeding outcomes among high-risk women.

> For more detailed information refer to evidence for *ANBS-E Strategy 6: Targeted/specialist breastfeeding support services (access to professional support)*

The evidence about the effectiveness of interventions for specific high-risk groups is generally sparse and few systematic reviews are available. Breastfeeding outcomes are rarely the primary focus of intervention studies and often are not reported. Available evidence identifies population groups who are socially or medically at risk of premature breastfeeding cessation and mixed feeding.

Evidence related to whether interventions differentially affect breastfeeding success among population groups with multiple risk factors for premature cessation of breastfeeding is summarised below, using the example of Australia's Aboriginal and Torres Strait Islander people. Breastfeeding among the Indigenous Australians illustrates the complex and multiple risk factors involved in short duration or no breastfeeding among some population groups, and the interventions or strategies that are likely to be most effective in improving IYCF practices.

Compared with non-Indigenous mothers, Indigenous mothers have lower rates of breastfeeding initiation, duration and exclusive breastfeeding, and are less likely to continue breastfeeding as recommended. Indigenous children are more likely never to have been breastfed.[5, 130-133] Only very remote location is protective of breastfeeding initiation among Indigenous Australian women and their children.[134] However, a barrier to the preservation of Indigenous traditional breastfeeding culture and practices is the requirement for pregnant women from remote communities to travel long distances to access maternity care, which separates them from family and community support around the time of birth.

Indigenous Australian women and children often experience multiple risk factors for premature cessation of breastfeeding, with higher rates of smoking, obesity, maternal diabetes, teenage motherhood, low-birthweight infants and preterm births, delays in accessing antenatal care, lower levels of income and education, less maternal breastfeeding knowledge and support from partners, families and communities, high rates of social stress from crowding and poor housing, violence and sexual abuse, substance abuse, systemic racism, and separation of mothers and children intergenerationally and currently through higher rates of incarceration and out-of-home care.

ANBS-E Strategy 11 (Question 2): Culturally sensitive and appropriate interactions/communication

EVIDENCE SUMMARY — ANBS-E Strategy 11: Culturally sensitive and appropriate interactions

The evidence about effective interventions and strategies to increase optimal breastfeeding among Aboriginal and Torres Strait Islander women highlights the need for culturally sensitive interaction and communication and maternity and newborn care, that is also integrated with programs addressing the multiple health and social issues that are barriers to optimal IYCF.

However, the effectiveness of breastfeeding interventions for Indigenous populations in Australia and worldwide is under-researched and highly heterogeneous. Breastfeeding promotion is often included in programs that aim to address the large inequities in health but is rarely evaluated. This is true also for other high-risk population groups.

The limited evidence from reviews of health interventions that include breastfeeding by at-risk groups emphasises the effectiveness of individual counselling or education delivered by health workers that covers both the prenatal and postnatal periods, and that is long term and intensive.[51, 81, 83, 86, 93, 124, 126, 129, 135] Effective strategies included combinations of group and individual sessions and home visits. Professional support was effective in increasing breastfeeding duration, and lay support in increasing exclusive breastfeeding.[127, 128, 136, 137]

This Evidence Check identified studies indicating that in indigenous populations in other countries, interventions such as women's, infants and children (WIC) peer counselling support, and multifaceted, culturally appropriate breastfeeding promotion involving components of social marketing, more baby friendly healthcare, and individual education and support, including targeting family members, have been effective. However, some literature indicates that the traditional influence of family elders supportive of breastfeeding may be waning.

There is evidence of the effectiveness of culturally appropriate Indigenous health programs delivered within holistic primary healthcare services controlled by Indigenous organisations. Multiple opportunities to provide mothers and communities with consistent breastfeeding promotion, education and support also occur when maternity care and maternal and child health services follow a model of continuity of woman-centred care from pregnancy through to pre-school age, delivered by Indigenous community controlled organisations and Indigenous health professionals and employed or lay staff and health and childcare workers.[138-143] However, most Indigenous women give birth in mainstream hospitals that provide standard maternity care. Addressing the break in the continuity of culturally safe care may involve:

- Developing local maternity services and birth facilities for Indigenous communities, such as 'Birthing on Country' programs
- Ensuring that all health professionals who work with Indigenous mothers, infants and young children receive education in cultural competence
- Addressing high needs for training in promotion and management of breastfeeding and child nutrition among health workers and staff in Indigenous organisations.

For more detailed information for Question 2 refer to evidence for:

ANBS-E Strategy 11 (Question 1): Culturally sensitive and appropriate interactions/communication

ANBS-E Strategy 11 (Question 2): Culturally sensitive and appropriate interactions/communication

ANBS-E Strategy 6: Targeted/specialist breastfeeding support services (access to professional support)

Gaps in the evidence

There are many unaddressed gaps in robust, multidisciplinary intervention and translational research of sufficient scale, using appropriate design and methods and with adequate power, for evaluating complex breastfeeding promotion policies and interventions including exclusive breastfeeding outcomes at < 6 months and continued breastfeeding outcomes at 6–23 months.

There is a dearth of research evaluating the effectiveness of different policies. Also, research into financing methods and costs of scaling up the WHO/UNICEF Global Strategy for Infant and Young Child Feeding (GSIYCF)[3] and other breastfeeding-enabling policies and programs relative to their full range of benefits, including maternity entitlements, is urgently needed. There are also major gaps in knowledge about what level of support is needed for socially at-risk women to increase breastfeeding. Interventions outside of health settings are under-researched, particularly complex and multifaceted interventions by breastfeeding support organisations

Because of policy synergies, there is a need to draw on and integrate research about effective breastfeeding interventions into other public health research on commercial determinants and industry interventions including on how to address and manage conflicts of interest, and how to identify and counter industry interventions.

A selection of key areas for research arising from this Evidence Check is outlined below.

Research on policies for enabling environments and addressing structural barriers

Regulation, marketing and use of young child milk products in Australia — WHO Code, marketing

- Studies of policy conflicts between public health objectives in infant and young child feeding and dairy industry / food industry influence on policy development and governance in Australia relevant to domestic and export markets
- Translating evidence into action by regulatory authorities to enforce restrictions such as on health and nutrition claims for breastmilk substitutes promoted for children aged 0–36 months in line with the WHO Code, the UN Food and Agricultural Organization's Codex food standards and other relevant international guidance. Codex recommends prohibiting health and nutritional claims for IYCF products (for children from 0 to < 3 years of age)
- Applying the WHO Code to Food Standards Australia New Zealand (FSANZ) standards for toddler milk and WHO recommendations for labelling and packaging of commercial complementary foods (child ages < 6 months)
- Examine whether there are the differential impacts of restraints on marketing on optimal breastfeeding among at-risk (e.g. low-SES) population groups.

Public awareness or social marketing approaches to empower women about breastfeeding

- Evaluate cost-effectiveness of ongoing large-scale media/social media campaigns, social marketing and counter-marketing in high-income countries in changing behaviour, compared with cost and effectiveness of restraints on marketing, and when integrated with other interventions such as counselling or education
- Test culturally sensitive and appropriate messages in Australia to inform best social marketing messaging and behavioural change model for campaigns without 'guilt' backlash
- Multidisciplinary approach to design of media campaigns or social marketing interventions to enhance public profile and awareness of the economic value and importance of breastfeeding to maternal as well as child health
- Action-oriented research involving or led by breastfeeding support organisations such as ABA together with marketing experts, to improve social marketing of breastfeeding.

Medical education, school-based programs and integrated curricula

- Investigate the effectiveness and cost-effectiveness of sustained school-based social marketing or health education programs, or other strategies, in raising public awareness of the value of breastfeeding and the power of commercial marketing
- Expand medical curricula and pre-service education and training on breastfeeding importance and management, to reduce cost and increase feasibility of BFHI implementation
- Suitable information, education and training or awareness-raising on growth chart interpretation for families and health professionals.

Intervention settings

Gender and social equity, breastfeeding, employment and childcare

- Evaluation of breastfeeding equity implications of a Baby Friendly Workplace Accreditation (BFWA) type scale-up in workplaces and childcare vs. paid parental leave (PPL) expansion to six months, paid breastfeeding breaks or part-time work
- Controlled trials of package of workplace and employment measures to motivate and maximise flexibility of choice for maintaining exclusive breastfeeding (EBF) to six months
- Cluster RCT to test effectiveness of baby friendly childcare (BFCC) in increasing breastfeeding duration and continuation
- Evaluate training package and education curriculum for childcare workers on breastfeeding
- Test effects on knowledge and empowerment of provision of information to new mothers about sex discrimination laws, and how to enforce rights to non-discrimination in high-risk areas or occupations (cafes, bus drivers, security guards, workplace)
- Evaluate equity of access to human rights protection for breastfeeding among Indigenous, incarcerated and other disadvantaged groups.

Future implementation of BFHI as a scaling-up issue

Ample evidence exists that BFHI-type support is essential for breastfeeding exclusivity and duration. The key research question is how such support can be made universally available and equitable through implementation and quality improvement approaches.

- Testing for association between BFHI accreditation/designation status, mothers' experience of Ten Steps support, and breastfeeding rates
- Identify process for future scaling up or translation of BFHI into universal practice/accreditation systems, in all jurisdictions
- Examine cost-effectiveness and health/breastfeeding equity impact of incorporating BFHI practices and procedures into hospital accreditation standards
- Mixed methods research at hospital-system level on how extensive BFHI, including WHO Code implementation re formula purchase, is nationally (i.e. women's experience of Ten Steps in comparison with hospital's self-report), and health workers' and mothers' attitudes to it, and institutional incentive effects of implementing a hospital policy that requires purchase of formula
- Identify non-commercial (no conflict of interest) breastfeeding education and training activities and the needs of multidisciplinary healthcare staff in different contexts, and evaluate interventions
- Robust research to underpin adoption of a specific standard for using formula only when medically indicated or specifically requested and by fully informed mothers who are breastfeeding
- Cost-effective postnatal discharge processes to link mothers effectively to specialised and community support
- Implementation research on ways of teaching responsive feeding, recognising infant cues
- Evaluate effectiveness of involving family in education, counselling and information efforts about importance and management of breastfeeding

- Look at the effects of donor human milk (DHM) vs. mother's own milk (MOM) and other forms of NICU breastfeeding support on transition to enteral feeding and breastfeeding, and on clinical variables such as mortality, NEC, sepsis and longer-term health benefits, and compare cost/cost-effectiveness
- Improved healthcare systems for screening donor milk and for treatment/pasteurisation to improve milk content/quality; simplified screening and treatment methods for safe sharing.

Effective and cost-effective health professional training delivery for working with parents

- Identification of most effective education and training delivery modes to meet professional competency standards to address common and complex or persistent breastfeeding challenges
- Research on the breastfeeding behavioural outcomes of Step 2 training and nature of training; robust measures, i.e. core set of breastfeeding outcomes are measured
- Develop pre-service compulsory curricula or other education or social marketing resources targeting medical students
- Audit extent of industry-provided professional development activities received by health professionals caring for IYC
- Test effects of industry marketing and health professionals' knowledge and compliance with WHO Code on breastfeeding support knowledge, attributes and practices
- Evidence about breastfeeding education and training of health workers in the knowledge, attitudes, skills and competence needed to work effectively with breastfeeding parents.

Choosing the best packages for education and support

- Robust evidence base for choosing the most appropriate education and intervention for a given setting and population, and the timing of that intervention
- Effective combinations, timing and mode of education and support interventions involving both health professionals and peer supporters should be developed and evaluated; nature, and who should provide it
- Further well-designed RCTs evaluating home visit interventions
- RCTs on breastfeeding support and continuity of midwifery care models vs. standard models of care
- Validate education standards in existence for efficacy and cost of scaling up, link with implementation and accreditation.

Continuity of care, referral

- Identify and test interventions that address system-level factors that are barriers to continuity of midwifery care and referral to community with sensitive, culturally appropriate and specialised/targeted support as needed
- Scale up proven practice nurse/peer support team motivational interviewing intervention in primary care settings.

Evaluation of complex, multifaceted breastfeeding counsellor peer support and capacity resourcing

- Explore inconsistences in evidence about peer support and examine effects of complex, multifaceted breastfeeding counsellor peer support interventions in some country settings or communities
- Evaluation gap about complex peer support interventions, so need translation research and capacity-building on effectiveness of community-based social mobilisation and breastfeeding education activities

- Addressing social and gender equity by scaling up established interventions e.g. BFHI, PPL, BFCC, investment in training health workers, Australian Breastfeeding Association (ABA) relational style of support, validate BFI community, neonatal BFHI
- Use validated relationally-based peer support strategies (such as ABA) and cost scaling up the nature, mechanisms and effects of complex, multifaceted peer-led intervention programs in home or community settings
- Sustainability and effectiveness of a telephone helpline as the main and universal solution (including for at-risk groups) from a service delivery model leveraging off the limited social capital/infrastructure that underpins volunteer peer support.

Other emerging strategies

- Do milk banking, safe milk sharing and low-cost hospital formula reduce or increase the availability of other lactation support, and breastfeeding outcomes
- Developing an Australian disaster and emergency response for IYCF-E, including relactation if feasible and appropriate
- Developing the means and motivations for safe milk sharing in the community without medical supervision.

At-risk populations

Culturally sensitive and appropriate maternity care for Indigenous and other at-risk Australians

- Effectiveness of implementing evidence-based and culturally sensitive models of maternity care for reductions of interventions in childbirth, on breastfeeding outcomes
- Effectiveness in Australia of financial and tax incentives for breastfeeding among low-SES and high social risk women
- Effectiveness in improving Australia's compliance with human rights obligations, particularly for socially vulnerable children through breastfeeding-related maternal and child health and wellbeing interventions such as prison nurseries and parenting programs supporting breastfeeding for incarcerated mothers
- Addressing a lack of awareness on the human rights importance of breastfeeding and the best interests of the child among staff dealing with child protection or family law disputes
- Trial of the effectiveness of interventions underpinning marketing to health professionals, for example of probiotics for the treatment and prevention of mastitis in breastfeeding women, or for infant feeding problems.

Discussion/synthesis of findings

Key findings

In line with the project proposal and updated protocol agreed with the client, this rapid Evidence Check has identified 430 reviews of reviews, systematic reviews, randomised controlled trials, and other key papers, published peer-reviewed studies and grey literature, through several relevant databases and through a systematic process for identifying and filtering the literature, confirming that a range of strategies or interventions, in varied settings and targeting diverse populations, can be effective in improving optimal IYCF practices, especially breastfeeding.

It has identified evidence that integrated strategies and coherent combinations of strategies work better than uncoordinated strategies, multiple strategies work better than single interventions, and appropriate fiscal packages can fund effective education and support or training programs, as well as change financial incentives and IYCF outcomes. Strategies or interventions involving legislation or regulation may be cost-effective for governments compared with funding strategies or interventions in particular settings. For some women and their children, optimal breastfeeding requires them to tackle multiple intersecting barriers. Strategies and interventions to address their specific needs are likely to be necessary, and also effective. Nevertheless, strategies and interventions designed for healthy mothers and babies in the usual settings will contribute if delivered with an intensity and resourcing commensurate with the barriers these women face.

This Evidence Check has been designed and conducted with a wide scope and in a very short time frame, and is tailored for the Australian policy environment. It balances a systematic approach to peer-reviewed academic literature based mainly in health settings with the need to include grey literature of varying quality if high-risk population groups are to be included and if evidence is to be gathered to address cultural, social and commercial determinants of current suboptimal IYFC feeding practices.

Given the time frame and limited resources available, quality assessment rests on study design rather than on detailed analysis of included study methodologies. Data extraction and the depth of analysis and critical review are also reduced in the interests of timeliness and relevance to the client's requirements. A balance between an a priori and iterative study approach was necessary to designing and implementing the study protocol, and a pragmatic approach, informed by an interdisciplinary conceptual framework spanning social sciences, public health and health sciences, was necessary in the time frame to organise the data on effectiveness of strategies.

In order to inform an enduring Australian National Breastfeeding Strategy (ANBS-E), multiple and diverse strategies or interventions needed to be included in the Evidence Check, which can be implemented in multiple and highly diverse settings. An innovative approach to integrating social science and public health frameworks was used to organise the results, summarised for each question below.

Question 1:

What does the literature report on the effectiveness of strategies to influence optimal infant and young child feeding (IYCF) practices in OECD countries?

- Evidence from other areas of public health and nutrition, such as tobacco control, food marketing to children or alcohol policies can inform choices about effective and cost-effective approaches to improving infant and young child feeding (IYCF)
- Integrated strategies work better than uncoordinated strategies

- Multiple strategies work better than single interventions
- There are feasible and effective approaches for resourcing breastfeeding strategies from health-system cost savings and/or food tax redesign at policy or system level.
- Strategies or interventions to address commercial marketing activity that undermines optimal infant and young child feeding (IYCF) are effective. However, social marketing campaigns may be costly to implement for long enough to change behaviours
- Social marketing campaigns such as those addressing cultural barriers to breastfeeding in public are effective in raising awareness of the importance of breastfeeding, including in high-income countries such as Australia
- For well mothers and infants, there are few identified cost-effectiveness studies of specific breastfeeding interventions in OECD countries. Financial incentives and/or subsidies are emerging as an effective strategy for maintaining any breastfeeding among low-income groups
- Effective regulation of commercial food marketing targeting infants and young children may be more cost-effective than social marketing or financial incentives directed at redressing commercial marketing messages that undermine breastfeeding
- Maternity care practices to support breastfeeding based on the BFHI Ten Steps are effective
- BFHI implementation, and education and support interventions from combined trained health professionals and lay support people involving continuity of care and referral to social networks, are effective strategies based in healthcare settings
- BFHI may require full integration into health systems and medical (and other health professional) curricula to ensure that access to quality maternity care is equitable and does not reinforce social disadvantage and vulnerability, or widen existing inequalities in opportunities for breastfeeding and optimal women's and children's health
- The most effective interventions, including breastfeeding counselling peer support, may be complex and multicomponent, making them difficult to evaluate
- Interventions to address barriers to breastfeeding in work settings are effective in Australia and elsewhere but cannot be relied on to provide equitable access to breastfeeding support for working women. This is because the evidence is that the most at-risk mothers, confronted by multiple barriers to breastfeeding, are those least likely to be employed in breastfeeding-friendly and supportive work settings and occupations
- Breastfeeding by mothers and infants or young children is likely to be higher in childcare settings where there are specific and active support strategies in place. However, such strategies are not widely implemented in most countries, including Australia, and cannot be relied on by policy to provide equitable access to breastfeeding education and support. Nor will these settings provide sufficient support to at-risk mothers and children
- Encouraging MOM and donor milk and providing specialised lactation support are likely to be effective and cost-effective interventions for at-risk infants and mothers in healthcare settings.

Question 2:

> *What does the literature report on whether the effectiveness of these strategies differs for specific populations?*

Emergencies or disasters shift all infants and young children into an at-risk category by heightening the risk that breastfeeding will be reduced or ceased, and through the increased risk emergencies and disasters pose to infants and young children who are not breastfed. Socially disadvantaged families are most exposed to harm from such events.

The Evidence Check found no studies showing the effectiveness of the above strategies in improving optimal infant and young child feeding, including breastfeeding, differs for specific population groups,

despite their lower prevalence of breastfeeding. Certain population groups, such as young or low-income mothers, may face multiple social or other barriers to optimal breastfeeding. Improving breastfeeding opportunities and influencing breastfeeding outcomes for these at-risk groups of mothers and children may require more intensive, or additional or specialised support, addressing particular settings or circumstances, or may require changes to particular public or institutional policies or procedures and practices.

- Facilitating breastfeeding among at-risk mothers such as obese mothers, those with particular health conditions, or those whose breastfeeding is affected by obstetric or childbirth complications, including premature, epidural or caesarean section deliveries, can be effective for some populations
- Regulatory, education and training, and clinical interventions are available that may assist mothers or their support persons when they are considering using medications or undergoing treatments or procedures that are known to adversely affect breastfeeding
- Strategies or interventions supporting optimal feeding of at-risk infants such as preterm infants or twins, or those affected by maternal drug or alcohol abuse (neonatal abstinence syndrome — NAS) also may be effective for some populations
- Evidence from particular cultural and country settings indicates breastfeeding by some at-risk populations may be effectively facilitated by grandmothers
- Likewise, evidence from particular country and sector settings including high and middle-income countries indicates specific barriers to optimal feeding facing indigenous mothers and children
- Experience from disasters and emergencies around the world demonstrates that strengthening IYCF-E policy and planning will help to protect the health and feeding of all infants and young children in disasters and emergencies, and would be assisted by wider implementation of published guidelines and best practice responses in these settings by health and nutrition teams, or other personnel

Applicability

The applicability of the evidence to Australia and to the wide and diverse range of strategies under consideration was considered by the review team. The Evidence Check gives particular regard to generalisability of studies from other OECD countries, high or middle-income countries or comparable healthcare or employment settings, and Australia's geographic location in the Asia-Pacific region.

The applicability of evidence about interventions in particular country or healthcare system contexts, such as the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) in the US, private or public hospitals in Singapore, or the publicly funded NHS system in Britain, was taken into account in consideration of interventions such as involving healthcare funding or constraining marketing through health channels.

The implementation of strategies and interventions within the context of Australia's fiscal federalism, federal and state employment laws and awards, and healthcare delivery and funding arrangements was also taken into account in structuring the report.

Developing a national strategy for breastfeeding in Australia requires consideration of the different but sometimes overlapping roles and responsibilities of Australian governments. These responsibilities include regulation of employment conditions or childcare services standards, healthcare delivery and financing, and laws or regulation enforcing restraints on marketing to consumers, sex discrimination, or operations of family law and prison systems. It also requires consideration of whether the culture will support recommended IYCF practices including exclusive and extended breastfeeding.

Conclusion

Strategies exist that demonstrate that breastfeeding practices can be improved by modest amounts through a range of proven interventions in health settings. Central among these is the BFHI Ten Steps standard. However, only modest improvements in breastfeeding can be expected without a more enabling systematic approach that ensures wide access to BFHI maternity and newborn care practices, integrated with other enabling policies, in particular with community-based breastfeeding support.

Exclusive and extended breastfeeding has not been widely practised in Australia and there has been only limited improvement in breastfeeding initiation and duration since the 1990s. Achieving larger gains in optimal breastfeeding, particularly exclusive and extended breastfeeding, will require more broad-based strategies. These include addressing the structural determinants of premature cessation of optimal breastfeeding, such as marketing and public health messages about IYCF, employment, childcare and paid maternity leave policies, and improved breastfeeding support in workplace and childcare settings. Regular collection and publication of key data on breastfeeding practices is needed to underpin effective strategies, including maintaining and generating the focus and commitment of policy makers facing conflicting policy objectives.

Organisations such as the World Bank now recognise that investments in breastfeeding can demonstrate high economic payoffs in terms of health-system savings and economic productivity.[58] Achieving WHO recommended levels of breastfeeding in Australia would represent a more than doubling of the national supply of human milk and the potential for substantial health cost savings.[14, 59] Such a scenario would require proactive, innovative and 'joined up' strategies such as those described by Pérez-Escamilla and Moran in 2016.[61] This would scale up and coordinate health-system-based interventions with community-based and other strategies to change the wider social environment. It could involve valuing breastfeeding as an important element of the food system and food security for infants and young children. Without specific investments to support mothers to breastfeed in difficult circumstances, interventions may improve breastfeeding opportunities for some but worsen rather than improve social inequities in health.

For those facing multiple barriers to breastfeeding, greater investments are justified, both on equity and economic grounds.

Appendix 1: Search Strategies

The strategies identified studies by:

1. Updating two recent systematic reviews[144, 145] through searches of the major databases and the MeSH and/or common search terms used in those studies (Cochrane, PubMed, MEDLINE, PsycINFO, CINAHL)
2. High-quality recent reviews and key papers of high relevance and quality identified by the expert panel and researcher networks across the range of strategies listed
3. Hand searches of reference lists including backward and forward tracing of citations focused on identifying additional grey literature, and other very recent key papers.
4. A 'dragnet' search of selected electronic databases (MEDLINE, Scopus, ProQuest, SuperSearch, CINAHL and Google Scholar) using both MeSH and common terms to identify grey literature and fill gaps in studies for specific population subgroups, interventions and/or outcomes that are not well represented in 2)
5. A thematic content analysis of the most recent industry reports in the Euromonitor Passport database country studies on public and commercial strategies influencing trends in baby milk and baby food markets in countries selected for comparability with Australia and relevance to the Asia-Pacific region. It proved impractical to search the World Advertising Research Center (WARC) database on advertising and media effectiveness as had been planned.

The database search strategies were constructed using keywords combined into groupings (**Error! Reference source not found.** using the PICOTS structure: Participant, Intervention, Comparators, Outcomes, Time and Settings. Search limits varied for each search strategy and database but covered periods from 2007 to 2017, and were limited to English-language publications with both titles and abstracts, and full text, and to studies of human subjects.

Articles retrieved by the search strategy had at least one term from each PICOTS grouping. Word truncation and wildcards allowed for variations in spelling and word endings. Appropriate search terms were used for relevant databases, e.g. MeSH; or broad search terms, e.g. "breast AND feed", "breast AND milk". For policies and indirect enablers/disablers of breastfeeding and for lesser-studied interventions, search terms allowed for a wider range of study designs.

Industry studies were retrieved online from the Euromonitor Passport database, included in Endnote databases like other retrieved studies, and all text was entered into tables for systematic keyword searches indicating the effects of public regulatory or industry marketing strategies or interventions on country sales of baby food in 2015–2016 and beyond.

Eligibility criteria

The investigator team developed and finalised inclusion and exclusion criteria for the Evidence Check in consultation with the agency, Sax Institute and expert advisers.

The eligibility criteria are detailed in the Inclusion-Exclusion Table see *Table 4 Summary of literature inclusion and exclusion criteria*.

Articles were included if they described investigations that aimed to evaluate the effect of interventions targeting breastfeeding or breastmilk feeding of infants, or young children under three years of age. Included were existing reviews of the evidence, or key research papers.

All study designs were initially eligible for inclusion, depending on the search strategy. Studies from either published or grey literature with a publication date between 1 January 2007 and the search date were included.

Only evaluated interventions were included in the main strategy (SS) based on updating recent reviews by Sinha[144] and Skouteris[145] (see *Table 1 Information source summary)*. Articles were excluded if they described only the nature of interventions, or only described feeding practices. Articles published before 1 January 2007 or after 31 December 2017, or in a language other than English were excluded, also those with no English abstract and where the full text could not be acquired by February 2018. Those articles on interventions in healthcare settings that did not clearly describe interventions influencing primarily optimal breastfeeding outcomes or that reported only on other IYCF or child health outcome measures were excluded. Studies identified as relevant to the secondary question were included in the review if they provided relevant evidence on the effects of strategies or interventions on comparable population subgroups with low breastfeeding rates in OECD countries.

Study selection

Peer-reviewed and grey studies

Articles identified by the database search strategy went through two review stages for eligibility: title and abstract screening and full-text eligibility verification.

An initial trial of the inclusion and exclusion criteria was conducted by three reviewers on 100 titles and abstracts retrieved through the main search strategy. If concordance was less than 90% the inclusion and exclusion criteria was reviewed and the concordance tested again. Two reviewers conducted a first-round review of the remaining titles and abstracts using the initial eligibility criteria. A second round of screening of titles and abstracts (calibration) by two reviewers ensured that the platinum, gold or silver studies conducted in high to upper-middle-income countries were consistently selected for inclusion in the PICOTS group. First-round expert panel contributions were also screened in the same process using the same criteria.

During the screening process, it was determined that further refinement of the eligibility criteria, particularly in terms of enabling strategies, high-risk populations, non-healthcare settings and relevant countries included was required.

When screening titles and abstracts from the expert panel networks, desktop and hand searches, a second category of titles and abstracts were included in a group called non-PICOTS. These were studies considered important because they: (1) filled anticipated or apparent gaps in the evidence; (2) flagged new and emerging or promising interventions or the need for them; and (3) provided insights into what interventions work.

The three reviewers screened the titles and abstracts of all retrieved articles from the SS search strategy and allocated them to either the Included or Key Papers groups. The full-text articles were reviewed in order to exclude ineligible manuscripts (third screening stage). Those that were equivocal were discussed by the two reviewers and included/excluded accordingly. Two reviewers examined the full articles in order to verify eligibility and identify those of sufficient methodological quality, and relevant design and focus for inclusion in the analysis (eligibility stage).

Further expert panel input was also provided at the end of the SS searches following review of PICOTS criteria search results. For enabling strategies or policy interventions addressing the cultural, social or

economic policy environment for breastfeeding[146], for those outside healthcare settings, and for interventions targeting high-risk groups where platinum, gold or silver peer-reviewed literature was not being retrieved, key papers of sufficient quality from both peer-reviewed and grey literature were included where a study was judged by individual expert panel members and on full-text review to substantially inform one or both of the research questions. Studies that were included based on criteria outside the PICOTS framework are separately recorded in the PRISMA diagram.

Industry studies

Industry reports on baby food markets were purposively selected from the Euromonitor Passport database until sufficient representation and diversity was achieved of relevant country characteristics such as region, especially countries in the Asia-Pacific region relevant to Australian immigration and trade flows; population/market size; OECD, high-income, upper- middle- and lower-income status; regulatory environment; and optimal IYCF practices.

Country reports retrieved from the Euromonitor database were for Australia, New Zealand, Japan, Sweden, Denmark, Norway, South Korea, Britain, US, Chile, Mexico (OECD countries); Singapore (HIC), Hong Kong, China, Malaysia, India, Philippines, Vietnam and Brazil (MICs).

Searches were then conducted in the full text for keywords indicating industry strategies to increase sales of commercial baby foods, which are covered by the WHO Code and subsequent WHA resolutions. Examples included policy, regulation, advocacy; packaging, labelling, promotions, reformulation, advertising; effect, influence, shape drivers; preferences, convenience, health conscious, caregivers, working mothers, doctors, health professionals, health worker, health channel.

Country reports were selected for inclusion if they included text on public policy, regulation or industry counter-regulatory or industry marketing strategies or interventions; marketing channels, strategies, tactics or techniques such as those defined by the 'four Ps' of marketing (product, price, position, promotion) or the WHO Western Pacific Region 2017 report on the marketing of food for children and its influence on sales to targeted populations and subpopulations of caregivers, including mothers, or their consumer preferences. Text data on interventions and outcomes was then extracted into a table for analysis.

Appendix 2: Organising framework for interventions and strategies

Categorisation of intervention/ strategy/ exposure/ technique	
Context: social, economic and cultural determinants and institutions	A. Public awareness/ marketing/ cultural messaging
	B. Public law and regulation
	C. Health and welfare systems/practices
	D. Education and support, training
	E. Family and other support
	F. Other strategies
	G. Relationships and networks

Appendix 3: Conceptual framework mapping of ANBS strategies/interventions

Categories

1. Public awareness and acceptance campaigns (social marketing)
2. Restriction of advertising of infant formulas, including full implementation of the WHO International Code of Marketing Breastmilk Substitutes and subsequent WHA resolutions (addressing the marketing of infant formula)
3. Influence of returning to work and access to childcare (support for breastfeeding in the workplace and support for breastfeeding in early care and education)
4. The Baby Friendly Health Initiative (BFHI), previously called the Baby Friendly Hospital Initiative (maternity care practices)

Settings

5. Training of health practitioners (general practitioners, midwives, nurses, pharmacists, dietitians, students, etc) about the benefits of breastfeeding and providing support for mothers who choose to breastfeed (professional education)
6. Targeted/specialist breastfeeding support services (access to professional support)
7. Antenatal and postnatal education and support (access to breastfeeding education and information)
8. Peer support programs (peer support programs)
9. Influence of support person/people
10. Any other additional strategies that have been proven to increase breastfeeding that are identified during the review process

Processes

11. Culturally sensitive and appropriate interactions/communication
12. Continuity of care, referral pathways and support networks.

Appendix 4: Detailed evidence by ANBS Strategy

ANBS-E Strategy 1

ANBS-E Strategy 1: Public awareness and acceptance campaigns (social marketing)

The Evidence Check identified some evidence about whether the cultural environment for breastfeeding can be modified by public awareness and acceptance campaigns or similar interventions and strategies such as social marketing. These studies demonstrated that shifts in awareness could be achieved but might be costly to sustain long enough to change behaviour. This raised questions about the financial sustainability and effectiveness of social marketing as a strategy to counter the influence of commercial marketing, and the extent to which the effectiveness of media campaigns relies on being integrated with social mobilisation. Some studies also raised questions about potential negative outcomes of such campaigns in a context where women experience structural barriers to breastfeeding.

Media campaigns

The 2009 evidence review recommendations for breastfeeding promotion in Britain identified that local media programs were effective in targeting groups least likely to breastfeed, such as teenagers, to improve attitudes towards breastfeeding.[147]

A recent population health telephone survey in Ottawa, Canada[148], assessed public support for breastfeeding in public among adults in Ottawa and found that, overall, 75% of respondents agreed it was acceptable for a mother to breastfeed her baby in both a restaurant and shopping mall. Negative attitudes towards public breastfeeding were more common among respondents who did not have children at home, were less educated, or had a mother-tongue language other than French or English. Women and immigrants living in Canada for more than 15 years were also less likely to support breastfeeding in shopping malls. Such lack of cultural acceptability of breastfeeding in the company of others may affect breastfeeding practices.

A systematic review of factors supporting low-income WIC mothers in the US found media promotion and improving the WIC participation environment promoted breastfeeding initiation and continuation.[149] Despite laws to protect breastfeeding in public, recent studies in Britain, the US and Canada report that women's perception or experience of negative attitudes by others discourages breastfeeding.[148, 150, 151]

The 2017 systematic review by Sinha[88] found very high effectiveness of integrated mass media, breastfeeding counselling and community mobilisation approaches in low- and middle-income country settings. The likelihood of early exclusive breastfeeding initiation and exclusive breastfeeding from 1–5 months was multiplied two-to-sevenfold in studies identified by this Evidence Check.

In 2017 a systematic review study[12] examined the design, implementation and effectiveness of mass media and nutrition education interventions for infant and young child feeding in low- and middle-income countries. The review found 15 of 18 studies with a mass media component reported improvements in breast and/or complementary feeding practices associated with such interventions, using indicators recommended by the WHO. Improvements were in early initiation and exclusive breastfeeding, or appropriate introduction of complementary foods, but no studies reported improved rates of continued breastfeeding (6–23 months). Six of the included studies reported improvements in related psychosocial

factors. Despite evidence of effectiveness, it was not clear what the common elements in the design of interventions were because of the variability in study design. It is important that future research should consistently report these details to open the 'black box' of IYCF interventions and identify effective design components and ensure replicability.

Social marketing

The Evidence Check identified few systematic reviews or RCTs on social marketing effectiveness, though some evidence was provided by studies using before–after design. The use of marketing principles to design and implement programs to change health behaviour has been increasingly used in public health. It has been proposed that public health agencies can promote breastfeeding using the same channels industry uses, in order to counter corporate marketing influence. The reviewed studies pointed to cost and other barriers to achieving behaviour change through social marketing, particularly in the face of recognised structural barriers to breastfeeding experienced by women.

A 2010 study in Portugal[152] reviewed the use of social marketing as a tool for enhancing the health promotion of breastfeeding. Applying a social marketing approach identifies the role psychosocial aspects play in breastfeeding. It highlights the importance of maternal perceptions of the benefits of breastfeeding and how its social approval is crucial for its acceptance. A social marketing approach centres on the exchange process involved in voluntary behavioural change. By taking account of maternal needs and perspectives of costs and benefits, such programs may increase the prevalence of breastfeeding. The implementation of the first phase of such a program was described in the article. The authors identify challenges for the social marketing of breastfeeding, including the need to market to several audiences (healthcare providers, parents, young women, etc.), as well as to address the social dimension of competition from use of breastmilk substitutes and the need to influence the behaviour of policy makers and special interest groups as well as individual citizens.

Health promotion strategies have identified several areas of intervention where national and local governments need to invest in breastfeeding in partnership with others to make breastfeeding the norm. These include health staff knowledge, attitudes and skills, maternity ward routines, mothers' breastfeeding support groups and support for employed mothers to breastfeed. Most importantly, investment in addressing commercial pressure on health workers and mothers is needed. The authors question whether investments by governments can compete with the financial resources involved in commercial marketing and propose using marketing principles by applying social marketing concepts and tools to create incentives to adopt and maintain a new idea or practice over time. Specific marketing tools applied in social marketing include the design of a campaign or program to address the three elements of consumer orientation, an exchange process and long-term planning. Based on a sample of 79 women giving birth in a Portuguese hospital, the study used a social marketing approach to illustrate that mothers had inadequate knowledge of WHO breastfeeding recommendations to support their informed choices, which was not addressed by childbirth education classes. The study showed how health professionals focus on maternal child health advantages for persuasion, but neglect benefits to family and environment. However, from a social marketing perspective all advantages should be stressed, no matter how small, to increase readiness to adopt breastfeeding.[152]

AUSTRALIAN STUDY: Social marketing campaigns were evaluated in a South Australian program that included a campaign to increase awareness of breastfeeding as the best way to nourish babies.[25, 26] Originally conceived as a media campaign on nutrition, the intervention changed substantially after adoption of a social marketing approach. Messages and images were developed and refined through extensive focus-group consultation with the target group of lower socioeconomic, Aboriginal and young women. Several men and grandparents were also involved in the consultation, resulting in families and

fathers being incorporated within campaign images. As a result, the primary message 'breastfeed for longer' evolved, with sub-messages about breastfeeding becoming easier with time, support from dads and others being important, breastfeeding helping mums get back into shape, the health benefits of breastfeeding and the fact that solid foods aren't required until six months of age.

The campaign included television and radio advertising and printed resources. A pre-and-post campaign survey was conducted among women in their first pregnancy, new mums and the general population. The campaign assessment concluded that there was strong recall of 'every month is a bonus' in TV advertisements and aspects of the campaign even though the campaign was on air for only four weeks. There were notable increases in the core [new mums and women in their first pregnancy] and secondary target audience [general population] hearing or seeing information about the importance of breastfeeding, indicating that the issue was on the social agenda and being considered and discussed by more people than pre-campaign. There was little shift in attitudes to breastfeeding except for an increase in the recall of the message that breastmilk is best for baby. There was no change in behaviour, which was considered by the evaluation to be difficult and extremely rare to achieve in the short term. It was concluded that social marketing should be viewed as a medium- to longer-term strategy to influence attitudes and behaviours.

A 2012 systematic review of the literature about social marketing (SM) and breastfeeding identified 11 scientific articles and showed SM practices and techniques influenced breastfeeding practices and perceptions. Investigations of the relationship between SM and breastfeeding fell within three fields of research: psychology/education, public health and marketing.[153] For example, a 2011 study of developing social marketing capacity to address health issues focused on the implementation of an educational program based on SM techniques to achieve a wider understanding and practice of breastfeeding among young people in rural Scotland.[154] It found using SM techniques such as information dissemination and pedagogical activities increased understanding of the importance of breastfeeding among target groups (healthcare professionals and young people). Core issues identified for policy included the sustainability of breastfeeding practices in the rural population.

Long-term planning mechanisms, managerial support at local government level and security of ongoing resources were deemed vital for the success of SM activities. Articles within the public health field viewed SM as a reinforcement of women's perceptions and practices of breastfeeding determined by their social, cultural, socioeconomic and psychological characteristics. A public health study of SM examined the father's role in promoting breastfeeding activities. The study by Sherriff showed fathers' attitudes towards breastfeeding are an important factor in motivating and encouraging women to breastfeed, reinforcing that social support is an significant moderator and SM tool in breastfeeding practices.[155]

A 2009 study in Britain focused on the use of social marketing as a tool in forming women's opinions about smoking and breastfeeding before and after childbirth.[156] The SM intervention tool was shown to be effective in smoking reduction and increasing breastfeeding practices among the local women. In studies within the field of marketing the primary focus was on improving SM techniques.

One study reported on an Australian breastfeeding campaign designed to change attitudes and increase public awareness about breastfeeding focusing on 'messaging' as an important element of SM technique.[157] The results suggested the importance of consistency of messaging creation, implementation and evaluation, as well as analysis of the information needs of the target audience. A 2011 study of the use of social marketing to improve breastfeeding rates in a low-socioeconomic area of Britain investigated how different SM techniques, specifically the placement, price, product features and promotion (the 'four Ps' of marketing), influenced female choice of breastfeeding[154] The researchers concluded that a variety of SM tools including focus groups can be applied as well as longitudinal studies to motivate improved breastfeeding practices. Schmidt concluded the primary concern revealed in all types of SM studies included in the review was not education, as most mothers were aware 'breast is best', but rather the lack of

resources such as time, energy, material and social support.[153] A more integrated multidisciplinary approach to SM conceptualisation, design and implementation could improve its effectiveness in breastfeeding campaigns.

A 2013 study using data from India examined the use of social marketing techniques to raise awareness of breastfeeding and understand some mothers' preferences for infant formula.[158] Noting the growing evidence that carefully managed SM programs can be very effective, the study emphasised that SM campaigns go beyond media campaigns, being comprehensive, multifaceted approaches providing targeted, coordinated interventions to a variety of audiences, including consumers, their support systems, healthcare providers, the community and the general public. The study gave examples of several such SM initiatives in India applying this approach:

- Activities led by non-profit breastfeeding support organisations, such as advocacy, social mobilisation, information sharing, education, research, training, and monitoring company compliance with India's Infant Milk Substitution (IMS) Act
- Use of celebrities in project launches promoting breastfeeding
- Globally coordinated but locally designed and implemented activities such as World Breastfeeding Week, which focuses on a broad theme of breastfeeding protection, support and promotion
- The World Breastfeeding Trends Initiative (WBTi), which serves as a lens to discover gaps in policy and programs and helps nations initiate action to bridge these gaps
- The wide public promotion of the Baby Friendly Hospital Initiative (BFHI) to set a powerful example for new mothers
- Initiatives at state and village level to encourage breastfeeding including advertising campaigns on social media and at venues such as hospitals.

An experiment in Canada showed a poster campaign significantly improved levels of comfortableness about women breastfeeding in public at shopping centres in two rural Newfoundland communities.[159] Questions were posed to a convenience sample of 117 participants pre- and post-exposure to two posters designed to promote public acceptance of breastfeeding in public. Initially, only 51.9% of participants indicated that they were comfortable with a woman breastfeeding anywhere in public. Context played a role, whereby a doctor's office or park were the most acceptable public places for breastfeeding, but least acceptable was a business office environment. Results of pre- versus post-viewing of the promotional posters significantly improved the reported level of comfortableness about seeing breastfeeding in public.

ANBS-E-Strategy 2

ANBS-E Strategy 2: Restriction of advertising of infant formulas, including full implementation of the WHO International Code of Marketing Breastmilk Substitutes and subsequent relevant WHA resolutions

The International Code of Marketing of Breastmilk Substitutes (the Code) aims to address the undermining of breastfeeding by commercial marketing. The Code recommends there should be no promotion of breastmilk substitutes and, since 2013, WHO has clarified that so-called toddler formulas, or 'growing up milks', are not necessary and are possibly harmful to children.[160, 161]

There is growing evidence that the Code faces implementation challenges. The Evidence Check identified systematic reviews and key recent studies in the peer-reviewed literature as well as from grey literature such as market studies by industry and reports by government regulators and the WHO. These provided evidence of widespread and pervasive breaches of industry's Code responsibilities, the need for stronger implementation, and of improved compliance and IYCF outcomes where implementation is strengthened. Such findings were drawn from studies in a variety of domestic contexts.

A WHO Technical Report prepared for a 2013 Informal Consultation in Manila[162] presented a systematic review of evidence on the potential harm to children of the marketing of breastmilk substitutes, foods and non-alcoholic beverages, tobacco and alcohol. In relation to breastmilk substitutes, the review found widespread violations of the WHO Code (500 violations in 46 countries) contributing to sub-optimal breastfeeding practices. It found strong evidence overall from studies conducted in healthcare and community settings that marketing of infant formula negatively affects breastfeeding practice and is therefore harmful to infant health. Harm from not breastfeeding is causal, immediate and well documented. Current estimates of exposure indicate that 75% of mothers may recall advertising for infant formula, with television being the most likely modality for message delivery.

The systematic review found four randomised controlled trials, two longitudinal studies and one observational study conducted in the healthcare setting indicated that marketing has a negative impact on breastfeeding. Three cross-sectional studies conducted in community settings also showed marketing has a negative impact on breastfeeding. A study in the Philippines indicated that recall of any advertising message doubled the likelihood of infant formula usage (95% CI 1.2–3.4, $p < 0.01$), while receiving a promotional message from a paediatrician or obstetrician more than tripled this likelihood (OR 3.7, 95% CI 1.7–8.2, $p < 0.001$). Collectively, these studies provide strong evidence that marketing of infant formula negatively affects breastfeeding practice and is therefore harmful to infant health.

The report also found evidence that the WHO Code, when fully incorporated into legislation, can be effective in restricting the marketing of breastmilk substitutes. Legislation to restrict marketing of breastmilk substitutes is necessary but not sufficient; equally important are the promulgation of implementing regulations, effective enforcement and public monitoring of compliance.[24] Sufficient penalties must be consistently imposed as part of enforcement. Economic sanctions, while important, are likely to be less effective than reports that affect a company's public image negatively.[96] The non-government sector can play an important watchdog role with respect to monitoring of violations, but there is a need for a single transparent and sustainable international agency to take on the role formally of monitoring international compliance with the WHO Code. Effective interventions and programs to promote and protect breastfeeding are available.

EXPERT REVIEW: In 2016, the WHA passed a resolution noting new WHO guidance on marketing foods for infants and young children.[161] The document addressed the WHA intention to end the inappropriate promotion of foods for infants and young children, with the aim of promoting, protecting and supporting breastfeeding, preventing obesity and non-communicable diseases, promoting healthy diets, and ensuring caregivers receive clear and accurate information on feeding. This responded to a WHA resolution in May 2010 that recognised that the promotion of breastmilk substitutes and some commercial foods for infants and young children was undermining progress in optimal infant and young child feeding, and to a further resolution in May 2012 that requested the Director-General to provide clarification and guidance on the inappropriate promotion of foods for infants and young children.

The WHO guidance on inappropriate marketing is based on review of evidence from numerous countries showing that foods (understood in this context to refer to both foods and beverages, including complementary foods and breastmilk substitutes) are being promoted as being suitable for infants under six months of age, that breastmilk substitutes are being indirectly promoted through association with commercial complementary foods, and that inaccurate claims are being made that products will improve a child's health or intellectual performance.

Furthermore, the review found complementary foods had been shown to displace the intake of breastmilk if the amounts provided represent a substantial proportion of energy requirements. Commercial complementary foods were found to vary widely in quality, with some improving nutrient intake by providing those nutrients that are either lacking or are present in insufficient quantities in the diets of young

children, while others are of concern because of high levels of added sugars or salt. The inappropriate promotion of commercial foods for infants and young children was found to potentially mislead parents and other caregivers about the nutrition and health-related qualities as well as the safe and age-appropriate use of these foods. In particular, the differences between milk products promoted for children of different ages are not well understood. Furthermore, the promotion of foods for infants under six months of age was associated with earlier cessation of exclusive breastfeeding. The report included seven recommendations in the following.

1. Optimal infant and young child feeding should emphasise the use of suitable, nutrient-rich, home-prepared and locally available foods that are prepared and fed safely
2. Products that function as breastmilk substitutes should not be promoted. A breastmilk substitute includes any milks that are specifically marketed for feeding infants and young children up to the age of three years (including follow-up formula and growing-up milks)
3. Other foods for infants and young children should be promoted only if they meet all the relevant national, regional and global standards for composition, safety, quality and nutrient levels and are in line with national dietary guidelines
4. The messages used to promote foods for infants and young children should support optimal feeding and inappropriate messages should not be included
5. There should be no cross-promotion to promote breastmilk substitutes indirectly via the promotion of foods for infants and young children
6. Companies that market foods for infants and young children should not create conflicts of interest in health facilities or throughout health systems. Health workers, health systems, health professional associations and non-government organisations should likewise avoid such conflicts of interest
7. The WHO set of recommendations on the marketing of foods and non-alcoholic beverages to children should be fully implemented, especially ensuring that settings where infants and young children gather are free from all forms of marketing of foods high in saturated fats, trans-fats, free sugars or salt.

EXPERT REVIEW: A 2017 report by the WHO Western Pacific Regional Office summarised evidence on the exposure, power and impact of food marketing on infant and young child feeding and on older children at the regional committee meeting in Brisbane.[66] Concerned that, despite member state efforts, the harmful effects of food marketing on the diet and health of children continued to be widespread in the region, the regional committee urged member states to accelerate multisectoral and multi-stakeholder action to protect children from the harmful impact of food marketing and share best practices. The committee requested that the Regional Director advocate and provide technical support to member states to protect children from harmful food marketing; foster collaboration among member states to share experiences and best practices on ways to measure and mitigate the harmful impact of food marketing; and develop a regional action plan to protect children from the harmful impact of food marketing, in consultation with member states and seeking views of key stakeholders.

The report drew on evidence that exposure to breastmilk substitute marketing is pervasive in the region, and cited evidence that company representatives in China and the Philippines have offered financial incentives to health workers to promote breastmilk substitutes. It also cited studies showing that *"health professionals and hospital promotions are viewed as credible sources of information and thus are powerful channels for marketing. Mothers to whom doctors recommended or gave prescriptions to use infant formula were found to be four times more likely to give their infants infant formula."* Cross-promotion of product categories was an emerging area of concern, and modern communication technologies including the internet, social media and mobile phones were shown to increase the reach of marketing.

Drawing on experience with the tobacco industry, the report noted that marketing involved food industry sponsorship of health professional conferences, and 'stakeholder marketing', which is used to engage with government or other key stakeholders. The study detailed countries' policy responses to protect optimal breastfeeding from harmful marketing, noting that in Australia evaluation of the paid parental leave scheme has shown it has increased breastfeeding and improved the mental health of Australian mothers. Some valuable initiatives on implementing the International Code and on restricting food marketing to children were found in the region, and key elements were identified for effectiveness. While countries found voluntary action by the food industry easier to implement, the evidence of the WPR paper was that voluntary initiatives led to small or no reductions in harmful marketing practices. This approach is taken by several countries in this region. The paper cited evidence from Australia that the impact of self-regulatory or voluntary codes was limited by the extent of uptake by food companies or participation by child-oriented food marketers.

Other key studies in this area are summarised below.

A 2008 population based survey in the US[163] found two-thirds of breastfeeding women in Oregon received commercial hospital discharge packs and these women were more likely to exclusively breastfeed for fewer than 10 weeks than were women who had not received the packs The authors concluded that while commercial hospital discharge packs are one of several factors that influence breastfeeding duration and exclusivity, their distribution to new mothers at hospitals was part of a longstanding marketing campaign by infant formula manufacturers that implied hospital and staff endorsement of infant formula.

EXPERT REVIEW: A 2011 international comparative study was prepared for the Australian Government Department of Health and Ageing on the implementation of the WHO Code and other initiatives.[164] It gathered data on the implementation of the Code in nine developed countries: Australia, Canada, France, Germany, Ireland, New Zealand, Norway, Britain and the US. The findings were intended to assist the Department of Health and Ageing in assessing the relative success of measures already implemented in Australia and in considering the feasibility of any additional measures that may have the potential to be employed in Australia. The study concluded there was not one key factor or intervention that could determine whether one country would have higher breastfeeding rates than another. A significant finding was that there was variability in the Code's legislative implementation. The selected countries that were European Union members, and Norway, had adopted partial legislation (with articles 7 and 8 in particular lacking) while Australia and New Zealand had voluntary codes in operation that covered all articles of the WHO Code. Canada and the US had very limited implementation of the Code (only articles 9 and 11 were in national legislation) with no provisional laws or voluntary codes in place for the remaining articles. The study also reported that aspects of the WHO Code that had been implemented in legislation or as voluntary codes were also narrower in scope. This was evident in the type of products covered under the Code, whereas most countries focused on the use of infant formula only.

A 2012 review summarised the experience of countries in Latin America and the Caribbean and lessons learnt from implementing the Code and regulating food marketing to children.[61] The historical analysis of 30 years found legislation to restrict the marketing of breastmilk substitutes was necessary but insufficient; equally important were the promulgation of implementing regulations, effective enforcement and public monitoring of compliance. Experience showed that a system of funding for regular monitoring of compliance with legislation should be developed and funded from the beginning. Economic sanctions, while important, were likely to be less effective than reports that affected a company's public image negatively. Non-government organisations played a critical role in leveraging public opinion and galvanising consumer pressure to ensure that governments adopted regulations and companies adhered to them. Continual clinical, epidemiological and policy research showing the link between marketing and health outcomes and between policy and better health was found to be essential. The authors concluded that efforts to protect,

promote and support breastfeeding have been successful, with indicators of breastfeeding practices increasing globally. Progress in implementation is difficult because of imbalances in the financial power of governments compared with the resources available to the multinational companies that dominate the industry. However, the lessons learnt can inform current efforts to regulate harmful marketing of foods and beverages to children.

AUSTRALIAN STUDY: In 2013, an Australian study addressed the issue of whether voluntary industry regulation had altered companies' marketing of breastmilk substitutes in Australia since the adoption of the WHO Code in 1981.[165] Print advertisements marketing breastmilk substitutes were systematically sampled from the *Australian Women's Weekly* (AWW) magazine and the *Medical Journal of Australia* (MJA) for the 61 years from 1950 to 2010. It was found that breastmilk substitute advertising in both the MJA and the AWW peaked and began declining before the introduction of the WHO Code in 1981. Although there was almost no infant formula advertising in AWW after 1975–79, other breastmilk substitute advertising has been increasing since 1992, in particular for baby food, toddler formula and food and brand promotion. The authors concluded that companies have adopted strategies to minimise the effects of the WHO Code on sales and profit in Australia, including increasing toddler formula and food advertisements, increasing brand promotion to the public, and complying with more limited voluntary regulatory arrangements. Comprehensive regulation, therefore, was urgently required to address changed marketing practices if it was to protect breastfeeding in Australia.

AUSTRALIAN STUDY: A 2014 descriptive study[166] of the application of evidence on probiotics, prebiotics and symbiotics by the food industry concluded the industry used such research in ways that were not transparent.

A study in Italy aimed to assess how follow-on formula milks for infants aged 6–12 months are presented to and understood by mothers.[167] A quantitative and qualitative cross-sectional study included (1) an analysis of advertisements in three magazines for parents, (2) in-depth semi structured qualitative interviews with pregnant women on their perception of two advertisements for follow-on formula, and (3) self-administered questionnaires for mothers to explore their exposure to and perception of formula advertisements. Participants consisted of 80 pregnant women at 32–36 weeks' gestation with no previous children and 562 mothers of children less than three years old. The study was conducted via maternal and child health centres in eight cities in Italy. It found that advertisements of formula (n = 89) represented about 7% of all advertisements in the three magazines, the majority (58%) being for follow-on formula. Advertisements were parent-oriented, aimed at helping parents solve the health problems of their babies or at eliciting good feelings, or both. The qualitative interviews with pregnant women showed their inability to define the advertised products at first glance due to the ambiguity of the numeral 2 and the presumed age of the portrayed baby; this inability did not disappear after carefully viewing the advertisements and reading the text. When asked in the self-administered questionnaires whether they had ever come across advertisements of infant formula, 81% of mothers reported that they had, despite the legal non-existence of such advertisements, and 65% thought it was for a product to be used from birth. The authors concluded that advertisements of follow-on formula are perceived by pregnant women and mothers as promoting infant formula.

A 2015 literature review described the sales and marketing of breastmilk substitutes and their influence on WHO-recommended breastfeeding behaviours, focusing on low- and middle-income countries.[168] It reported that breastmilk substitutes are marketed directly to consumers via mass media and print advertisements and indirectly via incentives, free supplies, and promotions to and through health workers and facilities, retailers and policy makers. Internet marketing via company websites and social media is on the rise. Marketing influences social norms by making formula use seem to be extensive, modern and comparable to or better than breastmilk. Clear evidence of a negative impact is found when breastmilk

substitutes are provided free in maternity facilities and when they are promoted by health workers and in the media.

The review observed that influences through other channels are plausible but rigorous studies are lacking. It was not possible with the data available to quantify the impact of marketing relative to other factors on suboptimal breastfeeding behaviours. Marketing remains widespread even in countries that have adopted the Code to restrict such activities. The authors concluded that adoption of stricter regulatory frameworks coupled with independent quantitative monitoring and compliance enforcement were needed to counter the impact of formula marketing globally.

A study led by Belamarich in 2016[169] examined specialised paediatric formulas and concluded there was a lack of evidence to justify paediatric use. Direct-to-consumer marketing in the US promotes the sale of modified formulas that claim to ameliorate common infant feeding problems but these claims are not evaluated with reference to clinical evidence by the Food and Drug Administration. The study described the language of claims made on formula labels and compared it with the evidence in systematic reviews. Of the 22 product labels identified, 13 included claims about colic and gastrointestinal symptoms. There is insufficient evidence to support the claims that removing or reducing lactose, using hydrolysed or soy protein or adding pre-/probiotics to formula benefits infants with fussiness, gas or colic, yet claims such as 'soy for fussiness and gas' encourage parents who perceive their infants to be fussy to purchase modified formula. The authors concluded increased regulation of infant formula claims is warranted.

A recent systematic review found omega-3 fatty acids had no impact on maternal or child health despite implied or actual claims on infant formula or specialised products.[170]

In 2016 Waite and colleagues[171] showed that sending free samples of formula in the mail about the time of an infant's birth doubled the likelihood of US women introducing formula and ending exclusive breastfeeding by six months. The study aimed to determine if receiving a free sample of infant formula in the mail had an impact on breastfeeding duration and exclusivity, using data from a cohort study (Infant Feeding Practices Study II). Logistic regression models were developed to evaluate the association between any breastfeeding to 12 months of age and exclusive breastfeeding to six months of age, and receipt of a free sample of infant formula in the mail about the time of the infant's birth. The study included 3031 infants; mothers of 1741 (57.4%) received a sample of infant formula in the mail. There was no difference in the likelihood of any breastfeeding at each month among those who received formula in the mail compared with those who did not. There was also no difference in exclusive breastfeeding to five months; however, by six months of age infants whose mothers received formula in the mail were less likely to be exclusively breastfed (odds ratio = 0.57; 95% confidence interval, 0.37, 0.89). The authors concluded that receiving infant formula in the mail decreases the likelihood of exclusive breastfeeding by six months of age while having no impact on the duration of any breastfeeding.

AUSTRALIAN STUDY: A 2016 Australian study reported that although trials of probiotics to prevent mastitis in breastfeeding women are still in progress, these products are being marketed to health professionals in Australia. This is despite trials of probiotics for treating mastitis in dairy cows having had mixed results: some successful and others unsuccessful, and the publication of only one trial of probiotics to treat mastitis in women and one trial to prevent mastitis at that time.[172]

EXPERT REVIEW: A 2016 study of Code implementation in South-East Asia reviewed the frequently overlooked challenges and obstacles that the Code is facing worldwide but particularly in this region.[173] Drawing lessons from various countries, and following the example of successful public health interventions, the authors discussed legislation, enforcement and experiences that are needed to successfully implement the Code. The review found successful holistic approaches that have strengthened the Code need to be scaled up. Community-based actions and peer-to-peer promotions have proved successful. Legislation without stringent enforcement and sufficient penalties is ineffective. The public needs education about the

benefits of breastfeeding and ways and means to support it. It is crucial to combine strong political commitment and leadership with strict national regulations, definitions and enforcement. National breastfeeding committees with the authority to improve regulations, investigate violations and enforce the laws must be established. Systematic monitoring and reporting are needed to identify companies, individuals, intermediaries and practices that infringe on the Code. Penalising violators is crucial. Managers of multinational companies must be held accountable for international violations, and international legislative enforcement needs to be established. Further measures should include improved regulations to protect the breastfeeding mother: large-scale education campaigns; strong penalties for Code violators; exclusion of the formula industry from nutrition, education and policy roles; supportive legal networks; and independent research into interventions supporting breastfeeding.

A 2016 study led by Baker of global milk formula sales for the years 2008–2013 identified that an unprecedented infant and young child feeding transition is underway.[174] The study used industry-sourced data to describe contemporary trends and patterns of per child milk formula sales at the global, regional and country levels, examining each of the categories of milk formula identified by industry as well as total milk formula sales. It found that between 2008 and 2013 world total milk formula sales grew by 40.8% from 5.5 kg to 7.8 kg per infant/child/year, a figure predicted to increase to 10.8 kg by 2018. Growth was most rapid in East Asia, particularly in China, Indonesia and Vietnam, and was led by the infant and follow-up formula categories. Sales volume per infant/child was positively associated with country income level. However, there was wide variability between countries, suggesting a role for public policy in influencing these trends. The authors concluded that a global infant and young child feeding (IYCF) transition towards diets higher in milk formula was underway and would continue apace. The observed increase in milk formula sales had not been captured by existing IYCF monitoring systems and raised serious concerns for global child and maternal health, particularly in East Asia. The results were also seen to call into question the efficacy of current regulatory regimes designed to protect and promote optimal IYCF.

EXPERT REVIEW: In the 2016 *Lancet* Series on Breastfeeding a major study by the *Lancet* breastfeeding team reported that the breastmilk substitute industry is large and growing, and its marketing undermines efforts to improve breastfeeding.[175] It reported that violations of the Code are prevalent, which demonstrated that without enforceable legislation and investment to support monitoring, it will have limited effect. To understand the competing environment in which efforts to protect, promote and support breastfeeding operate, market research on the breastmilk substitute market and marketing practices was commissioned from Euromonitor International. It was found that, unlike other commodities, baby milk formula was resilient to market downturns. In 2014, global sales of all baby milk formula had grown to US$44.8 billion — by 2019, the market value is projected to reach US$70·6 billion.

The report cited evidence that marketing by the infant feeding industry and the availability of formula, including the distribution of free samples, increase rates of bottle-feeding. Formula advertisements portrayed formula milk to be as good as or better than breastmilk, or presented it as a lifestyle choice rather than a decision with health and economic consequences. Mothers reported that media was an important source of information, and findings from studies in several countries associated recollection of formula advertisements with decreased breastfeeding. This report noted that marketing messages can also convey that breastfeeding is difficult and that breastmilk substitutes help to settle fussy babies. Industries selling breastmilk substitutes and related products often sponsored health professional associations — for which comprehensive funding data are scarce — creating potential conflicts of interest in their support of breastfeeding.

The *Lancet* report found per-child consumption of all types of formula was highest in Western Europe and Australasia, followed by North America. Per-child (aged 0–36 months) annual average expenditure was greater in high-income countries (US$2528) than in high-to-middle income countries (US$209) and low-

income and middle-income countries (US$151). In high-income markets, sales of standard milk formula (for infants aged <6 months) are static or decreasing because of market maturity, decreasing birth rates and legislation on advertising and sales. The enormous difference in market sales between high-income and middle-income countries is due to large and increasing sales of follow-on and toddler milks: these products are often not covered under national Code-related laws and regulations. In high-income countries, follow-on and toddler milks are driving the estimated future 15.2% growth. France and the US are the only two major economies where the market growth rate is expected to turn negative (−2.5% in France and −0.3%, in the US). The decreases are the result of legislation, public awareness campaigns and actions by civil society in support of breastfeeding, such as the 2016 Public Citizen campaign.

Brazil exemplifies how vulnerable breastfeeding practices can be during economic transitions. Even though breastfeeding is deeply valued and government and civil society have invested in its support, per-baby consumption of breastmilk substitutes is projected to increase by 6·8% between 2014 and 2019, making Brazil's one of the highest growth rates in the world. The authors attribute the increase to increased purchasing power and families who did not breastfeed buying commercial formula rather than using locally available animal milk.

Data for marketing budgets for breastmilk substitutes were not available, but these budgets were assumed to be large. The trajectories of retail sales indicate that marketing strategies are effective, which emphasises the importance of comprehensive national laws and regulations to curb inappropriate marketing practices with adequate monitoring and meaningful penalties to protect breastfeeding.

AUSTRALIAN STUDY: A 2017 Australian study examined whether prohibited health and nutrition claims could be observed in Australian websites that advertise infant formula products available for purchase in Australia.[176] Content analysis was used to identify prohibited claims. The coding frame was closely aligned with the provisions of the Australian and New Zealand Food Standard Code, which prohibits these claims. The outcome measures were the presence of health claims, nutrition content claims, or references to the nutritional content of human milk. The authors identified web pages advertising 25 unique infant formula products available for purchase in Australia. Every advertisement (100%) contained at least one health claim. Eighteen (72%) also contained at least one nutrition content claim. Three web pages (12%) advertising brands associated with infant formula products referenced the nutritional content of human milk. All of these claims appear despite national regulations prohibiting them, indicating a failure of monitoring and/or enforcement. The authors concluded that although many governments have responded to WHO policies and WHA resolutions regarding health and nutrition content claims in infant formula advertising by enacting instruments to prohibit such claims, this was ineffective in the absence of monitoring of marketing of infant formula.

A 2017 study reviewed regulations and conducted a media audit of the promotion of products under the scope of the WHO Code and explored the ecological association between regulations and market size, and between the number of advertisements and market size and growth of milk formula for five countries in South-East Asia.[177] It identified national regulations in Cambodia, Indonesia, Myanmar, Thailand and Vietnam relating to the Code, and 800 clips of editorial content, 387 advertisements and 217 Facebook posts from January 2015 to January 2016. Regulations on the child's age for inappropriate marketing of products were all found to be below the Code's updated recommendation of 36 months (i.e. 12 months in Thailand and Indonesia; 24 months in the other three countries) and were voluntary in Thailand. Advertisements complied with national regulations on age limit but had content (e.g. stages of milk formula; messages about the benefit; pictures of a child) that confused audiences. The analysis found that market size and growth of milk formula were positively associated with the number of newborns and the number of advertisements. However, they were not affected by the current level of implementation of breastmilk substitute laws and regulations. The authors concluded from the audit that there was inappropriate

promotion and insufficient national regulation of products under the scope of the WHO Code in South-East Asia. Strengthened implementation of regulations aligned with the Code's updated recommendation should be part of comprehensive strategies to minimise the harmful effects of advertisements of breastmilk substitutes on maternal and child nutrition and health.

A 2017 report published by the competition regulator in Singapore based on information provided by industry and independent data sources[178] documented that marketing through healthcare channels, particularly hospitals and co-located pharmacies or similar health-related retailers, was crucial for establishing and maintaining milk formula and other baby food markets and customers for brands. The regulator documented that *"manufacturers invest in a broad range of marketing activities to expose their brands to consumers, communicate the benefits of their products and encourage early adoption (i.e. lock-in) and/or switching by a minority of consumers at the margins"*.

The Competition Commission of Singapore noted in this regard that: *"… marketing expenditure by manufacturers increased significantly over the period of study. In particular, the hospital channel receives a significantly higher share of marketing expenditure compared to its share of total revenue. Manufacturers provide sponsorship and/or payments to the private hospitals for participation in their milk rotation systems. Given that [the] majority of parents who use Formula Milk in hospitals do not have a preferred brand and tend not to switch brands of Formula Milk after leaving the hospital, manufacturers have invested significant efforts and resources into the marketing activities in the hospital channel to gain a 'first-mover' advantage … The significant barriers to entry and weak price competition have given the major Formula Milk manufacturers the market power to increase prices."*

The competition regulator also noted that *"'premiumisation' strategies further strengthen consumer perceptions and entrench consumer purchasing behaviours, which in turn give the Formula Milk manufacturers the market power to increase wholesale prices"*. The regulator suggested that the sponsorships and payments that milk formula manufacturers provide and their impact on the milk rotation programs in the hospitals could be reviewed: *"This can help to reduce a barrier to entry and expansion for new and existing brands."*

Industry reports on national baby food markets prepared by Euromonitor International describe industry practices that reveal how marketing interventions can reduce optimal infant and young child feeding by targeting mothers' needs and preferences. These include, for example, promotion of baby food products with attributes such as 'time saving' or 'convenient', 'clean and green', or emphasising 'safe' brands of formula or milk for infants and young children. Industry studies report counter-regulatory tactics, as well as direct and indirect interventions including health and nutrition or other claims attuned to culturally varied messages and maternal aspirations and priorities for their children. Labelling or packaging is also used to target caregivers, including grandmothers or fathers, in order to promote sales of breastmilk substitutes including infant formula or toddler milks and highly processed commercial rather than home-prepared complementary foods.

ANBS-E Strategy 3

ANBS-E Strategy 3A: Influence of returning to work and access to childcare (support for breastfeeding in the workplace and support for breastfeeding in early care and education)

A British study published in 2009 presented policy and public health recommendations from an analysis of the evidence of the effectiveness of and extensive consultation process underpinning the 2006 British National Institute for Health and Care (NICE) guidelines on promotion of breastfeeding initiation and duration.[147] It concluded there was a need for strategic policy recommendations aiming to achieve appropriate policy and cultural environments in which health and other service organisations operate to

promote breastfeeding. Such recommendations were prerequisites to other actions, to enable interventions to work and remove socio-cultural barriers.

It is well established that mothers who work away from home tend to stop breastfeeding earlier than their non-employed counterparts, due to factors including workplace or childcare barriers. Barriers to breastfeeding by employed mothers discriminate against women and produce inequities in children's health outcomes and inequality in women's earnings. A number of studies provide evidence on how to address these barriers to improve women's ability to combine breastfeeding with earning an income, and to protect human rights to breastfeeding.[179]

Employment policy environment

Earnings from employment are an important financial incentive and significant economic determinant of infant feeding practices, as discussed in more detail below under ANBS-E Strategy 10. Breastfeeding rates in Australia, as in other countries, are lower among employed mothers, especially among mothers returning to paid employment full time.[30] Employment and breastfeeding decisions interact.[180] Some mothers and families cannot afford to forgo employment earnings in order to accommodate breastfeeding. Australian time-use research demonstrates heavy time demands for women who maintain exclusive breastfeeding and care of infants and young children.[15, 181]

Evidence shows enabling interventions or strategies such as regulation of employment conditions or work settings can improve environments for breastfeeding by employed mothers of infants and young children. Most systematic studies of effective interventions are from international comparative studies.

A US research team recently published a review of the relation between paid parental leave schemes worldwide and wellbeing of families, including in relation to breastfeeding.[36] The study presented global data on the prevalence of policies in all 193 UN member states, identifying important information gaps in policy implementation. The review of the literature showed paid parental leave may support progress towards commitments to maternal and child health in the Sustainable Development Goals (SDG); across all national income levels, paid leave has been associated with lower infant mortality and higher rates of immunisation. In high-income countries paid leave is associated with higher exclusive breastfeeding and may improve women's economic outcomes. The duration of leave, the wage replacement rate, and whether leave is made available to both parents also importantly has shaped the impact of paid leave policies. While most countries offered at least some paid maternal leave, many provided less than the six months recommended for exclusive breastfeeding and only about half as many provided paternal leave. The authors concluded that improving maternal and child health requires more 'real time' monitoring of what countries are doing to enact or strengthen their paid leave policies.

AUSTRALIAN STUDY: A pre–post evaluation study of the paid parental leave scheme introduced in Australia in 2011 has shown that introducing 18 weeks[20] of publicly funded paid maternity leave at minimum wage levels for employed new mothers meeting minimum eligibility requirements resulted an increase in breastfeeding duration, particularly for the 7–12 month age group. The benefits to maternal and child health were most evident for disadvantaged mothers including sole parents. The identified maternal and child health benefits of paid maternity leave have potentially important consequences for health-system costs associated with treating postnatal depression, as well as for health cost savings and economic productivity. The finding of mental health gains by a related Australian study[97] is consistent with a study of EU countries which linked the generosity of maternity leave benefits with women's mental health in older age.[98]

A 2015 study by a global NGO examined the status of policies related to maternity protection within a global human rights framework, compiling data and case studies from countries where breastfeeding policies have been evaluated using the World Breastfeeding Trends Initiative (WBTi) tool.[182] Analysis of data

from International Labour Organization (ILO) documents and International Baby Food Action Network (IBFAN) WBTi assessments of countries' implementation of the WHO/UNICEF Global Strategy on Infant and Young Child Feeding (GSIYCF) showed the inadequacy of maternal protection policies, including the lack of enforcement of relevant employment laws and regulations. The study identified the growth of least-protected informal work. It also showed policies failed to recognise the interactions of women's employment with the time spent on unpaid family care work. It concluded these inadequacies reduced women's breastfeeding confidence and created vulnerability to the marketing of infant formula among working women. Strengthening, enforcing and heightening communication of maternity protection, anti-discrimination policies, and infrastructure support including childcare were recommended to address potential conflicts of women's reproductive and remunerated work opportunities, and the human rights of women and children. Research into policy implementation of this kind is a major limitation of the literature on effectiveness of interventions.

A study underpinning Britain's 2006 NICE guidelines on breastfeeding promotion recommended a package of measures, including employment policy and practices to support breastfeeding, as essential prerequisites to effective implementation by healthcare practitioners.[83] Government endorsement of the Code was also an element of the public health policy package recommended to promote breastfeeding initiation and duration.[83]

Recent industry studies of countries' baby food markets provide evidence that commercial marketing interventions targeting employed mothers are effective in reducing home preparation of complementary foods and exclusive or ongoing breastfeeding. This Evidence Check identified several Euromonitor studies evaluating actual and prospective markets for baby food in high-income countries (Australia, US, Japan, Taiwan, Singapore and Denmark) and middle-income countries (Thailand, Hong Kong, India, Vietnam and Philippines) that reported on strategies specifically targeting 'working mothers' and 'busy lifestyles'. These strategies were identified as promoting sales of breastmilk substitutes (including infant formula or toddler milks) and packaged complementary baby food in these countries.

> *"Recent amendments to Australian Government policy are likely to have a significant impact on baby food in the country. For example, changes to Australia's Paid Parental Leave scheme will have a significant impact on local baby food throughout the forecast period as it will influence whether a mother staying at home to breastfeed her children is a feasible option, as well as whether making homemade baby food is a practical choice. Changing paid parental leave from 18 weeks to six months would increase the ability of Australian mothers to breastfeed, while assisting the return to work would have the opposite impact. The anticipated result of this will be decreased breastfeeding rates and Australian mothers turning to milk formula as a substitute."* Euromonitor International, 2016, Baby food in Australia, p.5.

ANBS-E Strategy 3B: Workplace settings

In Australia, the 2007 *Best Start* report recommended wider implementation of the Baby Friendly Workplace Accreditation (BFWA) scheme to encourage supportive workplace settings for breastfeeding.

At that time, there were few studies showing effective interventions and no systematic reviews had addressed the effectiveness of interventions on breastfeeding for mothers employed in formal workplace settings. Cochrane reviews up to 2012 found there was insufficient evidence about such interventions, there being no studies of adequate quality.[183]

This Evidence Check identified a 2017 systematic review of employer-based programs to support breastfeeding by working mothers.[34] This study reported on 22 studies, across 10 different countries and

both public- and private-sector employers, including governmental offices, schools, hospitals, manufacturing/industrial companies and financial settings. It showed that providing a lactation space was the most common employer-based support accommodation studied, followed by breastfeeding breaks and comprehensive lactation support programs. The majority of studies analysing these three support types found at least one positive breastfeeding and/or non-breastfeeding outcome.

A study[37] aimed to assess trends between 1995 and 2014 in the number of countries guaranteeing breastfeeding breaks in the workplace and paid maternal leave that lasts until the infant is six months old. It concluded that adopting measures to facilitate breastfeeding at work can be a critical opportunity for countries to increase breastfeeding rates among the growing number of women in the labour force. The study collected and reviewed legislation and secondary source data for the 193 UN member states. Legislation was analysed for content on breastfeeding breaks and maternal leave guarantees. This showed that 51 countries (26.7%) in 2014 did not guarantee breastfeeding breaks in any form and four countries provided only unpaid breaks or breaks that did not cover the first six months of life; since 1995, about 15 countries (10.2%) have legislated for such a policy. In 2014, out of 55 countries that did not guarantee paid breastfeeding breaks for the first six months after birth, seven countries guaranteed paid maternal leave for the same duration; 48 countries (25.1%) provided neither paid maternal leave nor paid breastfeeding breaks. The authors concluded that progress in the number of countries guaranteeing breastfeeding breaks at work is modest. Adopting measures to facilitate breastfeeding at work can be a critical opportunity for countries to increase breastfeeding rates among the growing number of women in the labour force.

AUSTRALIAN STUDY: Since 2007, Australian studies have also found that having workplace settings permitting reduced and flexible work hours, access to breaks, and a supportive workplace culture on return to work are effective strategies. For example, a South Australian breastfeeding support program evaluation demonstrated benefits of implementing the Breastfeeding Friendly Workplace (BFW) package of workplace support interventions (workplace policy, facilities and time flexibilities). This accreditation program, delivered by the Australian Breastfeeding Association[35], was effective in generating employer-perceived benefits (such as employee retention and earlier return to work) from providing workplace breastfeeding support.

AUSTRALIAN STUDY: In 2013, an Australia-wide study of employers and employees found benefits for employers as well as women and children from providing structured workplace support for breastfeeding.[32] This research used a mixed-method design to identify best-practice strategies for breastfeeding support in the Australian workplace, based on criteria in the ABA BFWA program. The study analysed survey data collected in 2010–11 from 64 Australian employers and their 304 female employees who had initiated breastfeeding and returned to work before their child was two years old. The study found that among mothers returning to work at six months or earlier, 13% reported that returning to work influenced breastfeeding initiation, 58% reported reducing or stopping breastfeeding to return to work, and 8% reported that they would have returned to work earlier if breastfeeding had been supported. Among those returning to work before six months, part-time work was important for sustaining exclusive breastfeeding to six months. Mothers would have preferred more (longer) leave. Of employees reporting more workplace support for breastfeeding, more had exclusively breastfed at six months. For women returning to work in the first six months, flexibility in start and finish times, work hours and timing of breaks to accommodate the employee expressing milk or breastfeeding were particularly important for exclusive breastfeeding. Workplace attitudes and job security also mattered: mothers who perceived they could lose their job for breastfeeding were less likely to exclusively breastfeed at six months. Women returning to work at or before six months introduced formula two months earlier and their breastfeeding duration was two months shorter. Statistical analysis also showed a significant correlation between exclusively breastfeeding for six months and fewer reported hospitalisations of infants of women who returned to work at between seven and 12 months compared with those returning earlier. Employees who had exclusively breastfed for six months tended to have fewer days off work to care for a sick baby.

AUSTRALIAN STUDY: An Australian study examined how timing of return to work, number of hours worked, and their interaction, affected the likelihood of breastfeeding at six months and of predominant breastfeeding at 16 weeks.[184] A nationally representative sample of Australian mothers in paid employment in the 13 months before giving birth (n = 2300) were surveyed by telephone. Multivariate logistic regression models were used to analyse the effects of timing of return to work and work hours, independently and in interaction, on any breastfeeding at six months and on predominant breastfeeding at 16 weeks, controlling for maternal sociodemographics, employment patterns and health measures. The study found mothers who returned to work within six months and who worked for > = 20 hours per week were significantly less likely than mothers who had not returned to work to be breastfeeding at six months. However, returning to work for < = 19 hours per week had no significant impact on the likelihood of breastfeeding regardless of when mothers returned to work. The authors concluded that, a) reduced working hours (≤ 19 hours per week) should be recommended by health professionals to mothers who decide to return to work within the first six months postpartum to maintain any breastfeeding at least up to six months, and b) that policy makers should provide incentives for employers to improve lactation support to mothers in workplaces.

A study of 715 working mothers at a female-labour-intensive electronics manufacturer in Taiwan found women were more likely to use breastfeeding breaks after return to work if they were aware of the benefits provided by the employer, and concluded that workplaces and employers can help employed mothers to understand the benefits of breastfeeding.[185] A more suitable worksite room (OR 1.51), awareness of breast-pumping breaks (OR 4.70), encouragement by colleagues to use breast-pumping breaks (OR 1.76), and greater awareness of the benefits of breastfeeding (OR 1.08) were significant predictors of the use of breast-pumping breaks after returning to work, but perceptions of inefficiency halved women's intention to use breast-pumping breaks.

A related study examined the influence of partner support on an employed mother's intention to maintain lactation. After adjustment for maternal employment and sociodemographic factors, the study found the partner's initial support of the choice to breastfeed and encouragement to use the lactation room and milk expression breaks, and the mother's perception of partner support, significantly predicted her intention to continue to breastfeed after returning to work. The authors concluded that including the partner in antenatal education or activities provided by the workplace may improve workplace breastfeeding rates.[186]

Social equity

There is an important social equity dimension to this issue, as such workplace supports were found to be more available to well educated women in professional occupations. Inconsistency in support for breastfeeding in workplaces was found in US and British studies to widen socioeconomic disparities in breastfeeding.[187-195]

AUSTRALIAN STUDY: A 2015 Australian study using data from a 2008 cross-sectional survey among Australian Defence Force (ADF) women who had taken maternity leave the previous year concluded that, notwithstanding operational requirements, breastfeeding prevalence compared favourably with Australian population norms. ADF maternity leave provisions (including 14 weeks of paid maternity leave) are generous by community standards. Ninety-eight percent of the cohort initiated breastfeeding and breastfed for a median duration of eight months, returning to work when the mean age of the child was 8.4 months. Sixty-six per cent of the respondents returned to work full time. Women who returned to work part time had a longer median duration than those returning full time (10 months vs. seven months). The study found officers had higher initiation and a longer median duration of breastfeeding than enlisted women, and this was attributed to being better placed to negotiate lactation breaks and flexible work hours, more likely to be in control of their work schedule, and more likely to have access to a private space in which to express breastmilk.

ANBS-E Strategy 3C: Childcare settings

Childcare provides a potentially important setting for breastfeeding promotion. Lack of support for breastfeeding in childcare undermines gender equality, may unnecessarily discourage maternal labour force participation and, to the extent it affects continuation of breastfeeding, may adversely affect infant nutrition and health. A study using data from the Longitudinal Study of Australian Children (LSAC) has shown that attending less than full-time hours in childcare centres is associated with lower rates of infectious illness among infants attending formal childcare services.[196] Another study using LSAC data found using multivariate analysis that breastfeeding was less frequent among children with similar demographic characteristics but who used formal childcare rather than parental care.[197] Likewise, in Britain a large cohort study of infants found childcare was associated with a reduced likelihood of breastfeeding compared with parental care only.[198]

The Evidence Check identified no systematic reviews or experimental studies on policy or other strategies effective in promoting breastfeeding-friendly childcare environments. Few studies examined interventions or strategies in childcare services, and only two studies linked the implementation of measures to actual breastfeeding outcomes among children attending childcare.

Childcare policy environment

AUSTRALIAN STUDY: An Australian study published in 2013 investigated the extent of breastfeeding support by childcare services in Australia. In 2011 the Commonwealth Sex Discrimination Act was amended to prohibit discrimination against breastfeeding mothers in the provision of services, which includes childcare services. The mixed-methods study used data from a 2011–12 cross-section survey of a population-based sample of 178 Australian childcare services. Analysis examined childcare service and mothers' awareness of relevant legislation and reported extent of discrimination, and explored relationships between childcare service characteristics, accommodation of breastfeeding and breastfeeding prevalence. Most childcare services directors were found to be unaware of relevant discrimination laws, and some reported that services may discriminate against breastfeeding mothers. Most services accommodated breastfeeding, though such support was highly variable. Breastfeeding prevalence in childcare services varied significantly according to the types of support for breastfeeding that were offered. Whether or not a particular type of support was linked to better breastfeeding outcomes differed according to children's age groups. For breastfeeding prevalence among the youngest infants, the most important measures for breastfeeding support were in the domains of the environment and management attitudes and staff support and capabilities of childcare services. Breastfeeding prevalence among infants aged less than six months was significantly lower (26%) in childcare services that did not display posters showing breastfeeding as normal practice for babies and young children, compared with breastfeeding prevalence of 46% at services displaying such posters ($p = 0.037$). Breastfeeding was also significantly lower where the service did not provide information about the national ABA breastfeeding helpline, where staff did not have formal training or qualifications in breastfeeding support, or where policies prevented children of staff from attending the childcare service.[99]

Childcare settings

A survey of 183 US mothers participating in the Infant Feeding Practices Study II found that a mother was four-to-six times more likely to be breastfeeding at six months if she had childcare services support to feed expressed breastmilk and breastfeed at the childcare place before or after work.[100] Compared with mothers who reported fewer than three total supports, mothers who reported five supports were three times as likely to be breastfeeding at six months.

AUSTRALIAN STUDY: A qualitative study of centres in Adelaide found implementation of policies and practices to protect breastfeeding in childcare settings, such as physical space to breastfeed and facilities to store the expressed breastmilk, were mainly available on an ad hoc basis, as a personal or passive response

to individual parents' needs.[101] The study highlighted the need for breastfeeding support in childcare to be proactive and an integral part of childcare centres' training, policy and practice.

A study comparing the US and Australian policy environments for breastfeeding support by childcare services found similarities and differences between the two countries' childcare settings.[102] One theme that emerged from this study was that infant feeding was seen as the parents' choice and that most centres provide breastfeeding support in a passive way (only if parents prefer to do so) rather than actively promoting it. The authors concluded this reflected both official guidance and the breastfeeding environment, with childcare practices reflecting the environment of support, or lack thereof, for breastfeeding in the society as a whole.

ANBS-E Strategy 4

ANBS-E Strategy 4 (Question 1): The Baby Friendly Health Initiative (BFHI), previously called the Baby Friendly Hospital Initiative (maternity care practices)

This Evidence Check identified multiple recent systematic reviews as well as RCTs and quasi-experimental studies that assessed evidence for the effectiveness of the BFHI at the system level, as well as a large number assessing effectiveness of the individual Ten Steps to Successful Breastfeeding that underpin the BFHI.

Effectiveness of the BFHI as a whole, and for its individual components, was found in the major systematic reviews of multiple interventions, summarised earlier. The review by Dyson 2010 recommended implementation of BFHI as routine practice in the British health system.[83] This was one of 25 recommendations, and was one of the two recommendations for adopting changed clinical policies and practice, the other being Baby Friendly Initiatives (BFI).

The rapid evidence appraisal by Hector et al. in 2010 reported strong evidence for the effectiveness of the Baby Friendly Hospital Initiative (BFHI) as a whole, and for many of the individual Ten Steps.[51] The presence of a written breastfeeding policy (non-draft) and communication of the policy to staff (Step 1), early skin-to-skin contact (Step 4) and not giving supplementary fluids while in hospital unless medically indicated (Step 6) appear to be particularly important practices for improving breastfeeding practices. The evidence concerning the latter two practices is especially strong. Supplementation is considered a poor response to maternal fatigue. The authors also noted there was inadequate evidence about effectiveness of other steps. Step 1b 'communication of written policies to staff', Step 2 'training staff in skills to implement the policy', Step 7 'rooming-in' and Step 10 'informing mothers about breastfeeding support on discharge' were identified as areas for improvement in Australian studies. The available evidence did not support a causal relationship between pacifier use (Step 9) and poorer breastfeeding practices, though the authors found it likely that banning provision of commercial hospital discharge packs has a strong equity basis. Hector et al. also noted there are no studies examining the effectiveness of the Baby Friendly Health Initiative in paediatric or community settings, where implementation has been very low, despite it being recommended as core in breastfeeding promotion worldwide. Implementation of the Baby Friendly Hospital/Health Initiative was reported to be limited by a lack of management support, a lengthy accreditation process, embedded alternative practices by senior midwives, and time pressures to learn about the policy and its implementation. Enabling factors include the gaining of upper management support and training in BFHI for senior management staff. Specific funding or incentives are likely to be required.

A comprehensive revision of BFHI took place in 2017 in response to the 2012 Comprehensive Implementation Plan for Maternal, Infant and Young Child Nutrition, endorsed by all member states of the World Health Assembly (WHA). The plan included expanding BFHI as a strategy for achieving the agreed targets of 50% exclusive breastfeeding to six months.[199] The review process instituted by WHO led to

publication of the *Guideline: Protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services* in late 2017.[71]

Development of the Guideline followed WHO procedures for systematic quality assurance, and was based on case studies and country experience[200] as well as on multiple Cochrane and other systematic reviews of the practices underlying the criteria for BFHI designation. It also drew on a systematic review of mothers' and health workers' values and preferences regarding the BFHI.

BFHI is presented in this Guideline within a human rights and equity framework. This is based on a WHO literature review of human rights and equity issues common to BFHI breastfeeding support interventions. The process for reviewing the BFHI has identified low coverage of hospital births within countries, despite it being adopted in a large number of countries.[201] Access to maternity care adhering to BFHI requirements is presently not widely available in many localities to mothers giving birth, resulting in social and other inequities in hospital-based breastfeeding support. While BFHI is effective in increasing breastfeeding, the WHO[42] identified that low coverage and 10 Step adherence resulted in inequity in the quality of healthcare for newborns and their mothers. As breastfeeding rates for high-socioeconomic status women are higher than for women in low-SES groups, current 'vertical' implementation of BFHI can widen disparities in breastfeeding if it is not consistently implemented across the health system.

An implementation guide encompassing the recommendations in the Guideline, the International Code of Marketing of Breastmilk Substitutes and the Baby Friendly Hospital Initiative has been developed by WHO and UNICEF and will be published separately in *Protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services: the revised Baby Friendly Hospital Initiative 2017*.

A consultation draft of the implementation guide was released in late 2017. The consultation draft pointed to the importance of scaling up BFHI and integrating it into maternity care systems for both effectiveness and health equity reasons.[42] It proposes a 'health system strengthening' approach, noting experience pointing to the importance of mainstreaming to achieve sustainability. Barriers to high BFHI coverage, costs of its insufficient incorporation into pre-service education, and over-reliance on 'champions of change' were identified in the draft as challenges in the current 'vertical' model. Evidence supporting a revised approach also included observations of WHO Code violations and industry influence on BFHI implementation.[200] The consultation draft proposes strengthening heath-system protection, promotion and support for breastfeeding by, a) reducing resource costs; b) scaling up implementation via sustainable integration of BFHI into health systems; and c) aligning with other WHO guidance on quality improvement, such on maternity and newborn care, HIV and infant feeding, and on inappropriate promotion of foods for infants and young children.

A proposed reframing of the Ten Steps to Successful Breastfeeding aims to more clearly separate issues on clinical standards of care for individual women from institutional procedures to ensure care is 'consistent and ethical'. The consultation draft proposes four 'critical management procedures' and six 'key clinical practices', in line with the original Ten Steps to Successful Breastfeeding.[39] Being one of the critical management procedures, facility compliance with the WHO Code and subsequent relevant WHA resolutions would be an explicit part of the Revised BFHI (p.12). A health-systems approach would underpin recommendations for a national coordinating body, inclusion of BFHI in mandated standards of care, and capacity strengthening through pre-service education of all health professionals working with pregnant women and young children, alongside appropriate institutional performance incentives, and internal data collection and monitoring reinforced through external monitoring by governments.

REVIEW OF REVIEWS: The 2017 WHO Guideline on maternal and newborn care to support breastfeeding is based on 22 quantitative systematic reviews of the effectiveness of each of the BFHI Ten Steps and one qualitative systematic review of the BFHI's feasibility and acceptability to mothers and health workers.[39] The evidence from these systematic reviews updated the WHO *Evidence for the Ten Steps*. These systematic

reviews are listed and only briefly summarised below, being fully documented by WHO in the Guideline document. The quantitative systematic reviews followed the procedures of the *Cochrane Handbook for Systematic Reviews of Interventions* and assessed the effects of interventions to protect, promote and support breastfeeding in facilities providing maternity and newborn services. All studies compared a group of participants who received advice on, or practised, one of the behaviours described in the Ten Steps to Successful Breastfeeding, which appeared in the 1989 joint statement by WHO and UNICEF on *Protecting, promoting and supporting breastfeeding: the special role of maternity services*, with a group that received a placebo or usual care, or did not practise the intervention. For the studies to be included in the reviews, co-interventions other than the practices of interest had to have been used for both the control and intervention study arms.

The overall quality of the available evidence varied from very low to high for the critical outcomes of breastfeeding rates, nutrition or health in the different interventions. Additional syntheses of qualitative evidence served to assess the values and preferences of mothers regarding the benefits and harms associated with each intervention and the acceptability of each intervention to health workers. A search of the published literature was also performed to inform on resource use, feasibility and equity and human rights issues for each intervention. A decision-making framework was used to promote deliberations and consensus decision-making.

The WHO Guideline relates to the following areas and evidence base:

A. Immediate support to initiate and establish breastfeeding (nine systematic reviews):

- *Early skin-to-skin contact (moderate-quality evidence) and early initiation of breastfeeding[202-204] (high-quality evidence)*
- *Showing mothers how to breastfeed[205,206,207] (moderate-quality evidence)*
- *Rooming-in[208] (moderate-quality evidence)*
- *Demand feeding[209, 210] (very low-quality evidence).*

B. Feeding practices and additional needs of infants (seven systematic reviews):

- *Early additional foods or fluids[211] (moderate-quality evidence)*
- *Avoidance of pacifiers or dummies[212-214] (high-quality evidence)*
- *Avoidance of feeding bottles and teats[215-217] (moderate-quality evidence).*

C. Creating an enabling environment (six systematic reviews):

- *Breastfeeding policy of facilities providing maternity and newborn services[218] (very low-quality evidence)*
- *Training of health workers[46] (very low-quality evidence)*
- *Antenatal breastfeeding education for mothers[218, 219] (moderate-quality evidence)*
- *Discharge planning and linkage to continuing support[220] (low-quality evidence).*

As noted above, the WHO 2017 BFHI Guideline (2017) incorporated findings from syntheses of qualitative evidence in order to assess the values and preferences of mothers regarding the benefits and harms associated with each intervention and the acceptability of each of the interventions to health workers.[71] The quality of each individual study was appraised and each individual theme was graded. Ten systematic reviews of the values and preferences of mothers and one of health workers were summarised in Annex 4 of the Guideline on various aspects of breastfeeding support as related to the Ten Steps and BFHI. The overall confidence in the synthesis of qualitative evidence was very low to moderate for both maternal values and preferences and health-facility staff acceptability. The following themes were identified from qualitative studies of mothers' values and preferences:

- *Most mothers valued immediate skin-to-skin contact and felt happy doing this; found that being taught how to breastfeed was helpful but sometimes inadequately done; (of normal infants) found that being taught how to express breastmilk was useful; preferred to room-in their infant, although there was a significant proportion who would prefer not to room-in at night; and valued linkage to breastfeeding support after discharge. Mothers also valued demand feeding but felt they needed more support.*
- *Mothers living in cultural contexts where pre-lacteal feeds are acceptable valued pre-lacteal feeds; valued the use of pacifiers or dummies; valued the use of bottles; found cup feeding difficult.*
- *Mothers also felt infant feeding was not discussed enough in the antenatal period and that antenatal education abut breastfeeding was not optimally done.*

Annex 4 of the WHO 2017 Guidelines also reported themes from studies on healthcare workers.

- *Health workers valued and had favourable views towards early skin-to-skin contact; had safety concerns during early breastfeeding and skin-to-skin contact after caesarean delivery or anaesthesia; had safety concerns about early breastfeeding and skin-to-skin contact when the infant was admitted to the neonatal intensive care unit; felt there were too many barriers (especially lack of time) to adequately show mothers how to breastfeed. There were differing levels of confidence among health workers when showing mothers how to breastfeed; they often felt someone else, someone more experienced, would do a better job; there was a negative attitude among health workers towards showing mothers how to breastfeed; health workers could themselves be obstacles to breastfeeding. Though some health workers valued rooming-in, most felt it was not necessary; there were differing views among providers about demand feeding.*
- *Health workers felt breastmilk was good but that breastmilk substitutes were also fine; had differing values about pacifier use; disliked cup feeding and were ambivalent about bottle feeding.*
- *Health workers felt a clearly stated infant feeding policy should be neutral or there should not be one; felt implementing a policy on breastfeeding was a daunting task and would require frequent communication; felt more breastfeeding training would be helpful yet there was lack of time for breastfeeding training due to competing priorities; had differing views on provider roles in promoting breastfeeding in antenatal breastfeeding education; had differing confidence in and perceptions of the effectiveness of breastfeeding counselling; and felt linkage to continuing support for breastfeeding was challenging.*

Recommendations from WHO are in the box over the page.

WHO Revised BFHI

A. Immediate support to initiate and establish breastfeeding (nine systematic reviews)

1. Early and uninterrupted skin-to-skin contact between mothers and infants should be facilitated and encouraged as soon as possible after birth (*recommended, moderate-quality evidence*).

2. All mothers should be supported to initiate breastfeeding as soon as possible after birth, within the first hour after delivery (*recommended, high-quality evidence*).

3. Mothers should receive practical support to enable them to initiate and establish breastfeeding and manage common breastfeeding difficulties (*recommended, moderate-quality evidence*).

4. Mothers should be coached as to how to express breast milk as a means of maintaining lactation in the event of their being separated temporarily from their infants (*recommended, very low-quality evidence*).

5. Facilities providing maternity and newborn services should enable mothers and their infants to remain together and to practise rooming-in throughout the day and night. This may not apply in circumstances when infants need to be moved for specialised medical care (*recommended, moderate-quality evidence*).

6. Mothers should be supported to practise responsive feeding as part of nurturing care (*recommended, very low-quality evidence*).

B. Feeding practices and additional needs of infants (seven systematic reviews)

7. Mothers should be discouraged from giving any food or fluids other than breastmilk, unless medically indicated (*recommended, moderate-quality evidence*).

8. Mothers should be supported to recognise their infants' cues for feeding, closeness and comfort, and enabled to respond accordingly to these cues with a variety of options, during their stay at the facility providing maternity and newborn services (*recommended, high-quality evidence*).

9. For preterm infants who are unable to breastfeed directly, non-nutritive sucking and oral stimulation may be beneficial until breastfeeding is established (*recommended, low-quality evidence*).

10. If expressed breastmilk or other feeds are medically indicated for term infants, feeding methods such as cups, spoons or feeding bottles and teats may be used during their stay at the facility (*recommended, moderate-quality evidence*).

11. If expressed breastmilk or other feeds are medically indicated for preterm infants, feeding methods such as cups or spoons are preferable to feeding bottles and teats (*recommended, moderate-quality evidence*).

C. Creating an enabling environment (six systematic reviews)

12. Facilities providing maternity and newborn services should have a clearly written breastfeeding policy that is routinely communicated to staff and parents (*recommended, very low-quality evidence*).

13. Health-facility staff who provide infant feeding services, including breastfeeding support, should have sufficient knowledge, competence and skills to support women to breastfeed (*recommended, very low-quality evidence*).

14. Where facilities provide antenatal care, pregnant women and their families should be counselled about the benefits and management of breastfeeding (*recommended, moderate-quality evidence*).

15. As part of protecting, promoting and supporting breastfeeding, discharge from facilities providing maternity and newborn services should be planned for and coordinated, so parents and their infants have access to ongoing support and receive appropriate care (*recommended, low-quality evidence*).

Further additional recent evidence on the BFHI was identified by this Evidence Check. The findings of recent systematic reviews and key studies on BFHI are summarised below, while additional relevant studies on the BFHI are summarised in *Appendix 5: Supplementary narrative summaries on health settings studies*.

A 2016 systematic review and synthesis of the BFHI found 25 studies for review.[117] More studies supported the BFHI than studies that demonstrated no effect of the intervention. Design weaknesses, settings outside the US, and disparate methods reduce the ability to reach firm conclusions about the effectiveness of the BFHI in improving breastfeeding initiation, duration and exclusivity rates in the US. The authors identified the need for research conducted in the US and experimental designs in order to more conclusively determine the effectiveness of the BFHI as an intervention to improve breastfeeding rates.

A study led by Pérez-Escamilla (2016) conducted a narrative systematic review to examine the impact of BFHI implementation on breastfeeding and child health outcomes worldwide and in the US.[221] Fifty-eight reports were included in the systematic review of studies conducted in 19 different countries located in South America, North America, Western Europe, Eastern Europe, South Asia, Eurasia and Sub-Saharan Africa. *Adherence to the BFHI Ten Steps was found to have a positive impact on short-term, medium-term and long-term breastfeeding outcomes. The review also found a dose–response relationship between the number of BFHI steps women are exposed to and the likelihood of improved breastfeeding outcomes* (early breastfeeding initiation, exclusive breastfeeding (EBF) at hospital discharge, any breastfeeding and EBF duration). It also found community support (Step 10) appears essential for sustaining breastfeeding effects of BFHI in the longer term. WHO[71] notes that this coordination via breastfeeding-friendly community initiatives is crucial for sustaining breastfeeding in the community after discharge from maternity care facilities. Avoiding supplementation with products other than breastmilk was found to be crucial (Step 6).

In 2017 Wouk conducted a systematic review on the effects of Step 3 of the Ten Steps, which involves informing pregnant women about the benefits and management of breastfeeding.[118] Thirty-eight RCTs or quasi-experimental studies were included from developed or developing countries. Findings suggest prenatal interventions, delivered alone or in combination with intrapartum and/or postpartum components, are effective at increasing breastfeeding initiation, duration or exclusivity where they combine both education and interpersonal support and where women's partners or family are involved. However, varying study quality and lack of standardised assessment of participants' breastfeeding intentions limited the ability to recommend any single intervention as most effective.

Barriers and facilitators to BFHI implementation were examined in a 2012 systematic review.[222] The study identified a wide variety of obstacles and potential solutions to BFHI implementation. Findings suggest some priority issues to address when pursuing Baby Friendly Initiative designation, including the endorsements of both local administrators and government policy makers, effective leadership of the practice change process, healthcare worker training, the marketing influence of formula companies, and integrating hospital and community health services. The authors concluded that framing the BFI as a complex, multilevel evidence-based change process and using context-focused research implementation models to guide BFI implementation efforts may help identify effective strategies for promoting wider adoption of the BFI in health services.

A qualitative systematic review study by Schmied in 2014[223] used meta-ethnographic synthesis to investigate healthcare staff perceptions of the BFHI and to identify facilitators and barriers to its implementation. The analysis identified three overarching themes. First, BFHI was viewed variously as a 'desirable innovation or an unfriendly imposition'. The second theme highlighted cultural and organisational constraints and obstacles to BFHI implementation including resource issues, entrenched staff practices and staff rationalisation of non-compliance. Theme three captured a level of optimism and enthusiasm among participants who could identify a dedicated and credible leader to lead the BFHI change process. The study

authors concluded that introduction of the BFHI at a local level requires detailed planning, extensive collaboration and an enthusiastic and committed leader to drive the change process.

AUSTRALIAN STUDY: An Australian study in 2010[224] investigated the effects of BFHI designation and Queensland hospital care practices on breastfeeding rates at one and four months. Women who birthed in BFHI-accredited hospitals had lower odds of breastfeeding at one month than those who birthed in non-BFHI-accredited hospitals, and there were no significant effects on breastfeeding at four months or exclusive breastfeeding at one or four months. Where women experienced four BFHI practices (early skin-to-skin contact, attempted breastfeeding within the first hour, rooming-in and no in-hospital supplementation) they were much more likely to breastfeed at one and four months than women who experienced fewer than four practices. The authors concluded accreditation has less effect on duration where there are high initiation rates and BFHI is embedded in the community but it can play an important role in areas where breastfeeding rates are low.

A US study explored the association between the BFHI Ten Steps and breastfeeding at two days and two weeks through a 65-question institutional survey used to assess and score compliance with the Ten Steps for each of Oregon's 57 birthing hospitals.[225] The study found increases in overall hospital scores on the BFHI Ten Steps were associated with increases in the percentage of women breastfeeding at two days and at two weeks postpartum. Only the presence of a written hospital policy was independently associated with breastfeeding percentage. The authors concluded that increased implementation of the Ten Steps is associated with increased breastfeeding and that hospitals with comprehensive breastfeeding policies are likely to have better breastfeeding support services and better breastfeeding outcomes.

Hawkins[226] evaluated the impact of the BFHI on breastfeeding initiation and duration overall, and according to maternal education. Using quasi-experimental design and data from five US states from 1999–2009, the study compared breastfeeding initiation and duration before and after BFHI accreditation between mothers who gave birth in hospitals that were accredited or became accredited and mothers from matched non-BFHI facilities. No overall differences were found in breastfeeding initiation between birth facilities that received BFHI accreditation and non-BFHI facilities but breastfeeding and exclusive breastfeeding for > = 4 weeks increased among mothers with lower education who delivered in BFHI facilities. The authors concluded that by increasing breastfeeding initiation and duration among mothers with lower education, the BFHI may reduce socioeconomic disparities in breastfeeding.

Tsai[227] investigated the change in, and correlates of, breastfeeding practices in Taiwan after delivery at a hospital and at one, three, and six months postpartum among first-time mothers. Early initiation of breastfeeding, rooming-in practice and self-efficacy were significantly related to exclusive breastfeeding during the hospital stay. After discharge, health literacy, knowledge, intention and self-efficacy were positively and significantly associated with breastfeeding exclusivity. Later initiation, shorter intention and self-efficacy were important predictors of breastfeeding cessation within six months postnatally. The study concluded that interventions seeking to sustain breastfeeding should consider new mothers' needs and barriers at different times.

Passanha[228] evaluated whether the support offered by maternity hospitals in Brazil was associated with higher exclusive and predominant breastfeeding. This cross-sectional study found a tendency for more prevalent predominant breastfeeding when the number of fulfilled BFHI steps was higher. Not offering artificial teats or pacifiers to breastfed infants and encouraging the establishment of breastfeeding support groups was associated with higher rates of exclusive and predominant breastfeeding.

A 2015 US study by Whalen and colleagues concluded that a statewide intensive collaborative program had facilitated increases in Ten Step achievement and in-hospital breastfeeding for participating hospitals.[229] Active work in Ten Step implementation, including staff education, was found to be more effective in

increasing in-hospital breastfeeding than BFHI designation alone. Staff education showed the greatest improvement, increasing Step 2 achievement from one to six hospitals. Intensive collaborative hospitals achieved an average of 1.5 new steps, whereas non-BFHI hospitals lost 0.7 steps. In-hospital breastfeeding rates increased in intensive collaborative hospitals and were significantly higher than those in non-BFHI hospitals by the end of the study (any breastfeeding, 89% vs. 73%).

A systematic review by Jones et al.[230] pointed to racial and ethnic disparities in breastfeeding in the US arising from differential availability of support. This article reviewed the literature on racial and ethnic disparities in breastfeeding rates and practices, to address barriers to breastfeeding among minority women, systematically review effective breastfeeding interventions, and provide obstetrician-gynaecologists with recommendations on helping increased rates among minority women. Racial and ethnic minority women continue to have lower breastfeeding rates than white women and are not close to meeting the US Healthy People 2020 goals. Minority women report many barriers to breastfeeding. The study concluded that major efforts are still needed to improve breastfeeding initiation and duration rates among minority women in the US.

A US study examined the relationship between population demographics, including poverty and race, and exclusive breastfeeding outcomes in hospitals with and without the BFHI designation.[231] The study found hospitals with BFHI designation had exclusive breastfeeding rates that were on average 10%–15% higher than hospitals without BFHI designation, regardless of demographics. BFHI designation explained some but not most of the variability between women in exclusive breastfeeding rates — exclusive breastfeeding rates were lower where the local area had higher proportions of African-American and Hispanic populations, and people living at less than 200% of the poverty line.

A 2016 study examined two national policy documents and 16 original studies to evaluate the impact of the Baby Friendly Hospital Initiative (BFHI) on breastfeeding and early infant health outcomes in US.[232] Breastfeeding duration increased when mothers had increased exposure to baby friendly practices, but deficiencies in breastfeeding tracking mechanisms limited reliable breastfeeding duration data. Of the 10 Steps of the BFHI, Step 3, prenatal education, and Step 10, postnatal breastfeeding support, were found to be the most difficult steps to implement; however, those steps had the potential to make a significant impact on maternal breastfeeding decisions.

A large population-based intervention study in Norway found socioeconomic inequalities in exclusive breastfeeding at five months were largely explained by sociodemographic factors. However, the authors identified modifiable factors such as breastfeeding difficulties that were also important and could be modified by appropriate support.[233]

Strauch[234] examined whether initiation of breastfeeding and exclusive breastfeeding on discharge in first-time mothers increased after a change in hospital policy increased reporting requirements about breastfeeding by new mothers. The study reported that mandated reporting of breastfeeding outcomes increased breastfeeding initiation but not duration of breastfeeding.

A study in Brazil analysed the association between delivery in a BFH (main exposure), compared with a non-BFH, and timely initiation of breastfeeding using data from a nationwide hospital-based study of postpartum women and their newborns.[235] Forty per cent of all births occurred in hospitals accredited or in the accreditation process for the BFHI and 52% of women underwent caesarean section. The study found the chance of being breastfed in the first hour after birth in BFHs was twice as high as at non-accredited hospitals. Prematurity and low birthweight reduced the chance of timely initiation of breastfeeding.

A US study evaluated a national quality improvement initiative between 2011 and 2015[236] and concluded that the nationwide initiative of maternity care hospitals accomplished rapid transformative changes to achieve Baby Friendly designation. The changes were accompanied by a significant increase in exclusive

breastfeeding. The Best Fed Beginnings initiative enrolled 90 hospitals in a nationwide move to increase breastfeeding and achieve Baby Friendly designation. The intervention period lasted from July 2012 to August 2014. Overall breastfeeding increased from 79%–83% and exclusive breastfeeding increased from 39%–61%.

A study of BFHI in Switzerland investigated BFH designation (current, former and never) and compliance with Baby Friendly breastfeeding practices, and found BFHI implementation in Switzerland was associated with higher breastfeeding rates.[237] Continued breastfeeding was significantly longer when babies were born in current BFHs (cessation hazard ratio 0.60) or in former BFHs (cessation hazard ratio 0.68). The results support continued investment in BFHs, as babies born in current BFHs were breastfed the most and the longest, and even former BFH designation showed a sustained effect on continued breastfeeding.

AUSTRALIAN STUDY: An instrumental case study design with multiple sources of data critically examined the enabling factors and barriers to the implementation and dissemination of a global health strategy to support breastfeeding in a national setting.[238, 239] The combined findings of the document and interview analyses demonstrated that historical events and situational context are interrelated and both exert either an enabling influence or barrier to the awareness, acceptance, sense of applicability and uptake of the BFHI strategy at all levels of the health system in Australia. The presence of both enabling factors and barriers have significantly influenced the dissemination of the BFHI in Australia. Enabling factors were found to be intangible in nature, consisting of an altruistic belief in breastfeeding support as being important for women, babies and the world. In contrast, the barriers were found to be tangible: namely inadequate resourcing at all levels of the healthcare system constraining delivery of the BFHI at local levels. Recommendations included that any future expansion requires authentic government engagement and tangible incentives in collaboration with key stakeholders.

AUSTRALIAN STUDY: Esbati and colleagues[240] analysed publicly available legislation, policy and guidelines relevant to national and state government policy support for the BFHI and its uptake and implementation in Australia, and examined trends and coverage of BFHI in Australia. They found a declining number of maternity facilities have been accredited since 2011, with only one in five accredited by 2016. The study found legislation documents contained no direct references to the BFHI or Code of Marketing of Breastmilk Substitutes. There was little reference to the Code or to monitoring of the Marketing in Australia of Infant Formulas (MAIF) Agreement at national and state levels. The study also identified gaps in documentation for monitoring breastfeeding rates at the national level.

AUSTRALIAN STUDY: A 2017 qualitative study of the BFHI in Australia explored the perspectives of key stakeholders in the field of infant feeding on the implementation of the strategy, barriers and enablers to its successful implementation and actions that were still needed.[241] The main themes identified were initial opinions of the strategy as a blueprint for action, the strategy as a driver for action, lessons learnt and recommendations for the future. In order to successfully implement Australia's future national breastfeeding strategies, the following were recommended: an independent breastfeeding/infant feeding committee, increasing the political prioritisation of issues surrounding infant feeding, and strengthening regulation of the marketing of breastmilk substitutes.

A Canadian study examined the determinants of non-medically indicated supplementation (Step 6) on breastfeeding outcomes among mothers intending to exclusively breastfeed.[242] About 17% of babies were supplemented in hospital. Four factors were significant determinants: mothers having a low total prenatal Iowa Infant Feeding Attitude Scale score, no previous breastfeeding experience, negative first impression of breastfeeding and receiving breastfeeding advice from a hospital physician. These babies were two-to-three times more likely to be supplemented despite their mother intending to exclusively breastfeed.

BFHI and the role of human milk (HM) banking

Where a child cannot be breastfed by its mother, the next best option after receiving her expressed milk is to be breastfed or receive the milk of another woman.[3] In 2011, the WHO stated that low-birthweight infants, including those with very low birthweight, who cannot be fed mother's own milk (MOM) should be fed donor human milk (DHM), where safe and affordable milk-banking facilities are available (WHO, 2011).[71]

Studies providing evidence on the effectiveness of implementing milk banking within health facilities as a strategy to improve the breastfeeding of vulnerable infants are discussed below.

Milk banking relates closely to packages of interventions to support breastfeeding and human milk feeding of sick or vulnerable infants, such as the proposed Neo-BFHI for neonatal wards.[243] More broadly, human milk banking can assist implementation of BFHI Step 6 recommendations to avoid medically unnecessary supplementation with non-breastmilk. However, making DHM more available may lead to its inappropriate substitution for MOM and maternal breastfeeding, rather than using it as a substitute for bovine milk-based formula. Although donor milk is advantageous compared with formula, it can reduce provision of a mother's own milk, which is most suitable for her infant. Processing of donor milk, such as freezing and pasteurisation, also compromises some immunological and other components compared with MOM, which can be fed fresh. There are also important health and developmental consequences of feeding at the maternal breast that are not available to mother or child where donor milk replaces MOM or breastfeeding. Transition to breastfeeding can be inhibited by inappropriate use of donor milk where adequate lactation support is not available.

EXPERT REVIEW: For example, a 2017 expert review of methods to promote human milk (HM) feeding in the preterm infant noted a trend in research to conflate the mother's own HM and donor HM by referring to both as 'human milk fed' or 'breastmilk fed'.[244] Distinguishing the two is critical as the latter does not provide the same reduction in clinical risks for the recipient infant as MOM. Funding competition between milk banks and lactation support services has often resulted in scarce funds being invested in milk bank infrastructure rather than in improved practices and methods for acquiring milk from the infant's own mother. The review concluded that although HM feeding has increased in the past decade, efforts to help mothers maintain HM provision through to neonatal intensive care unit (NICU) discharge remained problematic; *"implementation of best practices translating evidence for high-dose human milk (HM) feeding for preterm infants during NICU hospitalization has been compromised"*. To support mothers' goals for HM feeding, the authors recommend a special emphasis on 'coming to volume' early in the lactation period.

Several recent expert reviews and systematic reviews were identified as relevant to whether donor milk banking improved breastfeeding and related feeding outcomes for vulnerable infants in NICUs. Key papers include several covering economic outcomes.

Hospital milk banks

The Evidence Check found two systematic reviews into whether milk banks in hospitals affect breastfeeding outcomes.

A systematic review and meta-analysis in 2016 identified 10 trials and found introduction of DHM increased any breastfeeding on discharge by about 20%.[245] It did not increase exclusive maternal breastfeeding on discharge, or exclusive administration of own mother's milk (OMM) in days 1–28 of life. The review identified a single-centre study demonstrating a significant decrease in the percentage of feeds of OMM after the introduction of DHM. The authors concluded there was some evidence of positive and negative effects on measures of maternal breastfeeding when DHM was introduced to a neonatal unit. This may indicate that the package of interventions to support breastfeeding delivered alongside appropriate use of donor milk plays an important part in the delivery of an appropriate milk banking service.

EXPERT REVIEW: A 2013 expert review by the Committee on Nutrition of the European Society for Paediatric Gastroenterology, Hepatology and Nutrition documented the benefits and common concerns deriving from the use of DHM in preterm infants. It identified protection against necrotising enterocolitis (NEC) as its major clinical benefit. Limited data also suggested unfortified DHM is associated with improved feeding tolerance. This review concluded that presence of a human milk bank (HMB) does not decrease breastfeeding rates at discharge, but decreases the use of formula during the first weeks of life. Fresh own mother's milk was considered the first choice in preterm infant feeding due to the effects of processing and storage on biological components of human milk. Hence the review called for strong efforts to promote lactation.[246]

EXPERT REVIEW: As noted elsewhere in this Evidence Check, a 2009 health technology assessment in Britain examined the effectiveness and cost-effectiveness of interventions that promote or inhibit breastfeeding or feeding with breastmilk for infants admitted to neonatal units.[18] This study concluded that it was unlikely specific clinical interventions would be effective if used alone in NICUs, but that, based on economic modelling, skilled support from trained staff in hospital is potentially cost-effective, and donor milk banking would become cost-effective given improved mechanisms for its provision.

Several other key studies that post-dated or were outside the scope of the above reviews have examined the impact of DHM availability on breastmilk use and related feeding outcomes in NICUs. These studies are are summarised below.

A study of changing availability of DHM in a population-based cohort of very low-birthweight infants in California assessed whether DHM availability was associated with rates of breastmilk feeding at NICU discharge and rates of NEC.[247] It found that after availability of DHM increased from 27 to 55 hospitals during 2007–2013 (giving 81.3% of premature infants in regional NICUs access to DHM), breastmilk feeding (defined as any HM feeding and including infants substantially fed formula) increased by 10% at NICU discharge with a concomitant 2.6% decrease in NEC rates.

A 2016 study on whether use of DHM changes the provision of MOM to very low-birthweight infants in a Boston level III NICU found a sixfold increased odds of consuming MOM at discharge and a 49% lower risk of cessation of MOM consumption during hospitalisation in the two years after compared with before the donor milk program.[248]

In 2016 a study in Greece examined outcomes of feeding 384 low-birthweight infants with MOM and early initiation of breastfeeding (raw human milk/breastfed infants), in comparison with feeding only with donor-banked milk (until the third week of life) and afterwards a preterm formula until hospital discharge (donor-banked/formula-fed infants).[249] The study found breastfeeding initiation occurred two weeks earlier in the former group, and hospital costs were lower for the first group.

A study using content analysis of interviews with health professionals working in NICU at a large teaching hospital in Quebec, Canada, identified key barriers and facilitators to implementing the BFHI in NICUs and concluded that partipants recognised its value.[250] Participants highlighted the crucial role of education, interprofessional collaboration and access to lacatation champions in enabling adoption of the Neo BFHI.

A qualitative study by Carroll examined changes in health professionals' knowledge and opinions on donor milk banking after pasteurised donor human milk (PDHM) was introduced to a NICU in the US.[251] It found NICU clinicians' support for PDHM exceeded their knowledge of its risks and benefits, and clinicians requested education about various aspects of PDHM.

Milk banking networks

In Australia at the present time there are five milk banks. Access to banked milk, including for babies in NICUs, is restricted and is not available in all jurisdictions or regions. Australian milk banks have largely

operated independently with no formal regulation and no benchmark for best practice. In 2007, a parliamentary committee report on the health benefits of breastfeeding recommended *"the Department of Health and Ageing fund a feasibility study for a network of milk banks in Australia including the development of a national regulatory and quality framework within which a network of milk banks in Australia could operate"*.[67] It also recommended funding existing milk banks. A Department of Health Discussion Paper published in 2014 discussed the financial, legal and regulatory barriers to establishing milk banks in Australia.[252] At that time, it took the view that decisions about establishing, managing and resourcing milk banks should be made by local hospital networks, subject to local priorities. It concluded that regulatory considerations for milk banks were too complex to be pursued and that emerging projects should be guided by operating principles already in use and by existing legal frameworks.

As is recognised in the BFHI, there are human rights and equity considerations regarding access to HM banks for vulnerable infants in healthcare systems.[253] A study of US health policy and access to HM banks identified numerous barriers to the use of banked HM, and concluded many patients were denied access to it because of lack of policy explicitly addressing its use. The author advocated a review of US health policies addressing child health and breastfeeding which would encompass consideration of HM banking services to fulfil the ethical principles of justice (fair access) and autonomy.[254] In 2013, a US study documented the significantly increased prevalence and coverage of milk banking in US intensive care neonatal units in maternity hospitals (from 25% to 45% between 2007 and 2011, $p = .001$), and the substantial geographic variation.[255]

The Evidence Check found several reviews and key papers that examined the role of national milk bank networks in enabling, or displacing breastfeeding.

A recent review of BFHI implementation suggested BHFI effectiveness can be strengthened by linking it to the establishment of human milk banks and other initiatives such as WHO Code implementation, and by identifying cost savings to hospitals from adopting BFHI.[200]

A review of global experience in milk banking by PATH (formerly the Program for Appropriate Technology in Health) in 2013[74] provided guidelines that reflected the objective of encouraging the nationwide expansion of hospital milk banking for preterm and very low-birthweight infants (in accordance with WHO recommendations for appropriate donor human milk use) in a way that supports rather than displaces maternal breastfeeding.[74] Based on this experience, a key study published in 2017 reviewed best practices and current guidelines for human milk banking.[256] By identifying key features of successful systems, this review put forward a model for effectively establishing and operating human milk banks to guide policy makers and strengthen existing HMB systems. The review observed that scaling up has been limited by lack of policy and procedural support for milk banks, as well as by the absence of an appropriate model for resource-limited settings. It identified universal requirements needed to underpin an integrated model of newborn care across all-country income settings. Crucial to success was comprehensively integrating the operation of human milk banks within newborn-care strategies, neonatal unit operational structures, breastfeeding support services, and national and regional policies involving standards of practice and guidance for core functions. The four key steps were addressing quality assurance and ownership, awareness and advocacy of breastfeeding, networks to facilitate auditing and other activities, and development of key protocols for operations and clinical procedures. The review emphasised that comprehensive support for and prevalence of exclusive breastfeeding is needed to provide a strong foundation for human milk banking. As well as being beneficial for breastfeeding, the review documented that milk banking also increased awareness of the value of breastfeeding for enhancing newborn health. In addition to increasing breastfeeding rates, donor human milk has benefits for outcomes such as length of stay in the NICU and direct cost savings.

AUSTRALIAN STUDY: A 2017 Australian review study set out to define a minimum acceptable standard required for safe donor human milk banking in neonatal units.[257] The review started from the premise that donor human milk-banking services (DHMBS) should cause no harm to donors or recipients, such as by displacing maternal milk. The review set out an assessment process to consider the potential risks and benefits of milk banking to both recipients and donors. These risks and benefits were proposed to define both the clinical responsibility of DHMBS and their social responsibility.

In Norway, a national network of hospital-based milk banks supplied by screened community donors provides unpasteurised donor human milk.[258] The milk is prioritised to hospitalised infants in the neonatal unit, but on occasions donor milk is provided to a baby at home for a fee, such as on compassionate grounds for a few weeks where a mother, through illness, cannot breastfeed her baby. Norway is unique in that it only pasteurises donor milk for the most vulnerable categories of babies in NICUs. Rigorous testing and screening of donors is an important cost factor. However, without the high costs of routine pasteurisation, mothers of very low-birthweight or at-risk hospitalised newborns in Norway have regulated access to milk banking through the healthcare system. About 80% of mothers are breastfeeding at six months in Norway, though rates of exclusive breastfeeding are not high and rates of continuation to two years are low. It is important to note, however, that donors in Norway are universally screened for cytomegalovirus (CMV) and must test negative to be accepted as donors. Low prevalence of CMV in Norway means this requirement does not excluded many donors. In Australia, a similar requirement would exclude approximately 75% of donors due to the much higher prevalence of CMV in our community. This illustrates an important consideration when assessing milk-banking models: models that are suitable and cost-effective in some jurisdictions may not be effective in others.

In Britain, clinical guidelines have been developed by the National Institute for Health and Care Excellence (NICE) to support milk banking as an effective and cost-effective way to promote initiation and duration of breastfeeding in neonatal, special and intensive care settings (also see below).[259]

The Guideline endorses the use of donor HM if a mother is unable to express sufficient milk or does not wish to express milk for a baby unable to feed at the breast.[259] The Guideline responded to the evidence from a systematic review and economic analysis[18], which found the cost-effectiveness of donor milk in Britain, compared with commercial formula, depended on improving mechanisms for providing donor milk. It did not make recommendations on the configuration of services, but rather on the safe and effective operation of donor milk services, including on donor recruiting, selection, screening, training and support to ensure the highest quality milk before processing for vulnerable infants. The Guideline notes that advice to donors may differ from advice given to mothers expressing milk for their own babies. It also notes that the aim of maximising safety has costs, and the recommendations made balanced the aim of observing the best possible safety standards with keeping costs at societally acceptable levels. The cost-effectiveness literature was reviewed for the Guideline with evidence identified on the cost-effectiveness of indications for donor breast milk, but not for aspects of how milk banks should operate (see below under hospital milk banking).

A key study in 2013 reported on increases in exclusive breastfeeding rates over time in Brazil, where there is a large network of human milk banks integrated into national IYCF policies.[60] The study quantified the relationship between Global Strategy for Infant and Young Child Feeding (GSIYCF) policy implementation and breastfeeding practices by analysing the correlation between World Breastfeeding Trends Initiative (WBTi)) scores and trends in exclusive breastfeeding and breastfeeding duration over the past 20 years in 22 countries. Countries with national policies and programs most consistent with GSIYCF recommendations (indicated by being in the upper 50th percentile of scores) had significantly higher median annual increases in exclusive breastfeeding (1.0% a year) than countries with the lowest scores (0.2% a year) ($P = 0.01$). The study controlled for country differences in maternal demographic, socioeconomic and other factors. The

authors concluded that the association between breastfeeding protection, promotion and support and improved exclusive breastfeeding was measurable, possibly causal, and can strengthened by case studies.

Economic evaluations

One recent systematic review identified by the Evidence Check addressed the cost-effectiveness of establishing milk banking networks at health-system level. Another recent systematic review and several key papers examined resource cost aspects of human milk feeding in hospitals. No identified studies examined how the cost-effectiveness of hospital milk banking for breastfeeding-related outcomes was affected by WHO International Code compliance or policies of paying market price for commercial formula.

A key health economic study published in 2016 modelled the cost-effectiveness of HM and breastfeeding in preterm infants in order to estimate the cost savings and health benefits in the British National Health Service (NHS) from increasing human milk usage in the NICU.[260] A systematic review established the disease areas with strong sources of evidence of the short-, medium- and long-term benefits of HM for preterm infants as opposed to the use of formula milk. The analysis then assessed the economic impact of reducing rates of necrotising enterocolitis, sepsis, sudden infant death syndrome, leukaemia, otitis media, obesity and neurodevelopmental impairment. Based on the number of preterm babies born in Britain in 2013, if all premature infants in the NICU were fed mother's milk, it was estimated the NHS would save £46.7 million (£30.1 million in the first year, total lifetime cost savings) due to improved health outcomes, with a total lifetime QALY (quality-adjusted life-year) gain of 10,594. The study estimated there would be 238 fewer deaths due to neonatal infections and SIDS, resulting in a reduction of approximately £153.4 million in lost lifetime productivity. The authors concluded that increasing the use of human milk in NICUs in Britain would lead to cost savings to the NHS.

A systematic review of cost-effectiveness studies specific to necrotising enterocolitis (NEC) outcomes was published in 2017.[261] The authors observed that while MOM is protective against NEC, it is not always available. DHM is also protective (although to a lesser extent) compared with formula milk, but it is more expensive to acquire. The systematic review aimed to evaluate the cost of DHM, the cost of treating NEC, and the cost-effectiveness of exclusive DHM versus formula milk feeding to reduce the short-term health and treatment costs of NEC. Seven studies with verifiable DHM costs and 17 with verifiable NEC treatment costs were included. Estimates of the incremental length of stay (LOS) associated with NEC were approximately 18 days for medical NEC and 50 days for surgical NEC. Two studies claimed to report economic evaluations but did not do so in practice. The authors conclude it is likely that DHM provides short-term cost savings by reducing the incidence of NEC.

A US study estimated the cost of using DHM in the NICU to achieve exclusively human milk feeding through to 32 weeks postmenstrual age, to ascertain the extent to which the cost of DHM per infant is modulated by the availability of MOM.[48] Preterm infants (< 1500 g birthweight or < 33 weeks in gestational age) were retrospectively evaluated for a one-year interval. Forty-six of the 64 (72%) infants admitted to the NICU who were < 33 weeks in gestational age received DHM. The mean costs of DHM were $27 for infants of mothers who provided sufficient breastmilk through to discharge, $154 for infants of mothers who had insufficient milk supply during admission, $281 for infants of mothers who went home on formula but received any volume of MOM during admission, and $590 for infants who received no MOM during admission. The authors concluded that most NICU mothers (72%) of very preterm infants were unable to provide all the milk necessary for an exclusive human milk diet and few infants (15%) received exclusively DHM. The cost of DHM per NICU infant ranged from $27 to $590, depending on the mother's willingness or ability to provide human milk.

Two economic studies focused on the economic costs or outcomes of human milk acquired from the infant's mother, rather than donated milk.

A 2015 prospective observational cohort study in the US aimed to evaluate the cost of NEC as a function of dose and exposure period of MOM feedings received by very low-birthweight infants during NICU hospitalisation, and to determine the drivers of differences in NICU hospitalisation costs for infants with and without NEC.[262] This study included 291 very low-birthweight infants enrolled between February 2008 and July 2012. Twenty-nine (10.0%) infants developed NEC. The average total NICU hospitalisation cost (in 2012 USD) was US$180,163 for infants with NEC and US$134,494 for infants without NEC ($p = 0.024$). NEC was associated with a marginal increase in costs of US$43,818, after controlling for demographic characteristics, risk of NEC, and average daily dose of MOM during days 1–14 ($p < 0.001$). Each additional mL/kg/day of MOM during days 1–14 decreased non-NEC-related NICU costs by US$534 ($p < 0.001$). The authors concluded that avoidance of formula and use of exclusive MOM feedings during the first 14 days of life is an effective strategy to reduce NEC risk and resulting NICU costs in very low-birthweight infants, and that investing in initiatives to feed exclusive MOM during the first 14 days of life could substantially reduce these hospitalisation costs.

The hospital costs of providing HM are not routinely reimbursed by insurance companies or the health system in the US, so this can be a significant barrier for mothers. One study acknowledged the cost to mothers of providing milk. It compared the costs of acquiring DHM and MOM and found milk can be reasonably inexpensive to provide, and that the maternal cost of providing milk is mitigated by increasing milk output over the early NICU stay.[49] This study determined the initial maternal cost of providing 100 mL of milk for very low-birthweight infants during the early NICU stay, using data collected during a multisite randomised clinical trial from 111 mothers who provided their milk for their very low-birthweight infants during the early NICU stay. The cost analysis examined the cost of the breast pump rental, pump kit and maternal opportunity cost (an estimate of the cost of maternal time). On average, mothers spent 98.7 minutes each day pumping and produced 558.2 mL of HM daily. The cost of acquiring the milk from the mothers was most sensitive to the costs of the breast pump rental and pump kit, and declined with every additional day of pumping. When maternal opportunity (time) cost was counted, the mean cost of 100 mL of HM ranged between $2.60 and $6.18, compared with between $0.95 and $1.55 excluding maternal time costs.

Baby Friendly Community Initiative (BFCI)

Several community interventions with established effectiveness (such as primary care-based educational program, competent professional support at home or in health facilities, home visits by trained professionals, home-based peer counselling, or the involvement of fathers) have been integrated into Baby Friendly Community Initiatives (BFCIs) in some countries. Individual interventions of this kind are considered below under 'Community, home and family settings'. No systematic reviews of the effectiveness of BFCIs were identified.

However, one controlled non-randomised trial was identified[263] that compared exclusive breastfeeding at six months and indicators for any breastfeeding up to 12 months in 18 local health authorities involved in BFCI implementation in nine regions of Italy. While breastfeeding in these communities increased during their implementation of the BFCI, no evidence of an effect was found after adjusting for confounding factors. However, there were statistically significant differences in how useful mothers found the help they received in solving problems; the authors conclude that it may take some time before effects of the BFCI are substantial enough to become evident in breastfeeding rates at the community level. This conclusion accords with the findings of other review studies from Europe, that a long-term commitment is needed for interventions to achieve behaviour change in this area.[147, 264]

ANBS-E Strategy 5

ANBS-E Strategy 5: Training of health practitioners (general practitioners, midwives, nurses, pharmacists, dietitians, students, etc.) on the benefits of breastfeeding and providing support for mothers who choose to breastfeed ('professional education')

The aforementioned study of the Baby Friendly Community Initiative in Italy examined a combination of community interventions that included primary care-based educational programs, competent professional support at home or in health facilities.[263] This section looks at evidence about single health practitioner training interventions. The Evidence Check also identified a small number of systematic review studies relevant to the question of medical education, and/or professional development and training for health professionals.

The major reviews discussed earlier considered health professional training interventions.

A systematic review of RCTs, controlled trials and before–after studies examined the effects of training, education and practice-change interventions covering health professionals and lay breastfeeding educator/counsellors on the duration of breastfeeding.[265] All included studies were before–after studies that included education of health professionals. No identified studies related to education or training of breastfeeding counsellors. Settings were in hospitals or the community. Due to methodological limitations and the non-comparability heterogeneity of studies, there was insufficient evidence to draw conclusions about the overall harm or benefit of such interventions. The review concluded from one of the more methodologically robust studies that the WHO/UNICEF training might potentially influence duration.

Recommendations by Dyson et al. in 2010 for policy directives in Britain to address staff training, supervision and workforce capacity issues drew on evidence demonstrating the need for improved health professional training. It also identified the need to recruit and retain a pool of trained and adequately supervised peer supporters.[83]

AUSTRALIAN STUDY: The 2010 Australian Physical Activity Nutrition and Obesity Research Group (PANORG) study found qualitative evidence stressing the need for education of staff providing community support services, but insufficient evidence on the most effective interventions for health professional education.[51] The WHO/UNICEF training package was found to be effective but unlikely to be sufficient. Also, the study found, relevant health professionals including GPs and paediatricians were likely to benefit from being trained to identify the predictors and barriers to successful breastfeeding and subsequently to provide targeted anticipatory guidance. There was some evidence to suggest the use of particular 'scales' to assess current knowledge and understanding of breastfeeding by midwives in Australia. This evidence review concluded that the provision of consistent advice and empathetic communication skills should be distinctive outcomes of any health professional training in this area.

The aforementioned 2015 systematic review by Sinha et al.[144] included systematic reviews by Beake et al. (2012) on structured compared with non-structured breastfeeding programs such as BFHI to support the initiation and duration of exclusive and any breastfeeding in acute and primary healthcare settings,[266] and by Spiby et al. on education and evidence-based practice interventions with health professionals and breastfeeding counsellors on duration of breastfeeding.[265] Meta-analysis indicated that special training of health staff at the hospitals increased any breastfeeding (RR = 1.33), breastfeeding initiation (RR = 1.09) and exclusive breastfeeding to six months (RR = 1.36).

In the 2017 systematic review by Sinha[88] on effective interventions in low- and middle-income countries (LMICs), 'baby friendly' approaches in health settings (incorporating health worker training and health worker counselling and support) increased the likelihood of exclusive and continued breastfeeding by two-to-threefold (OR 2.89 and 1.69 respectively), though there were only small effects on breastfeeding initiation (OR 1.2).

A systematic review of the effects of training on the knowledge, attitudes or skills of health workers[46] post-dated the 2017 Sinha review but was included in the evidence base for the 2017 WHO Guideline. The BFHI Step 2 requires the training of all healthcare staff in skills necessary to implement the policy. Previous systematic reviews had looked only at the effects of staff training on breastfeeding rates. Therefore, this review examined whether education and training programs for healthcare staff had an effect on their knowledge and attitudes about supporting breastfeeding women. The secondary aim was to identify whether any differences in the type of training or the discipline of staff mattered. This review concluded there was a lack of good evidence on breastfeeding education and training for healthcare staff.

The authors conducted a systematic search of the Cochrane Pregnancy and Childbirth Group's trial register and included RCTs comparing breastfeeding education and training for healthcare staff with no or usual training and education if they measured the impact on staff knowledge, attitudes or compliance with the Baby Friendly Hospital Initiative (BFHI). Four distinct studies were included out of the 1192 reports that were identified. Three studies were two-arm cluster-randomised trials and one was a two-arm individual randomised trial. Of these, three contributed quantitative data from a total of 250 participants. Due to the heterogeneity of outcome measures meta-analysis was not possible. Knowledge was included as an outcome in two studies and demonstrated small but significant positive effects. Attitudes towards breastfeeding were measured as an outcome in two studies; however, results were inconsistent both in terms of how they were measured and the intervention effects. Secondary outcomes examined in the systematic review also included compliance with the WHO Code and BFHI practices. No studies included WHO Code compliance outcomes but one study reported a small but significant positive effect on BFHI compliance as a result of health workers doing the 18-hour WHO course. Study quality was generally deemed low with the majority of domains being judged as having a high or unclear risk of bias.

The most recent relevant systematic review on the effect of training healthcare staff in hospitals and birth centres about breastfeeding outcomes also provided evidence for the 2017 WHO Guideline.[45] Three of the six studies included in the review were RCT and three were controlled before–after (CBA) studies. Provision of educational interventions aimed at increasing the knowledge and practice of BFHI and support was found to improve health workers' knowledge, attitude and compliance with the BFHI practices; in one study, the rate of exclusive breastfeeding but not initiation increased at the intervention site.

The Evidence Check identified an additional systematic review from 2016, which examined the impact of breastfeeding training on hospital health professionals and showed it was effective in increasing their knowledge, skills and practices.[47] The systematic review search was carried out through the MEDLINE, Scopus and LILACS databases. Exclusions were studies conducted in primary care, with specific populations, studies that had a belief and/or professional attitude as the outcome or those with focus on the post-discharge period. In total, 17 intervention articles were included, three of them with good internal validity. The studies were performed between 1992 and 2010 in countries from five continents; four of them were conducted in Brazil. The training target populations were nursing practitioners, doctors, midwives and home visitors. There were many kinds of training courses. Five interventions employed the theoretical and practical training of the BFHI. All kinds of training courses showed at least one positive result on knowledge, skills and/or professional/hospital practices, most of them with statistical significance. The authors concluded that training of hospital health professionals has been effective in improving knowledge, skills and practices.

No systematic reviews were identified on the effectiveness of medical educational curricula. However, a study in the US found that a targeted breastfeeding curriculum for residents in paediatrics, family medicine, and obstetrics and gynaecology improved knowledge, practice patterns and confidence in breastfeeding management in residents, and increased exclusive breastfeeding in their patients.[44] A follow-up study in 2017 examined trends in paediatricians' practices and attitudes about breastfeeding since 1995.[119] This found that although more paediatricians reported their affiliated hospitals had applied for 'baby friendly'

designation by 2014, and more reported that they recommend exclusive breastfeeding, fewer indicated that mothers can be successful breastfeeding or that the benefits outweigh the difficulties. Younger paediatricians were found to be less confident than older paediatricians in managing breastfeeding problems. The authors concluded that continued efforts to enhance paediatricians' training and attitudes about breastfeeding are necessary.

AUSTRALIAN STUDY: There was a key study relevant to health worker training in Australia. A cluster randomised trial in regional Australia evaluated the effects of an intervention that trained general practice (GP) nurses in rural family doctors' offices to deliver support for breastfeeding using motivational interviewing techniques. This intervention was found to be effective in increasing exclusive breastfeeding at four months.[50]

ANBS-E Strategy 6

ANBS-E Strategy 6: Targeted/specialist breastfeeding support services (access to professional support)

The Evidence Check identified several studies of interventions that can be characterised as targeted or specialist support services, or 'education and support' interventions targeting mothers and infants in NICUs or otherwise at high risk, such as obese mothers.

Some of these are identified in the major reviews of education and support interventions, and in the WHO Guideline.

However, most relevant studies about targeted support are considered under Q2 regarding at-risk mothers and babies.

ANBS-E Strategy 7

ANBS-E Strategy 7: Antenatal and postnatal education and support (access to breastfeeding education and information)

Several studies addressed education and support interventions targeting mothers (a small number of interventions included support persons, considered below in ANBS-E Strategy 9).

A 2007 systematic review study in Britain examined the effects of breastfeeding support, including 34 trials (29,385 mother–infant pairs) from 14 countries.[267] It found all forms of extra support, analysed together, showed an increase in duration, reducing the risk for stopping any breastfeeding before six months by about 10%. All forms of extra support together had a larger effect on duration of exclusive breastfeeding (EBF) than on any breastfeeding (RR of EBF cessation, 0.81). Lay and professional support together extended duration of any breastfeeding significantly (RR before 4–6 weeks 0.65; RR before two months 0.74). Exclusive breastfeeding was significantly prolonged with use of WHO/UNICEF training (RR 0.69).

In 2008 a systematic review of interventions to promote breastfeeding in primary care settings in the US examined 38 RCTs, mainly from developed countries.[85] The study did not find an effect on breastfeeding outcomes from formal or structured breastfeeding education or individual-level professional support, but lay support increased any and exclusive breastfeeding in the short term by 22% and 65% respectively, and longer term increased any breastfeeding by 37%.

The systematic review by Hannula[268] examined professional support interventions for breastfeeding and found that interventions expanding from pregnancy to the intrapartum period and throughout the postnatal period were more effective than interventions concentrating on a shorter period. In addition, intervention packages using various methods of education and support from well-trained professionals were more effective than interventions concentrating on a single method.

The 2008 Blueprint for Action in Europe[269] concluded the provision of breastfeeding information to prospective parents or new mothers with no or brief face-to-face interaction (i.e. based on leaflets or

telephone support) was less effective than the provision of information with extended face-to-face contact. The use of printed materials alone was the least effective intervention. It also found the impact of health education interventions to mothers on initiation and duration of breastfeeding was significant only when current practices were compatible with what was being taught.

The 2009 review study in Britain reported that existing evidence supported locally adapted packages of education and support to address the diverse of needs of specific population groups with low breastfeeding rates; in Britain, these were low-SES white mothers, teenage mothers and sole parents.[147] This review concluded these should delivered in an appropriate mix by both health professionals and peer supporters.

AUSTRALIAN STUDY: The 2010 evidence update by the Physical Activity Nutrition and Obesity Research Group (PANORG)[51] found that evidence for provision of professional support alone was mixed, and was stronger for postnatal than antenatal support. Evidence supported specific breastfeeding support from a single professional targeted to women of lower socioeconomic background in order to increase their rate of exclusive breastfeeding. Practical, hands-off teaching with professional support and encouragement was effective. Encouragement by health professionals was crucial to breastfeeding success. In order to be successful, professional support must be breastfeeding-specific, while empathetic, listening support by health professionals is likely to be useful.

Another systematic review found the combination of professional support and peer support by trained and experienced peer supporters was effective in ensuring the continuation of breastfeeding.[270] Only continuous breastfeeding support produced effective results. Diverse types of interventions were needed during different phases of motherhood. The role of peer support was most important during the postnatal period.

A systematic review in 2013[92] examined the effectiveness of breastfeeding education and support interventions on exclusive breastfeeding (EBF) and any breastfeeding and concluded from 110 included studies that there were statistically significant increases in EBF rates as a result of breastfeeding promotion: 43% at day one, 30% at < 1 month, and 90% at 1–5 months. Rates of 'no breastfeeding' reduced by 32% at one day, 30% at < 1 month, and 18% at 1–5 months. Interventions did not significantly affect rates of predominant and partial breastfeeding. Combined individual and group counselling appeared to be superior to individual or group counselling alone. Interventions in developing countries had a greater impact than those in developed countries.

A 2015 systematic review by Wong and colleagues examined the effects of group versus individual professional antenatal breastfeeding education on breastfeeding duration and exclusivity.[271] Included studies were limited to healthcare professional-conducted education delivered to pregnant women only. Nineteen studies were included. Two studies compared antenatal group education with peer-led education and neither study showed a significant difference in breastfeeding outcomes. Compared with standard care, four out of 12 studies supported the effectiveness of antenatal group education on breastfeeding duration or exclusivity, whereas four out of six studies supported the effectiveness of antenatal individual education. Methodological heterogeneity and the small number of high-quality studies limited the ability to draw firm conclusions about the effectiveness of either mode of antenatal education.

The 2017 systematic review included in the evidence base for the WHO 2017 Guideline concluded that antenatal education was not effective in increasing breastfeeding initiation.[272] Nevertheless, another systematic review, which included studies mainly from the US and Britain, found antenatal support interventions increased the odds of initiation by more than 40% (RR 1.43).[273]

The most recent major systematic reviews also found education and support to be effective. The 2016 US study of primary care interventions identified 43 trials (n = 21,973) evaluating individual-level support and education interventions provided by professionals or peers.[274] Pooled analysis found that, among adults,

individual-level support and education interventions were associated with a statistically significant increase of about 16%–21% in the likelihood of exclusive breastfeeding for less than three months, at three to less than six months and for exclusive (but not any) breastfeeding at six months.

REVIEW OF REVIEWS: The review of reviews by Sutton et al.[81] concluded that education, counselling and support were effective in the antenatal, extended postnatal period, and both periods combined. It also found that some reviews demonstrate that ongoing one-to-one education/counselling/support, especially in the postnatal period, over a long duration is an effective method of promoting breastfeeding. In addition, one-to-one needs-based counselling and support may be effective for low-income and adolescent mothers, and internet support may be a useful adjunct to face-to-face care.

The updated systematic review and meta-analysis by Sinha et al. in 2017 showed that counselling or education, when given concurrently in any combination of settings, approximately doubled the likelihood of continued breastfeeding rates (RR 1.97, 95% CI 1.74–2.24).[88]

The effects of education and support interventions were examined in the 2017 review of effective interventions on exclusive breastfeeding.[93] The four successful interventions identified were postnatal rather than prenatal, and were of long duration. Technology was also a factor in the successful interventions, particularly where the activity was regular and ongoing.

Education and curriculum strategies may also be effective to improve the cultural environment for breastfeeding. A systematic review by Glaser[275] evaluated the effectiveness of school-based breastfeeding education and found six empirical articles on school-based interventions to promote breastfeeding. These interventions varied greatly but demonstrated positive effects on perceptions and attitudes toward breastfeeding and increased behavioural intention of breastfeeding later in life.

Giles[276] conducted a cluster randomised trial in Ireland aimed at evaluating the effectiveness of an intervention to promote positive attitudes to breastfeeding among school students. The evaluation study found the intervention increased female students' intentions to breastfeed, expanded their knowledge and led to more favourable attitudes and perceptions of subjective norms.

Costing or economic studies on interventions in healthcare settings

Costing or economic studies relevant to the policy environment such as taxation or fiscal aspects have been discussed earlier.

Few studies evaluating the cost or cost-effectiveness of breastfeeding interventions for healthy mothers or healthy babies have been conducted in relevant country settings. Most economic studies of breastfeeding interventions in healthcare settings related to the cost-effectiveness of human milk intake by preterm or vulnerable children, such as introducing hospital milk banking or lactation support in NICUs. Economic studies on interventions to increase human milk feeding and exclusivity in such settings were discussed above under ANBS Strategy 4.

In Britain, a National Institute for Health and Care Excellence (NICE) Costing Statement was issued in 2010 alongside the NICE Guideline CG93, 'Donor breast milk banks: the operation of donor milk bank services'.[259] It concluded that the 2010 clinical guideline was unlikely to result in a significant change in resource use in the NHS. Although it expected any incremental national cost of implementation would be small, individual milk banks and recipient hospitals were recommended to investigate their own practices against the NICE recommendations.

A study by Frick et al. in the US examined the cost-effectiveness of a community-based support intervention among mothers in a socioeconomically disadvantaged community.[78]

A hospital based RCT in Scotland of proactive telephone support for mothers living in a disadvantaged area included a cost analysis showing the feasibility and cost-effectiveness in that particular service setting.[125]

AUSTRALIAN STUDY: A recent Australian economic review study of the return on investment for perinatal clinical trials concluded that an intervention providing education and support was not cost-effective as measured by the intervention not exceeding the cost savings on formula. This did not include potential avoided health-cost savings from reducing exposure to formula or cessation of exclusive breastfeeding <6 weeks.[277]

Other economic studies identified in this Evidence Check were excluded, being in lower-middle-income or low-income country settings, and addressing the cost-effectiveness of the 2013 WHO HIV guidelines[70] on supporting exclusive and continued breastfeeding through offering comprehensive antenatal screening and antiretroviral treatment regimens to HIV-affected women and children (see above).

Incentives

Social marketing-type interventions with token rewards or gift incentives have also been implemented through RCTs, and in combination with other education and support interventions. A systematic review of incentives delivered through healthcare services included 16 reports[278] of multicomponent interventions of varying frequency, intensity and duration. Incentives involved providing access to breast pumps, gifts, vouchers, money, food packages and help with household tasks. The overall effect of providing incentives for breastfeeding compared with no incentives was unclear, due to heterogeneity in the interventions and study quality.

By contrast, as noted earlier, a small RCT of cash incentives among a low-income WIC (Special Supplemental Nutrition Program for Women, Infants and Children) population in the US[19] showed monthly financial incentives of up to US$270 resulted in significantly higher breastfeeding in the incentive group; notably, for WIC participants who did not breastfeed, packages were available that included free formula. The 2017 British RCT study by Relton et al.[21] also found financial incentives were effective for socially at risk low-income mothers, with cash payments increasing breastfeeding at six weeks by 5.7 percentage points, from 31.7% in the control group to 37.9% in the intervention group.

ANBS-E Strategy 8

ANBS-E Strategy 8: Peer support programs

While there are a number of studies of peer support interventions, interpretation is made difficult by the variety of settings and definitions of peer support that are used by different researchers.[51]

Interventions commonly defined as 'breastfeeding peer support' may involve complex interactions between health professionals, peers and mothers, may be implemented 'top down' by healthcare or welfare services, involve differing levels of training for peer supporters, and may vary considerably in uptake. Conventional systematic review methodologies and categorisation of 'peer support' may not be suitable for addressing such complexities.

This Evidence Check attempted to distinguish health system-initiated peer support programs from breastfeeding peer counsellor support groups initiated by women in their own communities. The former are discussed under 'continuity of care' (ANBS-Strategy 12) as BFHI Step 10 interventions where the latter are characterised as peer support programs, and discussed under ANBS-E Strategy 8.

There are three main strategies for delivering breastfeeding counselling: the Baby Friendly Hospital Initiative (BFHI), peer counsellors (PC) and community health workers. The BFHI is the most widely used system and can achieve high rates of exclusive breastfeeding in hospital. Referral to breastfeeding support groups in the community is one of the Ten Steps to Successful Breastfeeding in the BFHI. However, high rates are not generally sustained once mothers return home. In contrast, trials of lay or peer counsellors have found

substantial increases in rates of exclusive breastfeeding during the first six months, but the sustainability of such systems dependent on unpaid counsellors has been questioned.

Procedures for implementing peer counselling programs vary considerably. Heterogeneity between and within programs makes comparisons of their effectiveness difficult. There may be different types and quantity of contacts, and where they are located or whether contact is initiated by the mother or the health service peer supporter may also differ.

The 2010 British study led by Dyson found consistent evidence for effectiveness of education and/or peer support to improve initiation. It also cited some evidence of social support in increasing breastfeeding intention and the need to include the woman's support networks.[147]

A systematic review in 2010 found 26 peer-reviewed publications of randomised trials evaluating peer counselling interventions, alongside a review of studies describing the scaling up of peer counselling programs.[89] Studies included 'lay health workers' and 'community health workers' providing breastfeeding support. The three studies included in the review that looked at increasing breastfeeding initiation through 'low intensity' interventions, involving only prenatal education or primarily telephone contact postnatally, did not show significant effects. 'High intensity' peer counselling was effective in increasing initiation. Likewise, low intensity support from peer counselling was not significant in increasing duration, but two of five high intensity intervention studies were. Peer counselling was effective in increasing exclusive breastfeeding up to six months in most studies evaluated and in all of the seven out of 12 studies that were designed to target exclusive breastfeeding. It was also found from review of eight included studies of scale-up of peer counselling programs that it can be cost-effectively scaled up as part of national breastfeeding promotion efforts.

The authors highlighted the importance of adequately describing peer counsellor training, supervision and compensation, and details of peer counsellor interactions with women and infants. They noted that outcomes may vary depending on specific peer counselling protocols and urged the importance of a standardised training program. They also noted that better results were obtained in studies that reported providing compensation for peer counselling, and that the response to peer counselling may vary depending on local breastfeeding customs and income levels. Although most peer counselling research had focused on models serving low-income women, this likely reflected funding priorities and should not be interpreted to imply that only lower-income women benefited from peer counselling. Peer counselling was noted to be well received and effective in the single RCT evaluating the peer counselling model among upper-income women.

AUSTRALIAN STUDY: As noted earlier (see ANBS-E Strategy 5), a cluster RCT in regional Australia tested an intervention in a rural family practice setting involving motivational interviewing intervention by practice nurses who had undertaken a replicable training program.[50] Current exclusive and full breastfeeding rates at four months were increased after adjustment for the mother's plans for when she would return to employment or study. Motivational interviewing was well suited to provision of breastfeeding support by general practice nurses, whose role increasingly includes lifestyle counselling.

AUSTRALIAN STUDY: In 2010, the PANORG review concluded there was overwhelmingly strong evidence that peer counselling is effective in improving all aspects of breastfeeding.[51] It cited a Cochrane review by Lewin et al. in 2010 showed trained lay health workers were effective in promoting greater likelihood of exclusive breastfeeding (RR 2.78), while another Cochrane review by Britton and colleagues found that lay and extra support together extended duration of any breastfeeding significantly and reduced the risk of cessation exclusive breastfeeding before 4–6 weeks (RR 0.65).[267] Additional lay support, compared with standard care, was effective in prolonging exclusive breastfeeding, while its effect on duration of any breastfeeding was uncertain. Scaling up experience suggested that it should not be offered as a stand-alone intervention and would benefit from being a part of an existing health professional program or initiative.

Also, a single session of informal, small group and discursive breastfeeding education should be delivered in the antenatal period. This education should include topics such as the prevention of nipple pain and trauma.

The PANORG evidence update also found that attendance at parent groups, where peers are breastfeeding infants of a similar age, was effective at improving breastfeeding. Evidence supported that targeted peer counselling and social support, combined with professional support, was particularly important for younger mothers. Complementary telephone support should be provided to all breastfeeding women.

Technology (internet, SMS, mobile phones) could be a potentially important mode for providing support in the current generation of mothers.

Overall, the review concluded, any breastfeeding promotion efforts should aim to enhance mothers' self-efficacy and confidence with respect to breastfeeding. There was no strong evidence for how this might be achieved, although expert opinion suggested that pregnant women and mothers should be taught the challenges of breastfeeding, and to examine their thought processes so they are not defeated but rather persevere through difficulties, i.e. that breastfeeding-specific, practical and problem-solving support be provided. Mothers needed to understand ways to solve the problems as and if they arose, which could be addressed through anticipatory guidance. The PANORG review noted that the Breastfeeding Self-Efficacy Scale could be useful for identifying women at risk of early cessation of breastfeeding and, together with various birth factors, sociodemographic factors such as young age and lack of tertiary qualifications, and other health factors such as obesity, might be used to identify women who required pro-active, additional support.

Recent systematic review studies covering various country settings have looked at 'peer support', and those where interventions are typically based in healthcare or WIC settings show inconsistent effects on breastfeeding outcomes.[270, 279-282]

Peer support interventions have been well recognised as effective in improving breastfeeding outcomes, and peer support for breastfeeding has been part of NHS commissioning guidance. A 2010 systematic review including 11 RCTs of breastfeeding peer support found interventions targeting women with a prior intention to breastfeed were more likely to lead to increases in breastfeeding initiation rates compared with universal breastfeeding peer support interventions.

However, a 2012 meta-regression of 17 RCTs concluded that such interventions improved breastfeeding maintenance in low- and middle-income countries (LMIC) but had less impact in high-income countries (HIC).[281] The review concluded peer support for breastfeeding was 'unlikely to be effective' in Britain. This 2012 review also found that less intensive interventions (< 5 planned contacts) had no impact on breastfeeding duration. Interventions that combined antenatal and postnatal contact tended to be ineffective, whereas postnatal-only interventions were associated with improved breastfeeding duration.

In 2013 Sudfeld and colleagues conducted a systematic review and meta-analysis of peer support and exclusive breastfeeding duration in LMIC.[280] Eleven RCTs were included, and the authors found peer support significantly decreased the risk of discontinuing exclusive breastfeeding (EBF) as compared with the controls (RR: 0.71; 95% CI: 0.61–0.82; I(2) = 92%). Notably, the effect of peer support was significantly reduced in settings with > 10% community prevalence of formula feeding compared with settings with < 10% prevalence (p = 0.048). There was no evidence in differential effect for low-birthweight infants and no difference in the effect on EBF at four compared with six months postpartum. The authors concluded that support increased the duration of EBF in LMICs; however, the effectiveness of support by peers appears to be less in 'formula-feeding' cultures. Questions remained about the optimal timing of peer visits, how best to integrate peer support into packaged intervention strategies, and the effectiveness of supplemental interventions to peer support in formula-feeding cultures.

AUSTRALIAN STUDY: *Evaluation of Australia's National Breastfeeding Helpline in 2012 concluded that the National Breastfeeding Helpline met a clear need for non-clinical breastfeeding information and support, and made an effective and efficient contribution to government policy to achieve better outcomes for mothers and babies.*[54] It found that a high level of satisfaction among users of the Breastfeeding Helpline was a testimony to the investment in service infrastructure, including quality staff (volunteers). The evaluation noted its effectiveness in meeting the needs of callers and affecting breastfeeding practices, although no quantitative data was provided on its effects on breastfeeding practices.

The evaluation identified that the Breastfeeding Helpline gains considerable leverage from its location within the Australian Breastfeeding Association (ABA) and is connected to evidence-based information and training. It benefits from the high profile of the ABA in the community, with stakeholder organisations and as an adviser to governments on policy. Its findings included that the Breastfeeding Helpline generally provided an appropriate and important source of breastfeeding information and support to mothers and their families, and its services were implemented by volunteer counsellors who satisfied core competencies, committed to the Breastfeeding Helpline for two years and offered peer support to mothers. Challenges to the model included: sustaining a sufficient supply of trained volunteer counsellors; ensuring consistency of information and support; adapting to preferred communication methods for users, such as calling back in response to a text message, video conferencing, and integration with face-to-face visits; promoting awareness of the inclusive nature of the Breastfeeding Helpline services; and building on the distinctive features of the Breastfeeding Helpline to reinforce its role within the growing number of related helpline services to benefit both consumers and service providers.

A 2016 systematic review was conducted to identify studies evaluating the efficacy or effectiveness of breastfeeding interventions on breastfeeding initiation, duration or exclusivity as a primary, secondary or tertiary outcome.[283] Combinations of search terms included breastfeeding, feeding behaviour, prenatal/patient education, health promotion, social support, perinatal/prenatal/intrapartum/postnatal care, and postpartum period. The review included six studies, finding that acquisition of knowledge and skills, emotional support by healthcare providers, and self-efficacy with respect to a mother's confidence in her ability to breastfeed were factors the intervention studies relied on to affect breastfeeding practices. Although these factors were addressed in the studies, breastfeeding mothers had difficulty transferring what they gained from interventions into their real-life breastfeeding practices as evidenced by the highest drop-off rate of exclusive breastfeeding in the early postpartum period. The authors concluded there were conceptual limitations to the reviewed studies: (1) lack of understanding of maternal perception of infant behaviour, and (2) perceived insufficient milk (PIM) as a remaining primary reason for breastfeeding discontinuation. There were methodological limitations: (1) lack of theory-based interventions, and (2) lack of intervention fidelity. Future studies involving breastfeeding should focus on the causes of the problems, driven by theory-based interventions integrated with intervention fidelity.

A systematic review of additional support (provided by professionals, peer supporters or both) based on 57 trials, including 37 from high-income countries found that any extra support (irrespective of provider) had a positive effect on breastfeeding duration rates.[84] Interventions tended to be more effective when delivered in areas with higher background initiation rates, delivered face-to-face, offered proactively, offered on an ongoing basis, and when tailored to the needs of the target population. The recent Cochrane review by McFadden and colleagues reported similar findings.[86]

A 2017 systematic review of community-based peer support by Shakya[284] identified 47 articles in high-, middle- and low-income country settings, and found that in high-income countries, compared with usual care, peer support increased the likelihood of exclusive breastfeeding (EBF) at three months threefold. This systematic review, led by investigators in Australia, was unusual in that it compared usual care with community-based peer support, which may engage with mothers as peers through multifaceted, 'mutual

help and support' interventions in home and family-like and community settings, rather than in a health-system program setting. In high-income countries, mothers who received such support exclusively breastfed their infants until three months compared with those without such support. The study found no significant results proving effectiveness of peer support for EBF until the fifth and sixth months in high-income countries. Mothers who received peer support in LMICs tended to exclusively breastfeed their infants for a longer period than such mothers in high-income countries. The systematic review by Shakya and colleagues (2017) also addressed inconsistencies in evidence about the effectiveness of peer support.

Regarding the early systematic review that found peer support had greater effect on EBF in LMICs than in high-income countries[281], Shakya et al. proposed that a possible explanation was the higher social preferences for infant formula feeding in high-income countries. Community-based peer support for mothers alone may be less effective in overcoming social barriers in those countries. For example, in Scotland, social preferences for bottle feeding and an aversion to public breastfeeding were likely responsible for the fact that peer support had no effect on EBF duration. On the other hand, several factors create a favourable environment for EBF in LMICs, such as negative social attitudes towards infant formula, the high cost of infant formula, and the low prevalence of its commercial marketing. Therefore, support alone could be effective in increasing EBF duration in LMICs. In addition, mothers in high-income countries are likely to receive more advice and breastfeeding support from professional health workers. The definition of 'usual care' in high-income countries may therefore be different from 'usual care' received in LMICs and hence, Shakya proposed, may be another reason for greater effectiveness of peer support in LMICs compared with high-income countries.

Key recent studies

AUSTRALIAN STUDY: A recent Australian study[285] found that mothers in first-time parent groups were more likely to cease breastfeeding if the proportion of other mothers breastfeeding in the group was low, even after adjusting for socioeconomic and demographic characteristics of group members.

In Western Denmark, researchers undertook a community-based cluster-randomised trial to study the impact of a supportive intervention on the duration of breastfeeding.[286] The study had 52 health visitors and 781 mothers in the intervention group, and 57 health visitors and 816 mothers in the comparison group. Health visitors in the intervention group received an 18-hour course. The intervention addressed maternal psychosocial factors and consisted of one-to-three home visits during the first five weeks postpartum. Health visitors in the comparison group offered their usual practice. The study, which measured duration of exclusive breastfeeding during six months of follow-up, found mothers in the intervention group had a 14% lower cessation rate (HR = 0.86 CI: 0.75–0.99). Similar results were seen for primipara and multipara with previously short breastfeeding experience. Mothers in the intervention group received their first home visit earlier, had more visits and practical breastfeeding training within the first five weeks. Babies in the intervention group were breastfed more frequently, fewer used pacifiers, and their mothers reported more confidence in not knowing the exact amount of milk their babies had received when being breastfed. *The authors concluded that home visits in the first five weeks following birth may prolong the duration of exclusive breastfeeding. Postnatal support should focus on both the psychosocial and practical aspects of breastfeeding. Mothers with no or little previous breastfeeding experience require special attention.*

A 2013 paper by Thompson[287] drew attention to issues of intervention design and implementation that make it difficult to interpret trial data drawn from the meta-regression analysis within high-income countries. *The authors proposed the need for alternative approaches to evidence review for peer support of breastfeeding, highlighting the need to integrate insights from qualitative research studies.*

Rozga[288] examined the associations between program components (individual and combinations) and breastfeeding outcomes (duration and exclusivity) in a peer counsellor (PC) program for low-income women

in Michigan. For each additional home, phone and other PC contact there was a significant — about 10% — reduction in the hazard of discontinuing any breastfeeding by six months and exclusive breastfeeding by three months. Participants receiving greater than optimal in-person and less than optimal phone contacts had a reduced hazard of any and exclusive breastfeeding discontinuation compared with those who were considered to have optimum quantities of contacts. The authors concluded that in-person contacts were essential to improving breastfeeding outcomes, but defining optimal program components was complex.

Colchamiro[289] reported an evaluation of a program to facilitate adoption of community-level strategies to promote healthy weight, which provided the platform for enhancing postdischarge continuity of care for breastfeeding. The study aimed to improve the continuity of breastfeeding care and support for mothers by enhancing post-discharge care infrastructure and supportive contacts for women and families. Six communities were awarded grants to enhance or convene Breastfeeding Continuity-of-Care Teams consisting of at least three community-based organisations (CBOs), including one maternity hospital, the local Special Supplemental Nutrition Program for Women, Infants and Children (WIC), and the local program representative. Teams implemented customised plans with performance indicators to create and strengthen infrastructure for supportive contacts with breastfeeding mothers. The project included 'baby cafe' pilots in three additional program communities. Across all grantee communities, there was an average total increase of 491 contacts with mothers per month, an improvement of 8.5% over baseline. The project created 153 added-value outcomes of community collaboration at five levels in the socioecological framework.

A 2013 study in Brazil examined how exclusive breastfeeding could be most effectively implemented at scale within routine health services, through pre–post evaluation of a 2003–08 intervention involving breastfeeding counselling training for community health agents (CHAs); it found training on counselling and practical skills (including an interactive style that used the knowledge and experience of CHAs) substantially increased exclusive breastfeeding rates among infants 0–5.9 months.[290]

The study compared rates of exclusive breastfeeding associated with a breastfeeding counselling intervention in which CHAs received 20 hours of training directed at counselling and practical skills, with rates pre-intervention, when CHAs received four hours of didactic teaching. The intervention modified the content, style and duration of training compared with previous practice, and the number of home visits expected during the infant's first six months was increased from six to eight. The training intervention emphasised counselling skills and practical aspects of the management of breastfeeding, and the syllabus was similar to the 18-hour UNICEF/WHO course for training staff of Baby Friendly Hospitals. Topics from the WHO/UNICEF Breastfeeding Counselling Course were also used, focusing on how to listen to mothers, establish good relationships, build confidence and offer support. To facilitate breastfeeding counselling, the intervention aimed for CHA visits three times in the first month, one within seven days of delivery and another in the second week. Cross-sectional surveys of breastfeeding practices were conducted pre- and post-intervention in random samples of 1266 and 1245 infants aged 0–5.9 months; 1449 CHAs from Brazil's Family Health Program were trained to provide breastfeeding counselling at home visits. Analysis showed rates of exclusive breastfeeding improved when CHAs were trained to provide breastfeeding counselling; they were significantly higher by 10–13 percentage points at age 3–5.9 months when compared with pre-intervention rates ($P<0.05$). Post-intervention point prevalence of exclusive breastfeeding for infants aged < 4 months was 63%, and for those aged < 6 months was 50%. The authors concluded delivery of breastfeeding counselling at scale within a routine health service with multifunctional CHA was feasible and was associated with a significant increase in rates of exclusive breastfeeding.

A 2014 study in the US used secondary analysis of program data to evaluate the impact of WIC peer counselling (PC) program protocols in Michigan's Breastfeeding Initiative on any and exclusive breastfeeding discontinuation among low-income women, and findings highlighted the importance of in-

person contacts for any and exclusive breastfeeding as a core element of PC support programs that can cost-effectively and flexibly address participant needs.[291]

The objective of the study was to describe associations between program components (individual and combinations) and breastfeeding outcomes (duration and exclusivity). Program components involved different types (in-person at hospital or home), phone or other (e.g. mail, text) and quantities of peer contacts. Quantities of contacts were considered 'optimal' if they adhered to standard program guidelines. Low-income (n=5886) women were enrolled prenatally from 2005–2011. For any breastfeeding, the hazard of discontinuation was highest in the first two months and levelled off at approximately six months. The rates for exclusive breastfeeding, conversely, decreased sharply in the first month and began to decline steeply again at four months, an age at which previous research has demonstrated many women begin introducing solids to their infants.

Specifically, the study found that for each additional home, phone and other PC contact there was a significant reduction in the hazard of discontinuing any breastfeeding by six months (hazard ratio (HR) = 0·90 (95% CI 0.88, 0.92); HR = 0·89 (95% CI 0.87, 0.90); and HR = 0.93 (95% CI 0.90, 0.96), respectively) and exclusive breastfeeding by three months (HR = 0.92 (95% CI 0.89, 0.95); HR = 0.90 (95% CI 0.88, 0.91); and HR = 0·93 (95% CI 0·89, 0·97), respectively). Participants receiving greater than protocol in-person and less than protocol phone contacts had a reduced hazard of any and exclusive breastfeeding discontinuation compared with those who had the protocol number of contacts (HR=0.17 (95% CI 0.14, 0.20) and HR = 0.28 (95% CI 0.23, 0.35), respectively). Of note is that in contrast to prior findings, age and race were not significant predictors of risk of discontinuation.

The authors interpreted these results to mean that a PC program can be effective in eliminating racial/ethnic disparities in breastfeeding rates in low-income populations through the use of increased support and education. Also, those who received a contact from their peer counsellor while in the hospital did not have a significantly decreased risk of discontinuation compared with those who did not receive a contact. However, women who received a PC visit while in the hospital were more likely to breastfeed for at least one month. Furthermore, the study illustrated that home visits and phone and other contacts had similar associations with breastfeeding outcomes. This suggests that in a PC model, different types of contact may be complementary rather than alternative support modes, as peer counsellors may be able to deliver support and education by types of contact in line with participant needs at the appropriate times postpartum. Also, a greater number of home visits in early postnatal months may correlate with greater difficulties establishing breastfeeding. The implication for the program was that while more home-visit contacts had more improvements in any or exclusive breastfeeding, they were impractical on cost or other grounds, and phone contacts can be effective if not over-used within a PC program that has home visiting as a core component. The authors concluded that specific components of a large PC program appeared to have an appreciable impact on breastfeeding outcomes. In-person contacts were essential to improving breastfeeding outcomes, but defining optimal program components is complex.

A study targeting postnatal depression[292] sought evidence of effectiveness of lay support in the early postnatal weeks to improve maternal and child outcomes in disadvantaged families through a prospective, pragmatic, individually randomised controlled trial involving 1324 nulliparous pregnant women at high social risk in Britain. Pregnancy Outreach Workers (POW) were trained to provide individual support and case management for the women including home visits from randomisation to six weeks after birth, alongside standard maternity care.

A 2016 qualitative study investigating poor uptake of breastfeeding peer support in two deprived areas in Britain found 'insurmountable barriers' to breastfeeding in a formula-feeding community even where the mothers wanted to initiate or continue breastfeeding — in this situation mothers were *"wary of asking for*

help, knew little of the peer support programme, were distrustful as to what a peer supporter did and what she could do for them, and consequently some endured pain without recourse to support".[279]

A study investigated the effects of social network relationships on advice received on infant feeding, among low-income women (n = 80).[293] Mothers were more than twice as likely to receive advice to exclusively formula feed from network members who exclusively formula-fed their own child or children than those who did not. The author concluded that social relationship characteristics and network members' infant feeding experiences may have implications for the advice new mothers receive.

An RCT in the US reported in 2017 that interventions focused on perceived milk insufficiency and improving mothers' skills in interpreting baby, and confidence in the ability to breastfeed, improved breastfeeding outcomes.[294] Mothers' perceived insufficient milk (PIM) is the primary reason for breastfeeding discontinuation globally. There are two changeable causes of PIM: (1) mothers' misinterpretation of their infant's behaviour, and (2) mothers' lack of confidence in their ability to breastfeed. The purpose of this study was to evaluate the short-term effect of a home-based intervention designed to prevent and/or reduce PIM. A mixed-methods single-group pre-test/mid-test/post-test design was used for evaluating a home-based breastfeeding program. The program was implemented during three 1.0- to 1.5-hour home intervention sessions at six, 13 and 27 days postpartum, delivered to 14 dyads of breastfeeding mothers and their full-term singleton infants.

The study found significant increases over time in mothers' sensitivity to infant behaviour and breastfeeding self-efficacy as well as significant decreased attribution of infant crying to PIM. Exit interviews indicated that the program was accepted by participating mothers. This is the first intervention study that has directly targeted the causes of PIM. The home-based intervention has the potential to add to maternal competencies both in correctly assessing their infants' behaviour, thereby preventing erroneous attribution of infant behaviour to PIM, as well as simultaneously bolstering maternal confidence in breastfeeding skills. The authors concluded that by building maternal competencies, the home-based intervention has a longer-range potential to prevent breastfeeding discontinuation. Further evaluation is warranted.

A recent RCT in Turkey found a motivational interview intervention targeting self-efficacy during the postnatal period resulted in higher intentions for breastfeeding and more anxiety, but also earlier initiation of breastfeeding and fewer problems with the first breastfeeding experience.[295] The trial aimed to increase breastfeeding duration and frequency using a breastfeeding motivation program (BMP), which was structurally based on Pender's Health Promotion Model (HPM) and administered during pregnancy and the postnatal period. The study was also designed to determine the BMP effectiveness in supporting exclusive breastfeeding. The sample of this RCT included 100 pregnant women (50 in the BMP, 50 in the control group) who applied to the pregnancy preparation course in a state hospital located in Usak, western Turkey. Participants in the study were allocated to either the BMP or control group through systematic sampling and randomisation. The BMP was carried out with the BMP study group four times: during the antenatal period, on the first postnatal day, between the fourth and sixth postnatal weeks, and during the fourth postnatal month. Data were analysed using the descriptive statistical test, Pearson's chi-square test, independent samples t test, and ANOVA.

The study found mothers in the BMP group started breastfeeding earlier than the mothers in the control group (97.1%) and had fewer problems with their first breastfeeding experience. The average score of perceived self-efficacy in breastfeeding and the rate of first breastfeeding experience (70.6%) were higher in the BMP group by a statistically significant amount. The author concluded that a BMP for breastfeeding, structurally based on Pender's HPM, can help in supporting and maintaining exclusive breastfeeding.

The US systematic review study of primary care interventions by Patnode and colleagues noted a study observing potential harms as well as benefits of peer counselling models such as WIC.[274]

ANBS-E Strategy 9

ANBS-E Strategy 9: Influence of support person/people

Education and support interventions or strategies may improve breastfeeding practices if involving other family members such as grandmothers or fathers. Effectiveness may depend on what are considered culturally appropriate roles in the targeted population.

A 2016 systematic review by Negin[296] investigated grandmother influence on a mother's breastfeeding practices, identifying 13 articles from high-, middle- and low-income countries. There was a significant positive impact on breastfeeding when grandmothers of the infants had had their own breastfeeding experience or were positively inclined towards breastfeeding; mothers were 1.6 to 12.4 times more likely to exclusively breastfeed or refrain from introducing solid foods. The author noted a study in China where highly educated grandmothers were associated with decreased exclusive breastfeeding. The author concluded that programs that seek to influence exclusive breastfeeding should include grandmothers in their interventions to achieve maximum impact.

The 2008 study by Chung found only two RCTs involving family members in healthcare-initiated interventions and effects on breastfeeding initiation were inconsistent. There was no evidence of effects on duration in the two included studies.[85]

A 2013 systematic review examined the impact of male-partner-focused breastfeeding interventions on breastfeeding initiation, exclusivity and continuation and found that three of the four included intervention studies found at least one breastfeeding outcome to be superior in the treatment group.[55]

AUSTRALIAN STUDY: An RCT involving education and support for fathers conducted in eight public maternity hospitals in Australia, led by Maycock[53], found that a minimal intervention involving a two-hour antenatal education session and postnatal support provided to fathers significantly increased any breastfeeding at 6 weeks, with infants of older fathers more likely to be breastfed at 6 weeks than infants of younger fathers, and infants of fathers with high SES more likely than infants of fathers with low SES .

Equipping grandmothers with new knowledge and skills was found to be important in improving breastfeeding outcomes in a 2017 intervention that aimed to increase exclusive breastfeeding among adolescents.[56] A quasi-experimental study in Thailand trialled experiential learning of empowerment strategies and social support (ELESSS) in a program for grandmothers delivered in two hospitals, one hospital serving as a control. At the baseline, grandmothers in the intervention group attended two days of an ELESSS program and then a refresher course two and four months after delivery. Adolescent mothers in the intervention group had an exclusive breastfeeding rate at six months of about 29%, whereas the control group had an EBF rate at six months of about 5%. The proportion of EBF in the intervention group was six times that of the control group. The median EBF duration in the intervention group was 90 days, while the control group was 0 days. The intervention group's participants also had significantly better knowledge and attitudes towards breastfeeding, and the adolescent mothers in the intervention group had a significantly higher perceived level of social support.

ANBS-E Strategy 10: Other (enabling environment) strategies

Strategies and interventions influencing the environment for infant and young child feeding (IYCF) practices

Recent public health nutrition research emphasises the importance of environmental and system factors contributing to high obesity and chronic disease rates. Food environments influence health behaviours and dietary choices. Likewise, breastfeeding can be considered as a food and healthcare system for infant and young children.[297] As breastfeeding is a biocultural behaviour, the cultural and social context as well as

mammalian biology and physiology influences the extent of its practice in different societies or communities. Strategies reviewed and identified by the Evidence Check include several addressing particular structural barriers or facilitating breastfeeding by influencing the environment shaping infant and young child feeding practices.

Enabling interventions include policies, statutes or common law addressing the cultural or social context for IYCF practices[175], and influencing what is permissible, encouraged or prohibited in various contexts. This category of interventions may include sex discrimination and employment laws as well as regulations and guidelines, and registration, licensing or accreditation standards, such as on food safety, hospitals, healthcare providers and childcare services. Policies, planning or implementation guidelines or protocols, such as for emergency and disaster responses, and child protection and criminal justice, are also 'enabling' strategies or interventions. Conversely, alongside social norms and institutions that affect breastfeeding by separating infants or young children from their caregivers within the health system or in employment, other interventions through the welfare, law and justice systems may also affect breastfeeding. These may involve, for example, separating infants and young children from their parents during child protection, welfare or adoption processes, during maternal imprisonment or in child custody proceedings.

Social policies and social protection

Recent studies point to the importance of supportive social policies in reconciling gender equality and breastfeeding or mothering traditions. Research by Lubold 2017[298] showed a relationship between countries' compliance with the WHO/UNICEF initiatives and the extent to which their welfare policies support women in both their productive and reproductive labour. The study examined the relationship between macro-level factors — welfare state policies (such as family polices) and public health initiatives — and breastfeeding initiation rates in 18 high-income countries. High breastfeeding initiation was associated with conditions including a high percentage of women in parliament, a low national caesarean section rate, and either low family spending, high rates of maternity leave, or high rates of women working part-time. Low breastfeeding initiation was associated with low national adherence to the Baby Friendly Hospital Initiative. The authors conclude there is a connection between broad-level welfare state policies, public health initiatives and breastfeeding initiation.

A study in Belgium examined the relationship between gender (in)equality and breastfeeding, and how cultural-contextual influences for infant-feeding decisions interact with maternal education during transitions to new macro-level social contexts.[299, 300] Related research investigated how European welfare state arrangements and social policies influence the association between breastfeeding and the social status of women within society, asking whether different social policy types — welfare regimes, maternity leave, the prevalence of breastfeeding-friendly hospitals (BFHs) and the WHO International Code of Marketing of Breastmilk Substitutes and subsequent relevant World Health Assembly resolutions (the WHO Code) — and services predicted breastfeeding initiation and/or duration in 24 European countries. Based on multi-level regression analysis of country data on breastfeeding among 27,936 newborns and measures of gender equality and maternal education, the authors concluded that there was an important social policy dimension to the issue of infant feeding. Cross-national variation in infant feeding was found to partially reflect policy influences, with highest levels of initiation found in Nordic and Central and Eastern European regimes and lower levels found in the Anglo-Saxon and Bismarckian regimes. Welfare states may have an important impact on breastfeeding initiation and duration via the mediation of socioeconomic position and how maternal roles are reconciled.

Employment

Laws and social norms affecting how breastfeeding is reconciled with women's lives are important and may be addressed by anti-discrimination or employment laws. For example, a 2014 US study showed supportive state laws were associated with higher breastfeeding initiation and duration rates in those states. Smith-

Gagen and colleagues analysed breastfeeding practices using the 2003–2010 National Health and Nutrition Examination Survey and evaluated three measures of breastfeeding practices: mother's reported breastfeeding initiation, a proxy report of infants ever being breastfed, and a proxy report of infants being breastfeed for at least six months. Survey data were linked to eight laws supportive of breastfeeding enacted at the state level. The most robust laws associated with increased infant breastfeeding at six months were an enforcement provision for workplace-pumping laws [OR (95% CI) 2.0 (1.6, 2.6)] and a jury duty exemption for breastfeeding mothers [OR (95% CI) 1.7 (1.3, 2.1)]. Having a private area in the workplace to express breastmilk [OR (95% CI) 1.3 (1.1, 1.7)] and having break time to breastfeed or pump [OR (95% CI) 1.2 (1.0, 1.5)] were also important for infant breastfeeding at six months. This research identified laws with the greatest potential to reach the US Healthy People 2020 targets for breastfeeding initiation and duration.[301]

The same authors also examined breastfeeding practices by race and ethnicity in areas with and without eight specific breastfeeding laws in US states, concluding that unequal access to protection offered by these laws could widen inequalities in breastfeeding opportunities.[302] The authors assessed eight breastfeeding laws before and after legislation was enacted and linked this to population-based estimates of breastfeeding initiation and duration for children between birth and age one. They found that relative to white babies, Mexican-American infants were 30% more likely to breastfeed for at least six months in areas with laws protecting break time from work to pump, and 20% more likely to breastfeed for at least six months in areas with pumping law enforcement provisions. Unexpectedly, five laws that were intended to support breastfeeding duration were significantly less helpful for African-American women relative to white women. African-American women were almost half as likely as white women to breastfeed for at least six months in areas with provisions to provide break time from work (adjusted odds ratio [aOR], 0.6; 95% confidence interval [CI], 0.5–0.8), private areas to pump at work (aOR, 0.6; 95% CI, 0.4–0.8), exemption from jury duty (aOR, 0.6; 95% CI, 0.4–0.9), awareness education campaigns (aOR, 0.5; 95% CI, 0.3–0.8), and pumping law enforcement provisions (aOR, 0.6; 95% CI, 0.5–0.8). As the laws influenced African-Americans and Mexican-Americans differently from whites, specific laws needed to be examined together with consideration of how they interacted with known barriers to breastfeeding for these mothers.

Health policies

A major British public health evidence review published in 2010 focused on policy and health recommendations for breastfeeding promotion in developed countries with low breastfeeding rates.[83] It identified 25 types of intervention for breastfeeding promotion in three categories: public health policy, mainstream clinical practice and local interventions. The evidence review and extensive consultation process identified that public health policy measures were prerequisites for healthcare system interventions to be effective, and to remove socio-cultural barriers to successful breastfeeding. The national adoption of the BFHI, implemented as routine practice across maternity hospitals, was central to recommended changes to British policy and practice for clinical care in hospitals and the community. Local interventions were also considered essential and complementary to policy measures and clinical practice changes. The evidence base suggested the following measures were effective: education and support programs, telephone peer support, continuity of support from a health professional for low-income mothers throughout the first year, and local media programs to promote improved attitudes to breastfeeding among teenagers. Updated evidence on such measures is considered in more detail under other ANBS Strategies. The specific national public health policy recommendations were:

- A comprehensive, coordinated, national, regional and local breastfeeding strategy and policies, including adequate financial incentives and monitoring and evaluation systems which account for maternal ethnicity and deprivation
- National media campaigns and celebrity endorsements promoting breastfeeding

- Inclusion of breastfeeding education in the national curriculum for primary and secondary schools, parenting programs and child development courses targeting pupils with low academic attainment
- Policy and practice to support breastfeeding in public
- Employment policy and practices to support breastfeeding
- Government endorsement of the WHO Code on Marketing of Breastmilk Substitutes (1981) and subsequent resolutions.

The 2010 British review[83] was related to a study in 2007 that examined the strengths and limitations of 'evidence-based' approaches to formulating policy recommendations in public health. Particular challenges were problems related to the formal evidence base, the number and diversity of potential stakeholders, the short timescale and limited resources available for this work.[303, 304] The authors reported on the methodological issues and examined the lessons learned, observing that in public health, *"the complex, long-term, often community-based interventions needed are difficult to evaluate with a predominantly randomized controlled trial-based approach, and may require synthesis of a range of different methods including both quantitative and qualitative approaches"*. Additionally, *"some potentially important strategies in improving public health are difficult to assess in formal research at all, such as the use of media and marketing and public policy, and information about other strategies that could be assessed using the experience of practitioners and service users is rarely sought"*. Furthermore, *"it can be especially difficult to assess how recommendations might work in different sub-groups of interest, such as low-income groups, or different minority ethnic groups"*.

The role of evidence-based public policies in protecting, supporting and promoting breastfeeding in European countries was comprehensively investigated in a 2009 study testing the effects of a major EU breastfeeding promotion project introduced from 2004.[264] The time trend study by Cattaneo et al.[82] found the number of countries with national policies complying with WHO recommendations increased following the EU breastfeeding promotion project.

In 2007, six countries lacked a national policy, three a national plan, four a national breastfeeding coordinator and committee. Little improvement was reported in pre-service training; however, the number of countries with good coverage in the provision of WHO/UNICEF courses for in-service training increased substantially, as reflected in a parallel increase in the number of Baby Friendly Hospitals and the proportion of births taking place in them. Little improvement was reported in implementation of the Code. With the exception of Ireland and Britain, where some improvement occurred, no changes were reported in maternity protection. Comparison of breastfeeding rates among countries was hindered by continued weakness in collection of breastfeeding data, but slight improvements in the rates of initiation, exclusivity and duration were reported by countries where data at two points in time were available. The study concluded that breastfeeding rates continue to fall short of global recommendations. National policies are improving slowly but are hampered by the lack of action on maternity protection and the International Code. More efforts are needed in pre-service training and standard monitoring of breastfeeding rates to accelerate progress.

National dietary guidelines and infant feeding guidelines, including on HIV/AIDS

The Evidence Check identified expert guidelines relevant to updating the NHMRC Infant Feeding Guidelines on HIV and breastfeeding. In 2016, the WHO issued revised guidelines to reflect important advances in HIV responses including new technologies, and new service delivery approaches that allow HIV testing and treatment monitoring to be diversified and decentralised.[70] Simple, safer, once-daily single-pill antiretroviral (ARV) regimens that are suitable for use in most populations and age groups have become more affordable and more widely available in low- and middle-income countries. Countries are moving towards earlier initiation of triple-drug regimens and simplified programming for the prevention of mother-to-child transmission (PMTCT) of HIV that emphasises the long-term health of pregnant women and mothers living with HIV, and preventing HIV infection among their children.

Current WHO recommendations are that all pregnant and breastfeeding women with HIV should initiate triple ARVs (ART), which should be maintained at least for the duration of mother-to-child transmission risk. Women meeting treatment eligibility criteria should continue lifelong ART (strong recommendation, moderate-quality evidence).

Regarding ARVs and duration of breastfeeding, the revised WHO guidelines retain the key principles and recommendations established in 2010, including that: national or subnational health authorities should decide whether health services will mainly counsel and support mothers known to be infected with HIV to either breastfeed and receive ARV interventions or avoid all breastfeeding given their particular context.

In settings where national authorities have decided that maternal and child health services will mainly promote and support breastfeeding and ARV interventions as the strategy that will most likely give infants born to mothers known to be infected with HIV the greatest chance of HIV-free survival: mothers known to be infected with HIV (and whose infants are not HIV-infected or of unknown HIV status) should exclusively breastfeed their infants for the first six months of life, introducing appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life. Breastfeeding should then only stop once a nutritionally adequate and safe diet without breastmilk can be provided (strong recommendation, high-quality evidence for the first six months; low-quality evidence for the recommendation of 12 months).

No relevant systematic reviews of breastfeeding and maternal child health outcomes specific to high-income countries were identified. However, a systematic review of the effect of maternal ART on the survival rates of breastfed infants at 12–24 months[305] informed the aforementioned updated WHO Guidelines on HIV and infant feeding. The review included 18 studies published from 2005–2015. The pooled estimates for 12-month HIV-free survival were 89.8% (95% confidence interval, CI: 86.5%, 93.2%) for infants of mothers on ART for six months postnatally (six studies) and 91.4% (95% CI 87.5%, 95.4%) for infants of mothers on lifelong ART (three studies). Eighteen-month HIV-free survival estimates were 89.0% (95% CI 83.9%, 94.2%) with six months ART (five studies) and 96.1% (95% CI 92.8%, 99.0%) with lifelong ART (three studies). Twenty-four-month HIV-free survival for infants whose mothers were on ART to six months postnatally (two studies) was 89.2% (95% CI 79.9%, 98.5%). There was considerable heterogeneity throughout. In four studies, HIV-free survival in breastfed infants ranged from 87% (95% CI 78%, 92%) to 96% (95% CI 91%, 98%) and in formula-fed infants from 67% (95% CI 35.5%, 87.9%) to 97.6% (95% CI 93.0%, 98.2%).

Johnson and colleagues[306] examined the issue of whether health providers should discuss breastfeeding with HIV-positive women in high-income countries. They noted that the established recommendation is that women living with HIV in high-income countries avoid breastfeeding, but that some women may still choose to breastfeed for a variety of personal, social or cultural reasons. The authors argued that nonmaleficence ('do no harm') must be weighed against maternal autonomy and proposed that providers caring for women in this situation were ethically justified in discussing breastfeeding as a reasonable, though inferior, option.

National food system data collection and reporting

National growth monitoring

Enabling interventions (see ANBS-E Strategies 1–3) may also include reforms to social or economic institutions or guidelines that indicate, measure and influence the perceived economic value of breastfeeding and trends in growth. Lack of data signals lack of political or policy priority and predicts lack of effective action. For example, a report for the French Presidential Commission noted that not counting human milk production in economic statistics had important implications for maternal and child health and showed how policy priorities could be biased towards market production of valuable goods and services[307]. In Norway, counting the volume of mother's milk as part of the national food supply contributes to the

monitoring of the adequacy of children's diets and trends in breastfeeding[308], having been proposed by Norway at international forums as a strategy for maintaining a profile for breastfeeding in food-system statistics since the early 1970s.[309] A study of breastfeeding in several representative high-, middle- and low-income countries showed how measuring human milk production in GDP can indicate comparative productivity trends and gaps in countries' IYC food systems and food security.[310] A more recent study[59] compared the value of human milk production across countries with diverse breastfeeding policy approaches — Britain, Australia, the US and Norway. This showed that in Australia, achieving optimal breastfeeding at population level would involve an 82% increase in human milk supplied for infants and young children, increasing food production from 42 million litres to 89 million litres per year. Among these high-income countries, the 'lost' biological potential production was the least in Norway, where production of 'morsmelk' (mother's milk) is counted in the food system, and losses were most severe in Britain where cultural and social norms and institutions are less supportive. These estimates of the contribution of breastfeeding to food production for infants and young children also illustrates the importance of monitoring breastfeeding as a food system, particularly for informing disaster and emergency policies and planning, and IYC food security.[311]

Individual growth monitoring

As noted in the macroeconomic context above, the extent and nature of national monitoring and evaluation of breastfeeding practices can influence public awareness and support for breastfeeding and whether it is valued at the population level as part of the food system.

Growth-monitoring systems can influence breastfeeding practices at the clinical level. New charts for growth monitoring of infants and young children were published by WHO in 2006. These explicitly identify breastfeeding as the biological norm and establish the breastfed child as the normative model for growth and development.[312] By April 2011, 125 countries had adopted the WHO standards; another 25 were considering their adoption and 30 had not adopted them. Debate on the effect of this strategy on exclusive breastfeeding was identified by this Evidence Check.[313-315] Studies indicate the importance of appropriate education and training in this area[316], and identify the need for full evaluation of the effects on breastfeeding.[317] This Evidence Check found no systematic reviews explicitly evaluating the effects of using the WHO growth charts. However, one RCT study was identified that tested whether the growth chart used influenced breastfeeding rates. A study by Zhu et al[318] in Hangzhou, China, examined data from mothers of infants who were being 'fully' breastfed at six weeks after birth, and their infants measured at six weeks and three, four, five and six months after delivery. At six months, the rate of full breastfeeding was 18.1% in the group using the heavier growth chart compared with 22.8% in the lighter growth chart group. The difference was statistically significant, including after adjusting for potential confounders (aOR 1.41, 95% confidence intervals 1.02, 1.93). The results suggest full breastfeeding rates at six months may be considerably influenced by the growth chart used. The authors concluded that a larger trial is required to confirm the results, but in the interim a lower percentile line could be used to assess adequacy of growth if the heavier growth charts are used.

Economic determinants — cost-effectiveness, resourcing and fiscal policies

Decision-makers benefit from evidence about the resource costs of interventions, as well as about effectiveness. This can inform priority setting and funding allocation, and assist in formulating cost-effective coordinated and integrated strategies. The scope of this Evidence Check includes economic studies highlighting the costs and benefits of breastfeeding, and their distribution. They also provide a perspective on how the distribution of these costs and benefits affects institutional or individual incentives influencing IYCF practices.

Some recent studies inform consideration of economic, financial or fiscal aspects of strategies to increase breastfeeding. The review identified several diverse recent economic studies in high- or middle-income

countries, and a small number of studies of 'incentive' interventions including one systematic review.[21, 95, 319] Few such studies examined the costs or cost-effectiveness of specific strategies or interventions in OECD countries.[18, 78, 125]

Below, costing or economic studies relevant to the policy environment such as taxation or fiscal aspects are discussed under this enabling intervention heading, while those relevant to specific intervention types implemented in specific settings are considered later in this results section in the relevant setting or situation for the intervention. Health system-based interventions involving incentives for breastfeeding are also considered later.

Economic impact of breastfeeding

A group of recent publications from the World Bank Group summarise the globally relevant evidence on the economics of nutrition interventions for a variety of country settings and populations, of which breastfeeding interventions are found to be among the most cost-effective.[320-322]

Implementing the Global Strategy for Infant and Young Child Feeding (GSIYCF) fully through integrated national strategies has been shown to potentially produce gains in exclusive breastfeeding of 1%–2% a year. A recent study estimated the global cost of implementing the GSIYCF and concluded that maternity protection was the core cost element.[323] The scale of funding for maternity protection such as paid maternity leave and lactation breaks should be considered against the significant economic (time) investments by women in breastfeeding, and taking account of the links of such public health and employment policies to broader gender equality and poverty reduction goals.

A more limited number of recent quality economic studies address economic aspects of breastfeeding strategies in OECD countries. The *Lancet* Series on Breastfeeding reports country and global studies estimating the resource costs and economic benefits of 'investing in breastfeeding' at the national or global level. The 2013 NHMRC dietary guidelines cite earlier Australian evidence on economic costs and benefits of more optimal IYCF practices.[4] Studies in the Netherlands[324], Britain[13] and the US[76, 77, 325] are most relevant to Australia within the period of this Evidence Check.

Economic determinants

AUSTRALIAN STUDY: Economic incentives affecting breastfeeding are deeply embedded in social norms and institutions, including in employment, health and nutrition systems.[297] It has been perceived by many that breastfeeding is 'cheaper' than formula feeding, that breastfeeding is a free resource.[58] An important policy contradiction arises from the time demands of exclusive breastfeeding, which mainly affect women. This highlights the question of whether employment and maternity protection policies adequately address the substantial financial disincentives for women to breastfeed in accordance with public health policy guidelines.[15, 36, 326]

Likewise, the recent review of the BFHI by the WHO (discussed in ANBS Strategy 4) has identified the need to consider what incentives, including performance-based financing or contracts, might support a health system approach to fully protecting, promoting and supporting breastfeeding.[42]

Tarrant[327] investigated the effect of hospitals rejecting free infant formula from manufacturers on in-hospital formula supplementation rates and breastfeeding duration. The study was conducted at the in-patient postnatal units of four public hospitals in Hong Kong on two cohorts of breastfeeding mother–infant pairs (n = 2560) followed to 12 months postnatally. The average number of formula supplements given to infants in the first 24 hours was 2.70 (sd 3.11) in the initial cohort and 1.17 (sd 1.94) in the cohort following the policy change ($P < 0.001$). The authors concluded that after implementation of a hospital policy to pay market price for infant formula, rates of in-hospital formula supplementation were significantly reduced and the rates of in-hospital exclusive breastfeeding and breastfeeding duration increased.

A related study investigated the effects of changing policies about paying market price for infant formula on new mothers' exposure to Baby Friendly Steps and on breastfeeding exclusivity and duration. The study used a repeated prospective cohort study design and data from two cohorts of breastfeeding mother–infant pairs in the immediate postnatal period in four Hong Kong public hospitals. After hospitals began paying for infant formula, new mothers were more likely to experience four out of six Baby Friendly Steps, and the proportion experiencing all six Baby Friendly Steps increased from 4.8% to 20.5%. The proportion of women practising in-hospital exclusive breastfeeding increased from 17.9% to 41.4%. Breastfeeding initiation within the first hour increased from 28.7% to 45%. The risk of weaning was progressively higher among participants experiencing fewer Baby Friendly Steps; each additional step experienced decreased the risk of a new mother ceasing to breastfeed by 8% (hazard ratio = 0.92; 95% CI, 0.89–0.95). The authors' conclusion was that hospital practices may be substantially improved when their institutions pay market price for infant formula.[22]

A further example of the policy environment creating incentives affecting breastfeeding is the US Special Supplemental Nutrition Program for Women, Infants and Children (WIC), which provides free milk formula to approximately half the US population of mothers and babies. Several included studies in this review examined WIC reforms that have been implemented in recent years to improve financial incentives for breastfeeding and healthier eating by eligible mothers. Two studies[328, 329] have investigated recent changes to WIC and the effects of the changes to financial incentives for breastfeeding or complementary feeding. Fornasaro-Donahue et al. found the cost of formula was perceived as high but did not influence decisions to breastfeed among formula-feeding mothers. For mothers intending to breastfeed, cost information was perceived as an additional motivation. Langellier and colleagues found small but significant increases from pre- to post-implementation of the new WIC food package in prevalence of prenatal intention to breastfeed and breastfeeding initiation, but no changes in any breastfeeding at three and six months. The prevalence of exclusive breastfeeding at three and six months roughly doubled, an increase that remained large and significant after adjustment for other factors.

Research in 2012 concluded that data provide strong support for the impact of policy changes on WIC breastfeeding rates as well as the impact of breastfeeding on rates of childhood obesity among the low-income population served by WIC.[330] The WIC program provides nutritious food and nutrition and breastfeeding education to low-income pregnant and postpartum women, and children up to age five. About half of all infants in the US receive WIC services. The objectives of the research were to (1) examine the impact of the 2009 changes to the WIC food packages on the rate and duration of exclusive breastfeeding among Californian WIC participants, and (2) assess the impact of breastfeeding on childhood obesity rates at age four. ANOVA was used to analyse administrative data on 180,000-plus infants in California to demonstrate the impact of policy changes on breastfeeding rates. Multiple logistic regression was used to examine the association between breastfeeding behaviour and obesity rates at age four on a sample of 80,000 children served by WIC from birth to age four. Rates of fully breastfeeding increased by 86% and rates of infant formula use decreased significantly following the changes to the WIC food packages. Duration of breastfeeding to two and six months also increased significantly in the months following the policy change. Breastfeeding initiation was associated with a 26% reduction in childhood obesity at age four, and breastfeeding duration to six months conferred additional reductions in obesity rates of almost twice that amount for some subgroups.

A later 2014 study of the WIC changes concluded that the new food package could improve breastfeeding outcomes in a population at high risk for negative breastfeeding outcomes.[331] The study looked at the effect of the new WIC food package, implemented in October 2009, on breastfeeding outcomes among a predominately Latina sample of WIC participants in Los Angeles County, California. It used data from 5020 WIC participants who were interviewed in a series of repeated cross-sectional surveys in 2005, 2008 and 2011. Participants were randomly selected from Los Angeles County residents who received WIC services

during those years. The study found that, consistent with the WIC population in Los Angeles, participants were mostly Latina and had low levels of income and education; more than half were foreign-born. There were small but significant increases from pre- to post-implementation of the new WIC food package in prevalence of prenatal intention to breastfeed and breastfeeding initiation, but no changes in any breastfeeding at three and six months. The prevalence of exclusive breastfeeding at three and six months roughly doubled, an increase that remained large and significant after adjustment for other factors.

A previous systematic review of WIC observed that in 2009, for the first time since 1980, the WIC food package policies were revised to meet the Institute of Medicine's nutrition recommendations.[332] These changes included increases in fruits, vegetables, whole grains and low-fat dairy to improve the nutrition and health of WIC participants. This systematic review of the literature assessed the influence that the 2009 WIC food package revisions have had on dietary intake, healthy food and beverage availability, and breastfeeding participation. The systematic review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses recommendations. Four electronic databases were searched between April 1 and 30, 2014, for peer-reviewed research. Two reviewers screened the articles, extracted the data, and established inter-rater reliability by discussing and resolving discrepancies. Twenty articles were included that met our inclusion criteria. Nine of the studies analysed changes in dietary intake, eight examined changes in healthy food and beverage availability, and three evaluated breastfeeding participation exclusively. The review demonstrated an improved dietary intake and an increase in the availability of healthier foods and beverages in authorised WIC stores. The revised food package was also associated with the improved dietary intake of WIC participants. Mixed results were demonstrated in regard to improved breastfeeding outcomes. Further research is needed to assess the influence of WIC 2009 food package revisions on breastfeeding outcomes and to make conclusions about broad nutrition-related implications.

A systematic review of factors supporting breastfeeding within WIC in 2017 concluded that the 2009 changes to WIC food voucher packages to make them more supportive of breastfeeding more than doubled the odds of WIC participants initiating breastfeeding (RR 2.2), and of exclusively breastfeeding at three months (RR 1.7), and tripled the likelihood of exclusive breastfeeding at six months (RR 3.1).[149] This study aimed to determine factors associated with increased likelihood of breastfeeding among WIC participants. A systematic review of literature in September and October 2014 included studies limited to the previous 10 years. The following search terms were used: low-income; WIC; women, infants, and children; breastfeeding; breast milk; and maternal and child health. The criterion for inclusion was a study sample of women and children enrolled in the WIC program, thereby excluding non-US-based research. Factors that increased the likelihood of breastfeeding among WIC participants included sociodemographic and health characteristics (n = 17); environmental and media support (n = 4); government policy (n = 2); intention to breastfeed, breastfeeding in hospital or previous breastfeeding experience (n = 9); attitudes towards and knowledge of breastfeeding benefits (n = 6); healthcare provider or social support; and time exposure to WIC services (n = 5). Another study cited in this 2017 review demonstrated that the post-2009 package increased breastfeeding package demand by 86%, and increased exclusive breastfeeding at two and six months. Nevertheless, WIC funding for formula remains 25 times higher than for breastfeeding.

A 2016 US study examined the effect of WIC support on maternal employment and breastfeeding, reporting that WIC program participation decreased exclusive breastfeeding by almost 50% and increased work leave duration by more than 20%.[333]

Financial (cash) incentives are an emerging intervention to support health behaviours such as cessation of smoking and continuing breastfeeding. Two recent RCTs suggest incentives can affect the breastfeeding rates of low-income women. A recent study by Washio and colleagues[19] tested whether monthly financial incentives would significantly increase the proportion of breastfeeding mothers at six months postpartum compared with WIC services only. Using a randomised, two-arm parallel-group design, 36 self-identified

low-income Puerto Rican women who initiated breastfeeding were given monthly cash incentives contingent on observed breastfeeding, increasing the amount given at each month from $20 to $70 for a possible total of $270. Intent-to-treat analysis showed significantly higher percentages of breastfeeding mothers in the incentive group at each time point compared with those in the control group (89% vs. 44%). The researchers concluded that contingent cash incentives significantly increased breastfeeding through to six months postpartum among WIC-enrolled Puerto Rican mothers, although no significant differences between the study groups were observed on exclusive breastfeeding rate and infant outcomes.

The most recent study of financial incentives was a randomised trial of financial incentives in Britain[21] involving 10,010 mother–infant dyads living in 92 electoral ward areas. Shopping vouchers worth £40 were offered to mothers up to five times, based on infant age, at intervals up to six months, depending on whether the infant was receiving any breastmilk. The study found that at six-to-eight weeks, breastfeeding rates were higher (by 5.7 percentage points) in the intervention group. No significant differences were observed for breastfeeding initiation or exclusive breastfeeding.

Similarly, taxation is widely used to influence individuals' behaviour to achieve public health and nutrition objectives, such as by increasing the price of harmful products. A recently published study examined the operation of the WHO Code alongside the development of the Framework Convention on Tobacco Control (FCTC) and identified key factors underpinning effective public health advocacy on alcohol marketing, including taxation.[334] Taxes on soft drinks have been shown to be an effective intervention to reduce consumption[335], and the importance of commodity taxation as part of a comprehensive tobacco control policy is well established.[336] Recent WHO guidance[337] identifies so-called toddler or 'growing up' milks as 'unnecessary' and 'potentially harmful', yet after the GST was introduced in Australia in 2000 some such IYC food products, including flavoured milk formula and prepared foods, may have been exempted from GST by ambiguous Australian Taxation Office (ATO) rulings exempting 'baby milk'. Breast pumps and similar lactation aids are subject to the 10% GST. This is a cost comparable with the incentives paid to low-income mothers in the aforementioned incentive studies, and so represents a potentially important financial disincentive to breastfeeding. This would especially be the case for low-income Australian mothers experiencing breastfeeding difficulties, such as from premature birth or early return to an unsupportive work environment. A recent study of the GST on food products estimates changes in demand and revenue gains from removing exemptions for particularly highly processed food products.[338] This points to the potential for GST reforms to improve financial incentives for optimal IYCF[19, 21] while also generating substantial revenues for public programs, including those targeting affected low-income households.

Commercial determinants

There is a growing social science and public health literature on commercial determinants of health.[339] There is also an increasing relevant public health literature on policy frameworks for the most effective and cost-effective public policy responses to such commercial determinants.[340]

Issues of marketing addressed by the WHO Code (and subsequent relevant WHA resolutions) are universal in nature, but the WHO Code has evolved out of recognition of particular mother/child consumer vulnerability. New mothers and their infants and young children, in both developed and developing countries, have long been identified as uniquely vulnerable to the marketing of breastmilk substitutes. Marketing research has shown new mothers are a particularly vulnerable consumer group because of the transitional nature of their life stage and the need for adjustment to their own physical and psychological situation postpartum; breastfeeding; lack of sleep; dependency of the new infant; changes to family structure; social expectations of 'good mothering'; and making consumer choices about the correct goods and services to purchase.[341]

This period can be filled with anxiety for the mother about her infant's health and wellbeing, and her own skills and competencies as a mother. Mothers are known to place a high value on child nutrition,

development and learning, and this puts pressure on their mothering practices and their choice of consumer baby products. Mothering is a moralistic social space wherein mothers worry about being judged as 'good' or 'bad'.[342]

Marketers exploit such vulnerabilities by upholding the 'good mother' standard and promoting products and services ostensibly to assist mothers to attain this ideal, using health and medical expertise to confer credibility to the products through a range of marketing strategies including endorsements by health professionals and free samples.[341] Mothers of all socioeconomic groupings are susceptible to the aspirational effects of marketing, simply through all citizens' lifetime engagement with a modern market economy.[343]

Leading food marketers have identified the increased number of women in the work force as the most important impact on the food industry in the past 50 years, because *"their busy schedules are forcing food and produce brands to rethink the way they are offering new convenient meal preparation options"*.[344]

A systematic review by Cairns et al.[345] showed the nature, extent and effects of food marketing to children. Its findings are consistent with other independent, rigorous reviews conducted during the period 2003–2012. Food promotions have a direct effect on children's nutrition knowledge, preferences, purchase behaviour, consumption patterns and diet-related health. Current marketing practice predominantly promotes low-nutrition foods and beverages. Rebalancing the food marketing landscape is a recurring policy aim of interventions aimed at constraining food and beverage promotions to children. The collective review evidence on marketing practice indicated there had been little progress towards policy aims between 2003 and 2012. There is a gap in the evidence base about how substantive policy implementation can be achieved. The study recommended a greater emphasis on translational research and pointed to the valuable insights provided on implementation priorities by the work to introduce a global framework for co-ordinated intervention to constrain unhealthy food marketing, which has received high-level support.

To avoid the potential harm of excessive or inappropriate use, certain products such as pharmaceuticals and breastmilk substitutes have traditionally been marketed through health systems and health professionals, in order to protect consumers. Other products such as tobacco were historically promoted freely, including through association with medical science and with health claims, but are now comprehensively regulated by a global Framework Convention for Tobacco Control, which is a global regulatory evolution of the WHO Code.

Many high-quality studies now provide valuable evidence on the effects of marketing tobacco, pharmaceuticals, food and alcohol, as well as the effects on population health of regulating such marketing, which are relevant to this review. However, these are not specifically considered in this Evidence Check unless they explicitly include IYCF outcomes. The scope of this Evidence Check encompasses enabling strategies or interventions such as WHO Code implementation, social marketing, consumer protections, and national dietary guidelines or other policies about infant and young child feeding. Consideration of commercial determinants of IYCF not only highlights the market context of influences on IYCF decision-making, it also draws attention to the characteristics and effectiveness of industry interventions.[346] There are also gender equity aspects of commercial influences on nutrition and health.[347]

Against this background on the broader context and determinants of IYCF practices, evidence on specific enabling strategies or interventions identified for the ANBS-E is summarised below.

ANBS-E Strategy 10. Other strategies in settings

Milk sharing and cross-nursing social and online networks

While Western concepts of breastfeeding are of a mother breastfeeding her own baby or babies, through most periods of human existence others have sometimes provided breastmilk or breastfeeding, for a variety of reasons. Practices of milk sharing, cross-nursing and wet nurse employment are well documented in historical[348-352] and contemporary anthropological studies.[353, 354] In recent decades there has been a renewed interest in milk sharing, including through local community networks facilitated by social media. As is the case for milk banking, milk sharing or cross-nursing is an intervention that can either support or displace optimal breastfeeding by the mother. It also carries potential risks.[355] However, until recently there has been little evidence about how these risks are managed by women sharing their milk in community settings, what benefits they perceive for doing so, the extent of milk sharing, and whether milk sharing is an effective intervention to support mother's own breastfeeding.

In 2014, the Australian College of Midwives (ACM) Position Statement on the Use of Donor Human Milk lists five pathways for accessing donor milk in Australia, via formal milk banks; hospital-based known donor protocols; informal sharing among family and friends; informal sharing via multimedia sites and commercial transactions via the internet.[356] Although the internet is used to share milk in the community, there is little evidence of explicit payment in this setting in Australia, perhaps owing to cultural expectations and uncertainty surrounding the legal classification of human milk.[357] ACM guidelines for donor screening, milk testing and pasteurisation apply to healthcare but not community settings, and refer to the Australian Breastfeeding Association (ABA) website for information on expressing and storing milk. The ABA Position Statement on Donor Milk directs potential users to the Australian pages of international social media sites that have protocols for safe milk sharing.[358]

In 2017, the Academy of Breastfeeding Medicine (ABM), a worldwide organisation of breastfeeding medicine specialists, released guidelines on milk sharing.[38] The position statement provides detailed guidance for healthcare providers so they can educate their patients about informal milk sharing. Informal breastmilk sharing can either be community-based or internet-based. Two important strategies can maximise the safety of community-based breastmilk sharing: (1) medical screening of the donor, and (2) safe milk handling practices. Internet-based breastmilk sharing is not recommended under any circumstances. Wet nursing (also known as cross-nursing), which is directly breastfeeding a non-biological child, is another mode of informal milk sharing that continues to be practised in many cultures. Wet nurses are directly breastfeeding other women's infants to provide them with breastmilk, whether this occurs within families or between friends. Wet-nursing women are functionally milk sharing donors and mothers should strongly consider screening wet nurses in the same manner as milk donors.

Providers should help mothers and families make informed choices about the risks and benefits of informal breastmilk sharing. Physicians and other healthcare providers can advise recipients on medical screening of donors for illnesses and medications that are contraindicated. As donors should be screened, the ABM discourages the use of any milk from an anonymous donor. Donors should have no medical illness where breastfeeding is contraindicated, nor should they be on any medication or herbal preparation that is incompatible with breastfeeding. This will usually require a review of the donor's medical history including, where possible, a review of her prenatal infectious screening tests and a review of her social practices. In addition, healthcare providers can advise mothers who want to further reduce the risk of infections by performing home pasteurisation of donated milk before giving it to their infants. However, the mother needs to be informed that pasteurisation can significantly decrease some of the beneficial components of human milk. The ABM recognises that informal milk sharing is an increasingly common practice with potential health benefits for the term healthy infant, but encourages adherence to these guidelines to reduce risk and make milk sharing as safe as possible.

A study of wet nursing and cross-feeding in Australia documented that informal cross-feeding existed long after the decline of wet nurses by the 1920s.[359] At the turn of the 20th century, wet nurses were employed in private homes or institutions but were extremely difficult to find by the 1920s. Wet nursing and cross-nursing both involve the breastfeeding of a baby by someone who is not the baby's mother but wet nurses were usually employees in paid situations and the breastfeeding was not reciprocated, whereas cross-nursing was between peers and was usually unpaid and could be reciprocal. This study examines both practices in 20th-century Australia, 1900–2000, and includes a discussion of the decline of human milk banks, another means of sharing mother's milk.

An article exploring the sharing of breastfeeding, principally in Australia, provided a historical context for concerns about transmission of infection and discussed such issues also in relation to human milk banking.[360] Although wet nursing and cross-feeding both involve the breastfeeding of a child by someone other than the mother, wet nursing involves a woman who is not the social equal of the employer, is never reciprocal and is normally for payment. Cross-feeding (also cross-nursing or co-feeding) is the informal sharing of breastfeeding between equals, is usually unpaid and may be reciprocal. Community attitudes in the late 20th and early 21st centuries are distrustful of this practice, though satisfaction is reported by the women involved in sharing breastfeeding. Community unease has included feelings of revulsion, rationalised by concern about the transmission of infections. Yet recently there have been sporadic feature articles in the print media reporting instances of, and opinions on, these practices.

A subsequent study of mothers' experiences of sharing breastfeeding or breastmilk co-feeding in Australia during the period 1978–2008 concluded that existing policies for the sharing of this bodily fluid, milk, appeared to have been written without the benefit of a detailed examination of the actual experiences of the mothers and babies involved.[361] This study investigated the sharing of breastfeeding or expressed breastmilk by Australian women in a recent 30-year period, 1978–2008. The objective was to explore the mothers' experiences of sharing breastfeeding or human milk including: the circumstances in which this bodily fluid was freely shared; what screening process, if any, was used before the milk of another mother was accepted; the mothers' feelings about the experience; the reported attitudes of others; and the children's behaviour when put to the breast of someone other than the mother. The study concluded that the underpinning reason for the sharing of breastfeeding or breastmilk was the desire of mothers to provide human milk to their babies, exclusively, including while they were absent or temporarily unable to breastfeed. Most mothers were selective about those with whom they would share breastfeeding or breastmilk.

While women who informally shared breastfeeding or breastmilk in the latter part of the 20th century were often reluctant to disclose this practice, media attention in the past few years has resulted in the practice being discussed more.[122] This paper explored the experiences of mothers co-feeding in a variety of situations, focused on the early 21st century. Twenty-two mothers who had co-fed, and the coordinator of an online milk-sharing network, were recruited from online breastfeeding discussion networks, personal contacts and word of mouth. Sampling stopped when eight countries were included. Respondents came from a range of cultures and gave different reasons for this practice. They could choose whether to respond to a set of open-ended questions by email or telephone. A number of different situations were identified in which the women had cross-fed on one or more occasions. Cultural issues, including milk siblingship in Islamic and other cultures, were explored. Consent was important, but fully informed consent was not necessarily obtained. Although there was no formal screening, it was clear the women informally screened those with whom they shared their milk. In this study, sharing of breastfeeding or breastmilk mostly occurred in kinship or close female relationships, or at least between women with similar lifestyles and values, and seldom through casual contact. In most cases, there was informal screening and the women would not have cross-fed indiscriminately.

A 2011 study in the US examined human milk sharing including sale and purchase via the internet.[362] *'In the Infant Feeding Practices Study II, 85% of 1564 breastfeeding mothers of healthy singleton infants extracted milk from their breasts while their infants were 1.5–4.5 months of age. By seven months postpartum, 92% of the cohort still breastfeeding had extracted milk from their breasts. Women who pump may produce more milk than is needed by their own infants'*. This study described some of the ways human milk has become a valued commodity and highlighted some of the potential dangers of sharing raw, unpasteurised human milk.

A US study described from first-hand experience the process of buying milk via the internet.[363 et al. (2013] The authors anonymously bought 102 human milk samples via the internet, and characterised the outside box, packing materials, milk container, temperature and condition of the milk, and cost. The study documented the purchase of 2131 ounces of milk for a total cost of US$8306; 89% of the milk arrived above the recommended frozen temperature of –20C; 45% of it was above the recommended refrigerator temperature (4°C). The mean surface temperature of the milk samples in each shipment was correlated with the cost of shipping, time in transit and condition of the milk containers. The authors concluded that the prevalence and potential risks of this practice currently are unknown.

A 2014 study based in Australia examined why women use peer-to-peer shared milk, and found respondents were universally unable to provide some or all of the milk their infants required.[364] The process by which women came to use internet-facilitated peer-to-peer shared milk was explored via a written questionnaire administered to 41 peer-milk recipients from five countries. Twenty-nine dyads had a medical condition that could have affected their ability to breastfeed. Many respondents had had great difficulty in finding health workers who could assist them with their breastfeeding challenges. Before obtaining peer-shared milk, respondents had tried to increase their own milk supply, used infant formula or sought donor milk from personal contacts. The author concluded that health workers dealing with breastfeeding women require greater training in the recognition and treatment of conditions that adversely affect breastfeeding, including a physiological incapacity to fully breastfeed. Peer-to-peer milk recipients appear to be very satisfied with the solution milk sharing provides to their problem of being unable to fully breastfeed their infants. However, it does appear that, in this small sample of participants who had explored options to support their own breastfeeding first, it is unlikely sharing milk improved their breastfeeding outcomes. When a mother's own milk is unavailable, there is currently little evidence demonstrating the benefit of providing shared breastmilk rather than formula.

A 2014 US study of the biocultural context for milk sharing concluded that internet-facilitated human milk sharing is an emergent response to breastfeeding challenges.[365] The study collected data on demographic characteristics, reproductive history, lactation history, and levels of social support and healthcare provider support for breastfeeding, via an online survey in 2013–14. The aim was to examine the demographic characteristics of milk sharing donors and recipients, and the ways structural factors circumscribe the biocultural context of lactation in milk sharing practices. Statistical tests were executed to ascertain whether significant differences exist between donors and recipients. A total of 867 respondents (661 donors, 206 recipients) met the eligibility criteria for the study. Respondents were US residents and primarily white, middle class, well educated and employed women. Both donors and recipients reported higher than the national average for household income, maternal educational attainment, breastfeeding exclusivity 0–6 months, and breastfeeding duration. Differences in lactation sufficiency and breastfeeding outcomes between donors and recipients were associated with both structural and biocultural factors. Donors reported significantly higher income, education and support for breastfeeding from spouse/partner, other family, employers and paediatricians. Donors also reported significantly higher rates of full-term birth for the child of most recent lactation.

A 2014 mixed-methods observational study described the size and activity of online milk sharing communities.[366] Data for three months were extracted from nine public Facebook pages that facilitate the exchange of human milk. The numbers of participants, interactions and comments were analysed. The study found 954 individuals participated in milk sharing during that period. The number of interactions per individual ranged from none to 16 (mean, 1.74–1.65). Top reasons that participants requested milk included 'lactation problems' (69.4%) and 'child health problems' (48.5%). Almost half of donors were offering 100 ounces or more, which is the minimum to be eligible to donate to non profit milk banks. The authors concluded that milk sharing networks in the US are active, with thousands of individuals participating in the direct exchange of raw human milk. Public health issues include increasing the supply of pasteurised donor milk for fragile infants, increasing breastfeeding support, and helping milk sharing families appropriately manage risks.

A 2015 Australian historical study of wet nursing explored meanings of motherhood where a mother was not acknowledged as a mother, and where her welfare and that of her own child were subsumed to the interests of another mother's child.[367] She 'mothered' this other child yet could never be considered a mother to her. The wet nurse hired to breastfeed an unrelated infant was herself a mother, whether her child was born alive or stillborn. Yet, paradoxically, her motherhood was subsumed into the nature of her employment and the existence of her own baby was ignored, as she was valued only for her milk. Her workplace was the employer's home, her own home, or an institution. Occupational conditions were far from homogeneous, as were the effects of her employment on her own life and that of her child. The personal and health repercussions for the wet nurse and her own baby are discussed in this context.

A US study aimed to test milk advertised for sale online as human milk to verify its human origin and to rule out contamination with cow's milk.[367] The US Food and Drug Administration recommends against feeding infants human milk from unscreened donors, but sharing milk via the internet is growing in popularity. Recipient infants risk the possibility of consuming contaminated or adulterated milk. The authors anonymously purchased 102 samples advertised as human milk online. DNA was extracted from 200 µL of each sample and assessed for the presence of human or bovine mitochondrial DNA. Four laboratory-created mixtures representing various dilutions of human milk with fluid cow's milk or reconstituted infant formula were compared with the internet samples to semi-quantitate the extent of contamination with cow's milk. All internet samples amplified human DNA. After two rounds of testing, 11 samples were found to also contain bovine DNA. Ten of these samples had a level of bovine DNA consistent with human milk mixed with at least 10% fluid cow's milk. Ten internet samples had bovine DNA concentrations high enough to rule out minor contamination, suggesting a cow's milk product was added. Cow's milk can be problematic for infants with allergy or intolerance. Because buyers cannot verify the composition of milk they purchase, they should be aware that it might be adulterated with cow's milk. Paediatricians should be aware of the online market for human milk and the potential risks.

Peer breastmilk sharing has emerged in recent years as a subject of investigation and occasional controversy, with estimates that thousands of milk exchanges are facilitated through milk sharing websites every week.[368] A 2015 US study examined these practices through a 102-item online survey that asked questions about milk sharing practices, perceptions of milk sharing, and demographic characteristics. Participants were recruited through social media sites specific to breastfeeding and parenting events in Central Florida. The sample consisted of 392 respondents. Data were analysed using univariate analysis. The study found breastmilk sharing is a complex practice showing high levels of overlap, in which some donors are also recipients, and that cross-nursing sometimes occurs simultaneously with the exchange of expressed milk. Respondents often donated and received milk from people they knew; however, exchanging milk with strangers was also common. Many but not all used the internet to facilitate milk exchange; participants used well-known milk sharing websites as well as their private virtual networks. The study found most milk

exchanges happen in-person as gifts and that selling and shipping breastmilk were rare. The authors called for further research on breastmilk sharing practices to inform breastmilk safety, research and policy recommendations.

Aiming to describe human milk sharing practices in the US, a 2016 study examined milk sharing social networks, donor compensation, the prevalence of anonymous milk sharing interactions, recipients' concerns about specific milk sharing risks, and lay screening behaviours.[369] The authors collected data on human milk sharing practices via an online survey from September 2013 to March 2014. Chi-square analyses were used to test the association between risk perception and screening practices. A total of 867 (661 donors, 206 recipients) respondents were included in the analyses. Most (96.1%) reported sharing milk face-to-face. Only 10% of respondents reported giving or receiving milk through a nonprofit human milk bank. There were no reports of anonymous purchases of human milk. A small proportion of recipients (4.0%) reported that their infant had a serious medical condition. Screening of prospective donors was common (90.7%) but varied with social relationship and familiarity. Likewise, concern about specific milk sharing risks was varied, and risk perception was significantly associated (P values = 0.01 or less) with donor screening for all risk variables except diet. The authors concluded that understanding lay perceptions of milk sharing risk and the risk reduction strategies that parents are using is an essential first step in developing public health interventions and clinical practices that promote infant safety.

Women in the US have several options for what they do with excess breast milk, including donating to milk banks that serve medically fragile infants, sharing directly with families seeking milk, and selling to individuals or for-profit entities. A US study explored how lactating women with a surplus of breast milk come to the decision to share their milk with a peer rather than donate to a milk bank.[366] The study employed a qualitative design using a grounded theory approach. Semi-structured telephone interviews were conducted with 27 women who had shared milk with a peer but not with a milk bank. The study identified five dominant themes: a strong belief in the value of breast milk, unexpected versus planned donation, sources of information regarding milk exchange, concerns and knowledge gaps about milk banks, and helping and connecting. The authors concluded that their findings offered insights into potential strategies for promoting milk bank donation among peer-to-peer milk sharers, including developing donor education campaigns focused on knowledge gaps regarding milk banks and developing healthcare professional referral programs that can reduce barriers associated with the convenience of milk bank donation.

A 2017 study aimed to learn about the milk-handling practices of expressed human milk by milk sharing donors and recipient caretakers in the US and explored the degree to which donors and recipients adhere to the Academy of Breastfeeding Medicine's clinical recommendations for safe handling and storage.[370] Peer milk sharing, the non-commercial sharing of human milk from one parent or caretaker directly to another for the purposes of feeding a child, appears to be an increasing infant-feeding practice. Although the US Food and Drug Administration has issued a warning against the practice, little is known about how people who share human milk handle and store milk and whether these practices are consistent with clinical safety protocols. This study collected online surveys from 321 parents engaged in peer milk sharing. Univariate descriptive statistics were used to describe the safe handling and storage procedures for milk donors and recipients. A two-sample t-test was used to compare safety items common to each group. Multivariate ordinary least squares regression analysis was used to examine sociodemographic correlates of milk safety practices within the sample group. The study found that respondents engaged in peer milk sharing reported predominantly positive safety practices. Multivariate analysis did not reveal any relationship between safety practices and sociodemographic characteristics. The number of safe practices did not differ between donors and recipients. The authors concluded that parents and caretakers who participate in peer human milk sharing report engaging in practices that should reduce the risk of bacterial contamination of expressed peer-shared milk.

A 2017 study canvassed the key issues of milk sharing and its regulation in a paper arguing for expanding the reach of human milk banking so that it also serves many infants who are not critically ill, but would benefit from human milk from women other than their own mothers.[371] Noting that the banking of human milk is expanding rapidly in both high- and low-income countries, the author observes that most milk banks serve critically ill infants, including those who are born prematurely or have low birthweight. Some who cannot breastfeed may be fed with banked milk from their own mothers, in accordance with WHO recommendations.

A small number of cross-sectional or qualitative studies provide some evidence that milk sharing is an emerging community-based strategy for increasing breastfeeding duration and human milk intake in recipient mother–child pairs in such settings. There is also some evidence of increased breastfeeding by donor mothers and their children. There is historical evidence that optimal breastfeeding by some social groups can be displaced rather than enhanced through such strategies.[372] However, there are cultural and institutional barriers to wider implementation of safe milk sharing in many OECD countries.[366, 372] However, there are no studies that look at how institutional guidelines and practices can be translated for implementation in community settings and social networks, to increase safe milk sharing practices as a support to breastfeeding.

Nevertheless, a degree of medical oversight of community milk sharing occurs in some networks. In addition, outside the preterm very low-birthweight infant there is no evidence of the health benefits of receiving donor milk (particularly if pasteurised). It may be useful to consider milk sharing in other populations as a cultural and social practice outside the domain of public health professionals in screening and facilitating donation in the US[368, 373] and the Netherlands.[122] Other barriers exist to community milk sharing: in settings with low breastfeeding rates and where the cost of banked milk is not borne by the health system, concern about the allocation of human milk between medically fragile babies in NICUs and non-hospitalised babies discourages institutional involvement in scaling up milk sharing in the community.[374]

IYCE-E

The WHO/UNICEF Global Strategy for Infant and Young Child Feeding (GSIYCF)[3] identifies the importance of policies and strategies to address breastfeeding protection, support and promotion in exceptionally difficult circumstances, such as emergencies (IYCF-E), or mother–child exposure to HIV/AIDS. Despite almost 20 years of evidence-based recommendations focusing on enlisting member states to protect, promote and support IYCF during emergencies, embracing the 'do no harm' principle, to date IYCF-E interventions are the least well implemented GSIYCF measure within the 86 countries assessed through the World Breastfeeding Trends Initiative (WBTi).

In 2004 the WHO issued guiding principles for feeding infants and young children during emergencies.[i] The principles reaffirm the importance of protecting, promoting and supporting breastfeeding during calamities, as well as limiting and strictly controlling the use of breastmilk substitutes and the role of complementary feeding. The same guiding principles highlights the importance of assessing the nutrition status of children and continuously monitoring their feeding practices as a means of preventing malnutrition.

In 2007, the Infant Feeding in Emergencies (IFE) Core Group, of which UNICEF and WHO are members, issued operational guidelines on IYCF in emergencies.[ii] The guidelines reiterate the significance of

[i] WHO. Guiding Principles for feeding infants and young children during emergencies. Geneva, Switzerland, 2004. http://www.who.int/nutrition/publications/emergencies/9241546069/en/

[ii] Operational Guidance on Infant and Young Child Feeding in Emergencies, v2.1. Oxford, Emergency Nutrition Network, February 2007

supporting breastfeeding in difficult situations. In addition, they also make certain that donations of breastmilk substitutes are not collected. This is to meet the needs of the small proportion of infants who have no other option for breastfeeding after all alternatives, such as wet nursing etc., have been exhausted, thus procuring only the minimal amount of infant formula necessary through the emergency coordinating mechanism.

Infant and Young Child Feeding in Emergencies: Operational Guidance for Emergency Relief Staff and Programme Managers[i] proposes the following steps:[73]

(1) Endorse or develop policies
(2) Train staff
(3) Coordinate operations
(4) Assess and monitor
(5) Protect, promote, and support optimal infant and young child feeding with integrated multi-sectoral interventions, including integration with services for acute malnutrition
(6) Minimise the risks of artificial feeding.

In 2009, the IFE Core Group released a technical paper, Evaluating the Specific Requirements for Realising a Dedicated Complementary Feeding in Emergencies Training Resource (Module 3); a Preliminary Scoping Review of Current Resources (Phase I). The paper underlines the importance during emergencies of the need to ensure that all complementary feeding practices are not disrupted and are indeed appropriate to the age of the child. An addendum to the IFE guidance was issued in 2010[ii], which clarifies that the type and source of breastmilk substitutes (BMS) to purchase should be considered:

- Generic (unbranded) infant formula is recommended as first choice, followed by locally purchased infant formula
- Infant formula should be manufactured and packaged in accordance with Codex Alimentarius standards and have a shelf life of at least six months on receipt of supply
- The type of infant formula should be appropriate for the infant, including their age
- Specially formulated milks, so called 'follow up' or 'follow on' milks, are not necessary
- In the early stage of an emergency, ready-to-use infant formula (RUIF) has the advantage as it does not require reconstitution with water.

In the same year (2010) the World Health Assembly, endorsed resolution WHA 63.23, which expressed concerns that "*in emergencies … infants and young children are particularly vulnerable to malnutrition, illness and death*". It urged member states to: *"(8) ensure that national and international preparedness plans and emergency responses follow the evidence-based Operational Guidance for Emergency Relief Staff and Programme Managers on infant and young child feeding in emergencies, which includes the protection, promotion and support for optimal breastfeeding, and the need to minimise the risks of artificial feeding, by ensuring that any required breast-milk substitutes are purchased, distributed and used according to strict criteria"*.[337]

The Sphere standards (2011) include a specific set of recommendations on IYCF-E[iii]. They call on all humanitarian workers and agencies to *"Uphold the provisions of the Operational Guidance on infant feeding*

[i] Infant and Young Child Feeding in Emergencies Operational Guidance for Emergency Relief Staff and Programme Managers, IFE Core Group Version 2.1 — February 2007. (http://www.ennonline.net/pool/files/ife/ops-guidance-2-1-english-010307-with-addendum.pdf

[ii] http://nutritionatthecenter.care2share.wikispaces.net/file/view/Insert_Operational+guidance_6+3+2_Addendum+2010_FINAL.pdf

[iii] http://www.spherehandbook.org/en/infant-and-young-child-feeding-standard-1-policy-guidance-and-coordination/

in emergencies (IFE) and the International Code of Marketing of Breastmilk Substitutes and subsequent relevant World Health Assembly (WHA) resolutions (collectively known as the Code)."

In September 2014, Save the Children released a comprehensive IYCF-E tool kit that proposes[i] policy guidance, practical tools, references and documented experiences that support agencies, program managers, governments and others in their IYCF-related efforts during emergency response and preparedness.

In 2014, the European Commission endorsed the *"Infant and Young children Feeding in Emergencies. Guidance for Programming"*. This document offers a guidance to general practitioners on how to ensure that the specific nutritional needs of infants and young children are assessed and addressed. The guide is based on the most recent international recommendations and complies with the international code of marketing of breastmilk substitutes and relevant World Health Assembly resolutions.

In August 2015, UNHCR released a Standard Operating Procedure to provide guidance on how staff of UNHCR and UNHCR partners should manage artificial feeding in refugee contexts to protect both breastfed and non-breastfed children. Particular consideration is given to emergency contexts, to high burden, resource-poor settings, and to pastoral communities[ii]. The following year, in 2016, UNHCR, Save the Children, UNICEF and the IFE Core Group produced Interim Operational Considerations for the feeding support of Infants and Young Children less than two years of age in refugee and migrant transit settings in Europe. The guidance note outlines the benefits, risks, options and resources for supporting appropriate infant and young child feeding (IYCF) for children less than two years of age in refugee and migrant transit situations. Among the issues considered in the guidance are pre-existing suboptimal breastfeeding practices, a high dependency on breastmilk substitutes, and limited access to IYCF counselling and support services, as well as limited water, hygiene and sanitation facilities.

In 2017, UNHCR and Save the Children, released the IYCF Friendly Framework, based on the experiences and lessons learnt from the short and longer-term refugee experiences, in camps in particular. However, its application is not limited to these contexts; many elements are applicable to non-camp settings, host communities, the internally displaced and urban and rural settings. The IYCF friendly framework recommends seven key actions: 1) advocate for relevant stakeholders to consider IYCF; 2) mobilise resources for IYCF; 3) endorse key policies and adhere to the operational standards; 4) select appropriate IYCF activities; 5) integrate IYCF with other sectors; 6) coordinate IYCF-E sensitive activities; and 7) implement monitoring, evaluation, accountability and learning.

In 2017, the updated OG-IFE guidance was released (Version 3.0), putting greater emphasis on the needs of non-breastfed children, a more comprehensive set of recommendations for complementary feeding, introduced the concept of human milk banks and also a major highlight on preparedness and multisectoral approaches to protect, promote and support recommended IYCF practices even during emergencies.[73] The OG-IFE aims to provide concise, practical guidance on how to ensure appropriate infant and young child feeding in emergencies, including ensuring that commercial food distributions conform to international policies and guidelines such as the WHO International Code on Marketing of Breastmilk Substitutes and subsequent WHA resolutions.[40]

A Position Statement by the International Lactation Consultants Association states that infants and young children are vulnerable in any emergency and supporting their wellbeing should be a priority of

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[i] https://sites.google.com/site/stcehn/documents/iycf-e-toolkit,

[ii] Infant and young child feeding in practice. Standard Operating Procedures for the Handling Breast-Milk Substitutes in Refugee Situations for children 0–23 months. (August 2015) http://files.ennonline.net/attachments/2380/UNHCR_BMS-SOP-LAY2-MAINFILE-D.pdf

governments, aid agencies, health workers and members of the public. Such support should include assistance for exclusive and continued breastfeeding, safe artificial feeding where breastfeeding or provision of human milk is not possible, and appropriate complementary feeding for all infants and young children.[375]

The need for innovation in monitoring, evaluation and coverage assessment of IYCF-E programs has also been highlighted in a recent study.[376] Save the Children developed a list of research questions following the Child Health and Nutrition Research Initiative method[377] to set priorities for IYCF-E, engaging 27 respondents from 14 NGOs, universities, research institutes and UN organisations. The questions *"How to determine the number of potential beneficiaries and the coverage of IYCF-E programs?"* and *"What indicators are relevant to monitor IYCF-E programs and to evaluate their impact on IYCF awareness and knowledge, IYCF practices, nutritional status and morbidity at different periods of implementation, e.g. 6 months, 1 year?"* came-up among the top 10 priority questions. This review of research on health interventions in humanitarian crises confirmed initial findings that only four of the 77 (15%) studies that met the inclusion criteria focused on infant and young child feeding. The report recommends that more evidence is required on the impact of infant and young child feeding and there are huge gaps in the IYCF research arena. Despite the paucity of data and evidence about IYCF in the emergencies, the available literature shows the lack of measures to protect, promote and support recommended IYCF practices during emergencies both in the preparedness and during the actual response have a drastic impact on the affected populations.

Donations and indiscriminate distributions of infant formula are common but result in increased morbidity and mortality through decreased breastfeeding rates; where infants are not breastfed, options for obtaining breastmilk for the infant via wet nursing or relactation should be explored before supporting formula feeding.[41]

A study examined the changes in breastfeeding patterns and impact on child health during the Bosnian conflict. Four linked representative cross-sectional household surveys were carried out between 1994 and 1997. The concern is that breastfeeding deteriorates during humanitarian emergencies, when children need it most. The four surveys visited a random sample of clusters from population registers in the Federation of Bosnia and Herzegovina (BiH) and the Republica Srpska (RS). Interviewers asked about breastfeeding and other factors related to child health, and measured mid upper-arm circumference in 1123 infants aged one-to-12 months. One-fifth of infants were not breastfed at all (220/1087). The results show that among infants in sites visited by all four surveys, there was no change in the proportion ever breastfed and a significant increase in duration of breastfeeding and exclusive breastfeeding between 1994 and 1997. Non-breastfed children and those who breastfed for less than four months were more likely to be malnourished, as were those with complementary foods added either before or after their sixth month of life. It was concluded that if relief agencies had promoted and supported breastfeeding, this might have avoided some of the increased malnutrition that occurred during the conflict.[378]

A study aimed at reviewing the role of the media in infant feeding in emergencies after Cyclone Nargis in Myanmar and the earthquake in WenChuan, China. The study suggests the media (directly or indirectly) has been implicated in encouraging harmful aid in the form of donations of infant formula and other milk products.[379]

Internet-based media reports were collected after Cyclone Nargis in Myanmar and the WenChuan earthquake in China (2008) and examined for content related to infant and young child feeding. Common messages identified included that: babies are vulnerable; stress prevents breastfeeding; and providing infant formula saves lives. The results of the study suggest the messages distributed by the media rarely included that: artificial feeding is dangerous; and breastfeeding protects infants. This analysis suggests current patterns of media reporting may encourage harmful aid and increase child morbidity and mortality. Aid organisations should encourage the media to report accurately on the needs of infant and young children in emergencies so as to improve aid delivery.[379]

A study assessed the frequency of and factors associated with infant feeding methods after the Fukushima nuclear power plant accident using data from the Fukushima Health Management Survey. An anonymous self-administered questionnaire survey was conducted with 16,001 women who gave birth about the time of the Great East Japan Earthquake and registered their pregnancies at Fukushima Prefecture municipal offices between August 1, 2010, and July 31, 2011. The study analysed the responses of 8366 women. The percentage of women who had breastfed exclusively was 30.9 %. The percentage of women who had both breastfed and formula-fed or formula-fed exclusively was 69.1 %, of which 20.3 % formula-fed because of concern regarding radioactive contamination of breastmilk. The use of formula feeding because of concern about radioactive contamination was significantly higher in women who had lived within the evacuation area and those whose regular antenatal care had been interrupted. The results emphasised the importance of providing breastfeeding support to women who are forced to evacuate or whose antenatal care is interrupted after a disaster.[380]

The flood that hit Kelantan in December 2014 was the worst in Malaysian history. Women and their infants accounted for a large proportion of the people at risk who were badly affected, as almost half of the population in Kelantan was in the reproductive age group. Four of their concerns were identified during this massive flood: first, the negative impact of flood on infant nutritional status and their health; second, open space and lack of privacy for the mothers to breastfeed their babies comfortably at temporary shelters for flood victims; third, uncontrolled donations of infant formula, teats and feeding bottles that are often received from many sources to promote formula feeding; and, finally, misconceptions related to breastfeeding production and quality that may be affected by the disaster. The susceptibility of women and their infants in a natural disaster enhances the benefits of promoting the breastfeeding rights of women. Women have the right to be supported to enable them to breastfeed. This can be achieved through monitoring the distribution of formula feeding and providing water, electricity and medical care for breastfeeding mothers and their infants. A multifaceted rescue mission team involving various agencies comprising local government, including the health and nutrition departments, private or non-governmental organisations and individual volunteers has the potential to improve the condition of women and infants affected by floods and other potential natural disasters.[381]

'In 2015, more than one million migrants and refugees arrived in Europe. Commercial complementary foods, processed foods marketed for infants and young children 6–23 months of age, were distributed by various humanitarian actors along migrant routes and in European refugee camps'.[382] Unsolicited donations and distributions of commercial complementary food products were problematic and diverged from international policies on infant and young child feeding during humanitarian emergencies. Interim guidance regarding commercial complementary foods was published during the peak of the emergency but implemented differently by various humanitarian actors. Clearer and more technical specifications on commercial complementary foods are needed in order to objectively determine their suitability for operational contexts in Europe and emergency nutrition assistance in the future.

Little is known about the infant feeding experiences of refugees in Britain. But such experiences should be understood to enable successful health promotion for this population. One study aimed to gain an understanding of infant feeding practices among a group of British-based refugee mothers. Overall, the mothers were dissatisfied with their infant feeding outcomes. They often could not achieve their preference to exclusively breastfeed. Most resorted to using formula feed, perceiving that this was primarily due to a lack of support. Mothers who were HIV-positive followed the British guidelines of exclusively formula feeding for six months, but struggled with guilt at not being able to breastfeed. All mothers unable to exclusively breastfeed experienced a sense of loss. Lack of wider support services coupled with complex lifestyles appeared to create challenges in providing infant feeding support. The results highlight a need for an intensified response to enable these mothers to maintain their preferred infant feeding choices or, when

required, to support them in the adoption of a new method. Using experienced refugee mothers to guide newer mothers and integrating health and social care would be positive starting points.[383]

On the other hand, experiences including in OECD and high-income country settings have demonstrated that implementation of specific measures to protect, support and promote optimal breastfeeding can prevent disruption to optimal IYCF following emergencies or disasters.

The 2011 Christchurch, New Zealand, earthquake adversely affected large numbers of people and resulted in many mothers and infants evacuating the city. In the town of Timaru, an emergency day-stay breastfeeding service assisted evacuee women. The service was established after media messaging alerted mothers to the importance of breastfeeding and the location of breastfeeding assistance. The local hospital provided rooms for the breastfeeding support service, which delivered counselling to mothers experiencing breastfeeding challenges. The vulnerability of infants in emergencies demands that governments and aid organisations plan to support their wellbeing and access to safe food and liquid. Plans should be developed in accordance with the Emergency Nutrition Network's operational guidance on infant and young child feeding in emergencies and include breastfed and formula-fed infants. Many countries have existing health resources and personnel with the expertise to support infant feeding in emergencies. However, only comprehensive pre-emergency planning can ensure that infants are protected.[27]

Another study describes how recipients of portable sleeping spaces (PSSs) for babies received and used these devices, offered as emergency baby beds in earthquake-ravaged Christchurch in 2011. The PSS package responded to increased risk to babies from disrupted living and sleeping conditions in families. 'Door-to-door' distribution offered easy access to those in need. A subgroup of recipients gave feedback via a survey. Of 642 families who received PSSs between March and August, 139 were invited to complete a survey on usage and 100 (72%) responded. Risks identified were 'earthquake related' (82%), bed-sharing (41%), smoking in pregnancy (26%) and prematurity or low birthweight (11%). PSSs were used for same-bed co-sleeping by 87%. They were used even though most families (96%) also had a cot or bassinet. Features most appreciated were 'having baby close' (90%), 'peace of mind' (88%) and portability (74%). It was concluded that PSSs were acceptable to parents and were used as instructed. Enabling physical protection of babies when same-bed co-sleeping, they gave peace of mind to parents. PSSs could be considered in ordinary times for protecting babies from sudden infant death.[28]

During the Haiti earthquake, Ayoya and colleagues report[384], baby tents were introduced as part of a rapidly scaled up response; the tents provided a safe place for mothers to breastfeed and for non-breastfed infants to receive ready-to-use infant formula. Of infants younger than six months, 70% were reported to be exclusively breastfed and 10% of the 'mixed feeders' moved to exclusive breastfeeding while enrolled in the program. In 2010, 13.5% of registered infants could not be breastfed and received ready-to-use infant formula. The 2010 earthquake in Haiti displaced about 1.5 million people, many of them into camps for internally displaced persons. It was expected that disruption of breastfeeding practices would lead to increased infant morbidity, malnutrition and mortality. Haiti's health ministry and the United Nations Children's Fund, in collaboration with local and international NGOs, established baby tents in the areas affected by the earthquake. Such a large and coordinated baby tent response in an emergency context had never been mounted before anywhere in the world. Baby tents were set up in five cities but mainly in Port-au-Prince, where the majority of Haiti's 1555 camps for displaced persons had been established. Between February 2010 and June 2012, 193 baby tents were set up; 180,499 mother–infant pairs and 52,503 pregnant women were registered in the baby tent program. Thanks to rapid program scale-up, breastfeeding practices remained undisrupted. However, the authors noted, better evaluation methods and comprehensive guidance on the

…much more needs to be done to develop a standard code of practice to ensure children are safeguarded during emergencies and their needs responded to post-emergencies…

implementation and monitoring of baby tents are needed for future emergencies, along with a clear strategy for transitioning baby tent activities into facility and community programs.[384]

In 2013, Save the Children assessed how the needs of children are considered and reflected in the Australian emergency plans.[385] Recent disasters in Australia have consistently demonstrated that children need special protection in emergencies both physically and psychologically. The Australian Government must ensure that emergency management planning, activities and processes are designed to protect children and that this is integrated into routine emergency management planning across the country.

There are many positive activities and relationships that are being developed across Australia in planning for the unique needs of children in emergencies. This work should be fostered by all agencies and organisations to ensure that children are protected when emergencies and disasters occur. However, much more needs to be done to develop a standard code of practice to ensure children are safeguarded during emergencies and their needs responded to post-emergencies. Government, not-for-profits and communities need to take responsibility for ensuring the wellbeing of children is paramount during and after a disaster or emergency.

Findings:

- There is currently no standard practice in emergency management planning for the unique needs of children in Australia
- No local area planning was identified that focused on the most vulnerable children — those who are unaccompanied
- Children are most often included in plans in a generic statement that lists them with other vulnerable groups including the elderly, disabled and culturally diverse
- Of the plans that were available for analysis, there was no detailed planning that focused on the unique needs of children in emergencies and disasters
- There is not a standard code of conduct for emergency management staff regarding working with children
- There is not a consistent procedure across Australia to undertake Working with Children Checks for staff and volunteers who work with children in emergencies
- There are no clear links between local emergency management plans and the emergency plans of preschools, schools and childcare centres
- The needs of animals are considered in planning far more than the needs of children
- Fewer than half the local government websites in Australia make their emergency management plan available on their websites.

Key recommendations:[385]

1. Specific planning for the unique needs of children should be incorporated as a matter of urgency into all emergency management plans at all levels of government
2. Emergency management plans must clearly allocate responsibility for the needs of children to specific roles or agencies within the plan
3. The Commonwealth, state and territory, regional, district and local councils must consult with child protection experts in the development of emergency management plans. All emergency management committees should review their membership as a matter of priority to ensure that they contain members with child protection expertise
4. Emergency management plans should provide detailed plans for the following: unaccompanied children, family reunification, Working with Children Checks, child friendly spaces and evacuation centre planning

5. Emergency management planning should include the needs of children in plan development, plan content, plan communication and plan monitoring and implementation
6. Local emergency management plans should have clear links with school, kindergarten and childcare centre emergency plans
7. Emergency management planners should consider ways to engage with children to allow them to contribute to plan development and implementation
8. Emergency management staff and volunteers who work with children should sign a code of conduct for working safely with children
9. Emergency management exercises should include elements that test the plan in relation to the unique needs of children
10. All risk assessments contained in emergency management plans should be reviewed with a child lens to ensure that risks and hazards are assessed in relation to the unique vulnerabilities of children
11. The development of a national strategy for emergency management planning for children and young people should be considered by the Australia
12. All local area emergency management plans should be available for community members to access on local government websites.

ANBS-E Strategy 11

ANBS-E Strategy 11 (Question 1): Culturally sensitive and appropriate interactions/communication

The recently published WHO Guideline on protecting, promoting and supporting breastfeeding in maternal and newborn care services[71] provides evidence, based on several systematic reviews, of the effectiveness of BFHI Ten Step interventions alongside evidence of their acceptability to mothers and health workers. In relation to well mothers and babies, who are not in at-risk groups, these are considered more fully under ANBS-E Strategy 4 BFHI.

ANBS-E Strategy 11 (Question 2): Culturally sensitive and appropriate interactions/communication

High-risk groups identified in the literature include socioeconomically disadvantaged or low-income mothers, young mothers, African-American or indigenous mothers, and mothers or infants with medical or health conditions or family situations. This includes mothers in situations involving family law, child protection and maternal incarceration, as well as those at risk of premature cessation of breastfeeding from health or medical risks (e.g. preterm or small-for-gestational-age infants, infants experiencing drug or alcohol withdrawal, obese mothers).

Risk factors for premature cessation of optimal breastfeeding

AUSTRALIAN STUDY: The 2010 PANORG study found factors such as early return to employment, low socioeconomic status and education, and younger maternal age were associated with less optimal breastfeeding.[51] Mothers and babies at higher risk of premature weaning from exclusive breastfeeding also included those experiencing analgesia in labour, caesarean or preterm birth, primiparity and multiple births, low-birthweight infants, maternal smoking and postpartum depression.

Interventions or strategies addressing social risk factors

A 2010 RCT at two urban hospitals in the US led by Pugh[124] found that 24-week intervention including hospital visits by a breastfeeding support team, home visits, telephone support and 24-hour pager access resulted in higher breastfeeding rates at six weeks postpartum among urban low-income mothers. More women reported breastfeeding in the intervention at six weeks postpartum but the difference in rates at 12 weeks postpartum were not statistically significant.

A randomised trial at a postnatal ward in Scotland[125] tested whether daily proactive and reactive telephone calls (for <= 14 days) to women living in a disadvantaged area increased breastfeeding rates compared with reactive telephone calls (<= day 14). Women allocated to the intervention group were 50% more likely to be giving their baby some breastmilk and exclusively breastfeeding at six-to-eight weeks after birth. The incremental cost of providing proactive calls was £87 per additional woman breastfeeding and £91 per additional woman exclusively breastfeeding at six-to-eight weeks, demonstrating the feasibility and possible cost-effectiveness of making the intervention part of routine postnatal care, though costs were sensitive to service organisation.

A telephone peer counselling randomised trial in the US was reported by Reeder et al, which found non-exclusive breastfeeding among Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) mothers was increased among Spanish-speaking mothers but with little effect on English-speaking clients.[126]

Lay support for pregnant women with 'social risk' was tested in an RCT in Britain.[292] The study found an intervention involving Pregnancy Outreach Workers (POW) trained to provide individual support and case management for the women, including home visiting, resulted in no significant difference in any breastfeeding at six weeks.

A 2010 systematic review by Chapman et al found 22 studies evaluating 18 interventions targeting minorities (peer counselling, professional support, a breastfeeding team [peer + professional support], breastfeeding-specific clinic appointments, group prenatal education and enhanced breastfeeding programs. Peer counselling interventions (alone or in combination with a health professional), breastfeeding-specific clinic appointments, group prenatal education and hospital/WIC enhancements were all found to greatly improve breastfeeding initiation, duration or exclusivity. Postpartum professional support delivered by nurses was found to be the least effective intervention type.[89]

Johnson and colleagues[129] conducted a systematic review of key interventions and strategies influencing initiation and duration of breastfeeding in the US, with particular focus on low-income African-American mothers' maternal psychological vulnerabilities during the early postpartum period. The analysis was structured using a social ecological perspective as a guiding framework. The study found evidence that no single intervention sufficiently addressed the multiple breastfeeding barriers faced by mothers. Effective intervention strategies required a multilevel approach. A social-ecological perspective highlighted that individual knowledge, behaviour and attitudes are shaped by interactions between the individual woman, her friends and family, and her wider historical, social, political, economic, institutional and community contexts, and therefore effective breastfeeding interventions must reflect all these aspects. Current breastfeeding interventions are disjointed and inadequately meet all African-American women's social and psychological breastfeeding needs. The researchers concluded that poor outcomes indicated the need for an integrative approach to address the complexity of interrelated breastfeeding barriers that mothers experience across layers of the social-ecological system.

The 2016 Sutton study[81] noted the findings from the Cochrane review by Renfrew et al.[87] that support should be tailored to the setting and needs of the population group. They also found that reviews addressing interventions among adolescent mothers showed clearly *"that peer support and education interventions improve breastfeeding rates, especially when these are targeted at individuals"*.

The McFadden 2017 Cochrane review updating Renfrew[87] found no evidence that the interventions examined affected 'any breastfeeding' differently for subgroups.[86]

Evidence on interventions in indigenous populations

International studies

In the US, rates of any breastfeeding in American Indian/Alaskan Native populations at initiation are 68%, at six months 41% and at 12 months 22%. These were similar to those of non-Hispanic black populations and consistently about 16% lower than non-Hispanic white populations.[386] Rates of exclusive breastfeeding at three months (33%) and six months (18%) were also lower (18% and 8% lower respectively).

Studies among Native American women during the 1990s showed the effectiveness of a multifaceted culturally appropriate breastfeeding promotion program that operated at three levels: a social marketing campaign that used community public announcements via video, billboard and infant shirts; health system changes that included health provider education and policy development; and individual-level interventions: a video, prenatal brochure and community acceptance through allowing mothers and grandmothers to attend prenatal classes with pregnant women and incorporating an existing 'tribal Foster Grandparent program' where a bilingual foster grandmother visited women in the maternity ward and provided individual counselling and lactation support.[136, 137] The study of 870 mothers participating in the Navajo Breastfeeding Intervention Program reported that the use of formula in hospital almost halved from 84.6% to 45.4% ($P < 0.00001$), the introduction of formula was delayed on average from 11.7 to 48.5 days ($P < 0.001$) and average breastfeeding duration increased from 100 to 132 days ($P < .001$). Another study found that trained peer Native American breastfeeding counsellors increased breastfeeding initiation and duration up to three months in 41 low-income Native American women who used the WIC program in urban Utah.[127] The authors recommended scaling up this intervention to 80 WIC services for Native American women. However, more recent studies suggest young indigenous mothers do not always accept traditional advice on breastfeeding and may need different approaches.

In a small, incomplete study to increase breastfeeding duration by Native American mothers living on reservations, Native American health workers were taught to use motivational interviewing techniques and test-weigh babies during home visits as part of the Northern Plains Healthy Start program.[362] Five of the eight mothers in the motivational study group breastfed for six months, while none of the four mothers in the comparison group fed longer than 1.5 months, but this could not be tested statistically.

In Canada, a system-wide intervention, the Prenatal Nutrition Program, provided to 2000 communities *"food supplements, dietary assessments, individual and group nutrition education sessions, and breastfeeding preparation"*. In a study of 48,000 women, of whom 23% were indigenous, participation in the program increased the likelihood of breastfeeding initiation for indigenous women by 27% (odds ratio 1.27; 95% CI 1.11 to 1.46; $P < 0.05$) and tripled the duration of breastfeeding (OR 2.97, 95% CI 1.01 to 8.76, $P < 0.05$).[387]

In a 2013 study in Dunedin, New Zealand, provision of a lactation consultant and educational resources at four months postpartum delayed the introduction of complementary foods in well-educated mothers of European ethnicity but not Maori mothers, who comprised 7% of the study population.[388]

A review of obesity prevention in disadvantaged children reported a low-quality study of breastfeeding to prevent tooth decay in American Indians.[389] The program provided breastfeeding support as 7–21 home visits over the first two years of the child's life and social marketing media campaigns and hospitals becoming more baby friendly. Compared with national data, breastfeeding at initiation and at six months were 14% and 15% higher in two of the three target tribes, respectively, but this was not tested statistically.

A 2014 US study that surveyed 438 mothers from five Northwest American Indian tribes found most pregnant women understood basic breastfeeding facts but had much less understanding about the introduction of solid foods and the benefits of breastfeeding in reducing broader health risks, for example diabetes.[390] Women were ambivalent about bottle feeding. The authors recommended increasing women's

knowledge of the benefits of breastfeeding and the introduction solid foods and strengthening social support.

A qualitative study of breastfeeding by Canadian First Nations mothers reported that *"health promotion messages and, more so, peer support workers and home visitors had a great impact on women's education and, ultimately, their choice to initiate and sustain breastfeeding"* and *"women emphasized a need for the messages to be more realistic than idyllic"*.[391] Participants in this study differentiated between 'learning' and 'trying' to breastfeed, and that support workers, home visitors, doulas and lactation consultants taught personal agency to women to *"actively work through breastfeeding, feeling their ways through to physical comfort and psychological or emotional connection"*. In some communities, monetary incentives to breastfeed exclusively were provided by the local indigenous authority, for example, US$40 per month for six months or more, but its effects were controversial. This financial support was appreciated by breastfeeding mothers but left others, who had not been able to breastfeed for reasons beyond their control, feeling unsupported and struggling to afford or reliably source infant formula. The authors recommended that the negative effects of medical evacuation for birth experienced by First Nations women from remote communities could be modified by providing sensitive, specialised breastfeeding promotion and support by peers and nurses while mothers were in temporary accommodation.

A Canadian qualitative study of attitudes to breastfeeding in First Nations Cree communities in Ontario found barriers to the intergenerational transmission of traditional breastfeeding knowledge.[392] Great-grandmothers and grandmothers valued and retained this knowledge and reflected that in the past breastfeeding was expected by the community and accepted in public but that social attitudes had changed and were not as supportive. These older women felt young mothers did not value traditional knowledge on breastfeeding or parenting, but would listen to white women teaching them. Providing places for shy young mothers to breastfeed outside the home and receiving support to breastfeed from partners and in-laws were considered important to successful breastfeeding and parenting. The older women also commented on the harm caused by referral of mothers to give birth in facilities away from their communities and primary support systems at a critical period for learning breastfeeding.

Two descriptions of system-level breastfeeding strategies for American Indians did not measure breastfeeding outcomes. A 2010 report[393] described multiple and system-level interventions by the Indian Health Service (IHS) within the US Department of Health and Human Services to improve rates of breastfeeding initiation and duration among two million Native Americans in 564 tribes. These initiatives included: making all IHS hospitals Baby Friendly, legislation by First Nations employers to accommodate breastfeeding employees, the formation of First Nations breastfeeding coalitions and inclusion of breastfeeding-friendly practices in IHS maternity, weight management and workplace programs, and example communities conducting needs assessments and collecting stories of successful breastfeeding. Barriers to breastfeeding initiation and duration were infant formula use in the first days after birth and a lack of timely, proactive quality breastfeeding information and support. This was being addressed with a locally developed website and prenatal programs.

In 2017 the IHS reported on progress with these initiatives.[394] Baby Friendly Hospital and health facility designation received high-level support from former First Lady Michelle Obama's Let's Move! initiative and improved collection of breastfeeding data using electronic health records. A problem remained for mothers giving birth in remote areas being diverted to non-IHS hospitals that were not Baby Friendly and private-sector funding enabled Baby Friendly designation of nine tribal-operated birthing hospitals in the US and Alaska. Public funding was provided for health worker training to deliver prenatal care targeted at groups, families and partners or home visits. Institutional support was received from a university for online lactation education for staff in BFHI and other health facilities and International Board Certified Lactation Consultant (IBCLC) qualification of health professionals serving Native American communities. Breastfeeding training

and education was funded for IHS staff and included in the maternal and child health curriculum of IHS public health nurses. Visits to IHS and tribal health facilities by paediatric consultants under the Committee on Native American Child Health included breastfeeding support. Local First Nations health boards promoted breastfeeding with maternal and child health and some local breastfeeding task forces developed booklets and electronic resources to provide culturally appropriate breastfeeding information.

A systematic review of nutrition interventions for pregnant indigenous women in OECD countries identified 27 articles on 20 programs.[128] Eleven studies were from Australia with the remainder from Canada (five studies) and the US (10 studies). Consistent with Australian data, background rates of breastfeeding initiation in indigenous populations in these countries were 10%–25% lower than in non-indigenous populations, but this trend was reversed in some rural areas. Ashman et al. (2017)[128] found all of the 11 programs that measured breastfeeding outcomes reported positive results, although many studies were of low quality. Breastfeeding initiation was increased significantly by 10%–14% in two out of eight studies. Significant increases in breastfeeding duration were shown in six out of 10 studies. The authors[128] concluded breastfeeding outcomes were increased statistically in six programs that used individual counselling or education. Only one of the 11 studies that reported breastfeeding outcomes was from Australia. A low-quality study by Murphy and Best in 2012[395] looked at breastfeeding outcomes in seven sites of the NSW Aboriginal Maternal and Infant Health Service (AMIHS) that provided maternity care from conception to eight weeks postpartum led by midwives and Aboriginal Health Workers, including home visits, transport and staff education. The study found from 2003 to 2004 breastfeeding initiation increased from 67%–70% and any breastfeeding at six weeks from 59%–62%, although the statistical significance was unclear. In the review by Ashman et al. (2017)[128] two US studies[136, 137] conducted in the 1990s with statistically significant breastfeeding outcomes used multilevel and multimodal approaches. These studies are described below.

Aboriginal and Torres Strait Islander (Indigenous) Australians

Indigenous children represent 7.5% of infants 0–3 years old in Australia, with the majority living in NSW and Queensland in major cities and non-remote regional locations.[396] National surveys show Indigenous infants are 20% more likely than non-Indigenous infants never to have been breastfed, with about one-third of Indigenous children in that category.[134] The rate of exclusive breastfeeding also decreases more rapidly to reach half that for non-Indigenous infants by four months (19% vs. 40%)[5] because of high rates of exclusive formula feeding in hospital and the early weeks at home and early introduction of solid foods by three months.[5, 130-133] Culturally sensitive programs for Indigenous mothers and their families need to take account of diversity across Indigenous communities in different locations. There is some evidence that extreme remoteness is protective of breastfeeding initiation, but less so of exclusivity and duration.

Breastfeeding interventions for Aboriginal and Torres Strait Islander (Indigenous) Australians highlight the need for culturally sensitive interaction and communication that is integrated with programs to address a range of health and social issues. Consultation on the ANBS has cited the importance of drawing on the *Cultural Respect Framework 2016–2026,* which identified the need for culturally appropriate services and resources to be made available to ATSI women and their families. The consultations emphasised the need to work with relevant Indigenous health services (Aboriginal Community Controlled Health Services), address risk factors of specific importance for ATSI populations (such as high smoking rates), and incorporate consideration of the national antenatal care guidelines.

The effectiveness of breastfeeding interventions for indigenous populations in Australia and other OECD countries (New Zealand, US and Canada) is under-researched. Breastfeeding promotion is often included in programs that aim to address the large inequities in indigenous health but is rarely evaluated. However, there is evidence of the effectiveness of culturally appropriate Indigenous health programs delivered within holistic primary healthcare services controlled by indigenous organisations.

The limited evidence from reviews of health interventions for indigenous people that included breastfeeding emphasised the effectiveness of individual counselling or education delivered by indigenous workers that covered both the prenatal and postnatal periods and was long-term and intensive. Effective strategies included combinations of group and individual sessions and home visits. Professional support was effective in increasing breastfeeding duration and lay support to promote exclusive breastfeeding.

AUSTRALIAN STUDY: In a literature review for the development of Birthing on Country programs for the local delivery of maternity services for Indigenous women, one measure of effectiveness was duration of breastfeeding.[138] This review referred to 'increased' breastfeeding rates in an alternative birthing program for Indigenous women in Kempsey, NSW, in 1993–97 (NSW Health, Cupitt et al. 1998) and high rates of exclusive breastfeeding at birth (70%) in a study of a midwifery services and birth centres provided for 25 years for Inuit women in Nunavik, Canada, where cultural practices for adoption approach 30%.[139]

AUSTRALIAN STUDY: In parts of the Northern Territory, Western Australia and Queensland the need for women in remote areas to travel long distances to access maternity services can disrupt traditional breastfeeding knowledge and support.[397, 398] In other non-remote settings, qualitative studies show that in some communities breastfeeding knowledge has been lost and grandmothers, partners and communities may not support breastfeeding and that extended bottle feeding (up to four years) is accepted practice. In addition, there is qualitative evidence that Indigenous mothers, in particular young mothers, and their communities are vulnerable to marketing strategies for infant formula and baby foods, in particular advertising of toddler milks, 'premiumisation' of infant formula and labels on baby foods that recommend them as suitable 'from four months'. There have been no studies of the vulnerability of Indigenous populations to marketing of commercial infant formula and baby food, despite concerns about the contribution of these products to food insecurity in Indigenous families.

AUSTRALIAN STUDY: A 2017 narrative overview of reviews of nutrition programs for Indigenous Australians by Browne (2017)[399] found two reviews of medium quality that included breastfeeding promotion. These were by Laws and Jongen (described below), both conducted in 2014.

AUSTRALIAN STUDY: A systematic review by Jongen[140] of programs for Indigenous maternal and child health in Australian primary healthcare settings found breastfeeding promotion and education of mothers or health workers and/or postnatal breastfeeding support was described in six interventions but breastfeeding outcomes were reported only in two studies of low quality.[400,401]

The study by Laws et al (2014), systematically reviewed studies of interventions targeting obesity in disadvantaged or indigenous populations.[402] Only two studies of indigenous populations were found. It noted that predictors of child obesity, including lower breastfeeding rates, poorer diets and sedentary behaviours are more prevalent amongst Indigenous children. Only studies commencing antenatally or at birth had a positive impact on breastfeeding outcomes. The study found that anticipatory guidance approaches in infancy (generally from birth or antenatally) appear to be effective in influencing early obesity related behaviours such as breastfeeding or the timing of introduction of solids. It also concluded that such interventions needed to commence in the antenatal period or at birth to positively impact on breastfeeding outcomes amongst socioeconomically disadvantaged mothers.

AUSTRALIAN STUDY: A 2015 review of Indigenous health programs for the Australian Government Department of Health to inform the Better Start to Life approach to Indigenous maternal and child health found breastfeeding promotion was prominent but rarely evaluated.[403] The report listed breastfeeding programs for Indigenous women from the Australian Indigenous HealthInfoNet.[404]

AUSTRALIAN STUDY: A 2016 review of reviews of the effectiveness of implementation in Indigenous Australian health care found six reviews of 107 services and programs but none that reported infant feeding outcomes.[141]

AUSTRALIAN STUDY: A 2016 updated Cochrane review of midwife-led continuity of care for childbearing women included only two studies with breastfeeding outcomes (from Australia and Ireland). In contrast to earlier reviews, the authors concluded that there was no significant effect of this model of care compared with other models of care on breastfeeding initiation.[142] However, these results cannot be generalised to Indigenous populations (the Australian study was conducted in western Sydney and included only one Indigenous woman), or regional and remote locations.

AUSTRALIAN STUDY: Bertilone et al. (2017)[143] described nine domains of organisational cultural competence in an Indigenous maternity service that could be adapted to other cultural groups and providers. These domains were a welcoming environment, the cultural competence of new and existing staff, effective communication with Indigenous people (including the use of yarning and grandmothers), high-quality service delivery through collaboration and continuity of care, building relationships through community and institutional partnerships, improving the cultural competence of partner organisations, culturally responsive care (including providing transport, local facilities and home visits), culturally inclusive policies and practices, and monitoring these strategies.

A study by Josif et al. (2014)[405] found that in addition to facilitating access to culturally competent care for Indigenous women in all locations, in some very remote Indigenous communities, where rates of breastfeeding initiation and duration are high, traditional Indigenous breastfeeding culture and practices need to be protected from health policies that separate mothers from their communities at birth.

AUSTRALIAN STUDY: A 2000 study by Smith and others noted that the Strong Women, Strong Babies, Strong Culture program was developed in the Northern Territory to address low birthweight and growth of Indigenous infants and young children and promote exclusive breastfeeding.[406] When this program was implemented in the north of Western Australia in the late 1990s, high rates of breastfeeding initiation and duration were observed. However, the effects of the program itself on breastfeeding initiation, exclusivity and duration have not been evaluated.

AUSTRALIAN STUDY: Two studies led by Kildea in 2012 and 2016 that aimed to improve culturally competent maternity care found breastfeeding interventions likewise need to also be multifaceted and include antenatal, intra-partum and postnatal support.[138, 407]

Rates of exclusive breastfeeding at discharge did not change after the introduction of a Midwifery Group Practice in two remote Indigenous communities in the Top End of the Northern Territory that aimed to improve access of Indigenous women to continuity of maternity care, but nonetheless required routine travel to Darwin at 38 weeks' gestation to give birth. Similarly, in a metropolitan setting, use of a culturally sensitive antenatal service (the Murri Clinic) alone did not change breastfeeding initiation and in-hospital formula use for Indigenous women who received standard care during birth in a tertiary hospital.[138]

Young women

An RCT reported by Meglio et al. (2010) found peer support based on WIC peer support programs improved exclusive breastfeeding among adolescent mothers in a US city, but had no effect on 'any' breastfeeding duration.[408]

A systematic review of interventions from high-income countries targeting breastfeeding among adolescent mothers found six studies of interventions including school-based programs, home visits and telephone support that were implemented by a combination of peer counsellors, nurse clinicians, doulas and lactation consultants.[409] Only one intervention, a combination of education and counselling provided by a lactation

consultant/peer counsellor team, significantly improved both breastfeeding initiation and duration. Other results were mixed.

A 2017 study by Scott et al. reported a time-series analysis of breastfeeding support for mothers aged under 25, finding that breastfeeding initiation and prevalence at three weeks in a British city improved after introduction of a breastfeeding peer support service for young mothers.[410]

Trauma

There is some evidence that experience of trauma such as past or recent emotional, sexual or physical abuse reduces breastfeeding initiation, but the evidence is inconsistent. Effective strategies identified in reviews and studies in Norway, Brazil, India, Australia and Hong Kong include strategies emphasising sensitive and adequately skilled nurse/midwife care, and intensified efforts to ensure that girls and women obtain education to increase their empowerment and improve gender equality.

A Hong Kong study explored two understudied correlates that may influence breastfeeding initiation: intimate partner violence (IPV) during pregnancy and early postnatal depressive symptoms.[411] A cross-sectional comparative study design investigated the correlates of feeding modes of 1200 Chinese mother and infant pairs in a university-affiliated regional hospital. The prevalence rates of breastfeeding and mixed feeding were 42.25% and 26.25%, respectively. Women who had no experience of intimate partner violence during pregnancy were significantly more likely to initiate breastfeeding (adjusted odds ratio = 1.84; 95% confidence interval, 1.16–2.91) after adjustment for demographic, socioeconomic and obstetric variables. Early postnatal depressive symptoms were not significantly associated with feeding modes in a multinomial logistic regression model. Midwives are in a key position to identify and intervene to encourage more successful breastfeeding practice.

A 2009 review of breastfeeding mothers and violence offered strategies for nurses encouraging new mothers to breastfeed.[412] Violence against women and girls is a widespread problem with negative ramifications for both physical and mental health. Many women in abusive relationships find the violence escalates when they are pregnant. For the survivor of childhood violence, memories of the abuse may come to the forefront during the childbearing period due to the intense physical and emotional nature of pregnancy and birth. Nurses will often be the care providers, encouraging new mothers to breastfeed, and may face unique challenges with patients who are survivors of abuse. This article addresses issues surrounding violence and breastfeeding, and offers some strategies nurses can use to bolster the affected new mother's ability to take care of herself and her baby.

A 2010 commentary asked whether intimate partner violence affected the initiation of breastfeeding[413] stating that more than 20% of women experience IPV during their lifetime. IPV-positive mothers are statistically over-represented among mothers who choose not to initiate or sustain breastfeeding. There is a need to include the mother's voice at the table: women who have experienced IPV and are willing to share their complex decision-making regarding breastfeeding play an important role in increasing understanding of how best to support IPV-positive mothers during the perinatal period.

A 2011 study in Brazil investigated the role of severe physical violence during pregnancy (SPVP) between intimate partners in early cessation of exclusive breastfeeding (EBF) through a health services survey at five large public primary healthcare facilities in Rio de Janeiro.[414] The sample comprised 811 randomly selected mothers of children under five months of age who were waiting for a consultation. The analysis found SPVP is an independent risk factor for cessation of EBF since, after controlling for socioeconomic, demographic, reproductive and lifestyle variables, women exposed to violence presented an incidence density that was 31% higher than those who were not exposed (hazard ratio = 1.30, 95 % CI 1.01, 1.69). The authors concluded SPVP was an important risk factor for EBF cessation, indicating the need for adequate training of

healthcare personnel dealing with lactating women in order to gain a broader view of breastfeeding beyond the biological aspects of lactation, including the maternal psychological dimension.

In 2013, a study investigated factors influencing timing of breastfeeding initiation within one hour and 24 hours among women in India, focusing on healthcare-use issues and partner behaviour.[415] Data from the Ministry of Health and Family Welfare of the Government of India's National Family Health Survey (NFHS) from 2005–2006 (NFHS-3) were used in the study. Breastfeeding for the latest child was considered in the study, which had 35,795 female respondents. Statistical analysis used a Chi square test and adjusted logistic regression analysis. Among the 35,795 women, 31.1% initiated breastfeeding within one hour and 68.6% initiated breastfeeding within the first week. Educational level, economic status and a woman's caste or tribe, place of delivery, prenatal visits to healthcare facilities and assistance during delivery as well as her partner's controlling and violent behaviour were important factors influencing the time of initiation of breastfeeding. The authors concluded that policy makers needed to ensure that all health professionals support and promote early breastfeeding initiation. It is also important to promote deliveries in hospitals and other healthcare facilities as they may increase early initiation. The authors also concluded that it was fundamental to intensify efforts for girls and women to obtain an education to increase women's empowerment and improved gender equality.

AUSTRALIAN STUDY: A study in 2014 describes an analysis of data from a pragmatic cluster randomised controlled trial, 'Improving maternal and child health nurse care for vulnerable mothers (MOVE)', conducted in the north-western suburbs of Melbourne between April 2010 and April 2011 and involving 80 maternal and child health centres, 160 nurses and 2621 women who completed a survey.[416] Intimate partner violence was measured using the Composite Abuse Scale. Ninety-six per cent (n = 2111) of participating women initiated breastfeeding, with 80% (n = 1776) and 74% (n = 1537) indicating 'any' breastfeeding at three and six months respectively. Respondents tended to be older and well-educated compared with the general population, with a household income > $70,000 per annum. The characteristics of women from the IPV and non-IPV groups were similar and together were comparable to all women who gave birth in north-west Melbourne. The reported prevalence of IPV in this survey was 6.3% (n = 138), which may be an underestimate. Breastfeeding rates did not significantly differ between IPV and non-IPV groups. The authors concluded from this study that women who experience IPV are just as likely to breastfeed as the broader population of women. They noted that while their analysis provided a snapshot of breastfeeding rates for this group of women, it did not capture women's experience of IPV as it relates to feeding a baby. In order to better identify infant feeding in the context of IPV, qualitative research was also necessary to investigate in a way that fully engages victims/survivors, giving them the opportunity to give voice to their experiences.

A study in 2015 reported on a cross-sectional study of intimate partner violence (IPV) and infant feeding practices in India.[417] The study involved thousands of mothers and infants who were part of the 2005–2006 National Family Health Survey and used logistic regression to assess maternal reported lifetime exposure to IPV. The results reportedly revealed that mothers who were abused were more likely to stop breastfeeding exclusively than those who were not.

A 2015 Norwegian study, using data from a large cohort study in the period 1999–2006, examined whether exposure to past and recent emotional, sexual or physical abuse was associated with early breastfeeding cessation, and assessed whether a potential association differed for known and unknown perpetrators.[418] A total of 53,934 mothers participated in the Norwegian Mother and Child Cohort Study. The analysis included mothers from this group with singleton pregnancy who had responded to three questionnaires (at weeks 18 and 30 of pregnancy and six months postpartum) and had answered a minimum of one of the abuse questions in week 30. The main outcome measure was cessation of any (all) breastfeeding before four months, and the exposure was abuse, including subcategories of abuse. It was found that nearly all women initiated breastfeeding, but 12.1% ceased any breastfeeding before four months and 38.9% ceased full

breastfeeding before four months but continued partial breastfeeding. Overall, 19% of the women reported any adult abuse and 18% reported any child abuse. The highest risk of any breastfeeding cessation before four months was seen in women exposed to three types of adult abuse (emotional, sexual and physical), with adjusted OR being 1.47 (95% CI 1.23–1.76) compared with no abuse. Recent abuse and exposure from a known perpetrator resulted in nearly 40% and 30% increased risk, respectively. The OR of any breastfeeding versus breastfeeding cessation for women exposed to any child abuse was 1.41 (95% CI 1.32–1.50) compared with no abuse in childhood. The authors concluded that past and recent abuse of women is strongly associated with early cessation of breastfeeding. Abused mothers comprise a key group to target for extra support and breastfeeding assistance.

Health or medical risk factors for breastfeeding — mothers

A number of expert protocols of relevance to breastfeeding management in clinical settings were identified by the review, published online by the Academy of Breastfeeding Medicine. These included numerous clinical intervention protocols regarding medical situations where breastfeeding can be adversely affected. They include: *Breastfeeding and substance use or substance use disorder; hospital discharge of the breastfeeding term newborn and mother; use of antidepressants in breastfeeding mothers; breastfeeding promotion in the prenatal setting;* and *guidelines for blood glucose monitoring and treatment of hypoglycaemia in term and late-preterm neonates*. Newly issued protocols in late 2017 cover: *Analgesia and anaesthesia for the breastfeeding mother; human milk storage information for home use for full-term infants; guidelines for management of jaundice in the breastfeeding infant 35 weeks or more of gestation; breastfeeding an infant or young child with insulin-dependent diabetes;* and *supplementary feedings in the healthy term breastfed neonate*.

Obstetric complications

Interventions for women who have a caesarean birth were evaluated by Beake in a recent systematic review.[266] Beake et al. found seven studies on interventions relevant to women who had had a caesarean birth. These included immediate or early skin-to-skin contact, parent education, the provision of sidecar bassinets when rooming-in, and use of breast pumps. Only one study, an intervention that included parent education and targeted breastfeeding support, increased initiation and continuation of breastfeeding. A systematic review of breastfeeding after caesarean birth[419] found after considering 53 studies that rates of early breastfeeding (any initiation or at hospital discharge) were lower after caesarean birth compared with after vaginal birth and lower after pre-labour but not after in-labour caesarean birth. In mothers who initiated breastfeeding, caesarean birth had no significant effect on the likelihood of any breastfeeding at six months.

A recent systematic review in 2014[420] evaluated evidence on the facilitation of immediate (within minutes) or early (within one hour) skin-to-skin contact following caesarean section for healthy mothers and their healthy term newborns, and identified facilitators, barriers and associated maternal and newborn outcomes. A range of electronic databases were searched for papers reporting research findings published in English between January 2003 and October 2013. Seven papers met the criteria. The review provided some evidence that with appropriate collaboration skin-to-skin contact can be implemented during caesarean surgery. Further evidence was provided, although limited, that immediate or early skin-to-skin contact after a caesarean section may increase breastfeeding initiation, decrease time to the first breastfeed, reduce formula supplementation in hospital, increase bonding and maternal satisfaction, maintain the temperature of newborns and reduce newborn stress.

A 2014 study in Italy evaluated the correlation between epidural analgesia during labour, start of breastfeeding and type of maternal–neonatal care, in a cohort study involving 2480 healthy infants.[421] Two different assistance models were considered: partial and full rooming-in. A total of 2480 healthy infants

were enrolled, 1519 in the partial rooming-in group and 1321 in the full rooming-in group; 1223 were born to women subjected to epidural analgesia in labour. In the case of partial rooming-in the rate of exclusive or prevailing breastfeeding was significantly more frequent in newborns born to mothers who didn't receive analgesia. With full rooming-in the rates of exclusive or prevailing breastfeeding were very similar, with no correlation to use or not of epidural analgesia. The authors concluded that successful establishment of lactation and breastfeeding can be increased by the type of care offered to the mother–infant pair, despite any possible adverse effects of using epidural analgesia in labour.

AUSTRALIAN STUDY: A 2014 study used multivariate analysis of population data to investigate the impact of early contact on breastfeeding and other maternal health outcomes for women who gave birth in Queensland.[422] The study found that for women who had a vaginal birth, early skin-to-skin and longer duration of initial contact were associated with higher rates of breastfeeding initiation and breastfeeding at discharge, but not breastfeeding at 13 weeks. With longer durations of first contact, a dose–response effect was found for breastfeeding. A number of demographic and clinical interventions contributed to timing, duration and type of first contact, including type of birthing facility (public/private), area of residence and assisted birth.

Obese mothers

Wilkinson and colleagues examined the effects of a low-intensity, postpartum weight management program including breastfeeding as one of the trial outcomes. The study found that women in the intervention group breastfed for half a month longer than those in the control group.[423]

Lactation difficulties

Breast massage is a common practice to manage early breastfeeding problems such as mastitis or low milk supply in some countries such as China and among some ethnic groups in Australia. Mastitis or nipple pain is a common reason for reducing or cessation of breastfeeding.

Witt conducted a nested case control study in the US on effects of therapeutic breast massage on breastfeeding women with engorgement, plugged ducts and mastitis, a common cause of premature weaning from breastfeeding.[424] Following the intervention, there were significant improvements in breast and nipple pain, although no evidence on breastfeeding outcomes.

Health or medical risk factor — infants and young children

Preterm infants

The review by Renfrew[18] noted earlier conducted as part of a Health Technology Assessment (HTA) showed additional lactation support to be effective and cost-effective in supporting breastfeeding among mothers of babies in NICUs in Britain.

A trial of probiotics in formula-fed and human milk-fed NICU infants was unable to compare the two feeding groups due to inadequate study size but human milk-fed infants also having antibiotics achieved full enteral feeding sooner.[425]

Human milk intake as a therapeutic intervention was examined in some included studies, including with regard to outcomes affecting transitions to maternal breastfeeding, and was found to improve breastfeeding outcomes in NICU infants. Among preterm infants, pacifier use was found to support transition to full breastfeeding in a trial reported in 2017.[426]

A recent non-controlled before–after design study examined the effectiveness of lactation consultant support on breastfeeding in extremely low-birthweight (ELBW) neonates.[427] After controlling for covariates, the odds of infants receiving any human milk compared with exclusive formula feeding increased over time

associated with increased lactation support provision. The provision of full-time dedicated NICU lactation support was associated with improved breastfeeding outcome measures for high-risk preterm infants.

Twins

A systematic review in 2017 examined the effectiveness of breastfeeding support for women with twins or higher-order multiples.[428] The study identified 10 trials (23 reports) of education and support for breastfeeding that included women with twins or higher-order multiples. The quality of evidence was mixed and the risk of bias was mostly high or unclear. None of the interventions were specifically designed for women with more than one infant, and the outcomes for multiples were not reported separately for each infant. The two trials with data for women with multiple births compared home nurse visits versus usual care (15 women), and telephone peer counselling versus usual care (27 women). Data on breastfeeding outcomes was mostly not reported. The authors found no evidence from RCTs about the effectiveness of breastfeeding education and support for women with twins or higher-order multiples, or the most effective way to provide education and support. There was no evidence about the best way to deliver the intervention, the timing of care, or the best person to deliver the care.

An RTC in 2015[429] compared the effects for twin pregnancies of planned caesarean section versus planned vaginal birth on maternal outcomes at three months, including for breastfeeding. The trial found no significant differences in breastfeeding at three months.

Medications during pregnancy or lactation

Some studies identified lack of adequate information on the effects of medicines as a concern because of potentially adverse but unnecessary effects on breastfeeding where alternative treatment strategies are available and feasible. Potential interventions in this area include regulatory requirements for evidence-based information provision for pharmaceuticals but the effect of such regulations on breastfeeding outcomes has not been systematically studied.

In 2014, the US Food and Drug Administration (FDA) announced it was amending its regulations governing the content and format of the 'Pregnancy', 'Labor and Delivery' and 'Nursing Mothers' subsections of the Use in Specific Populations section of the labelling for human prescription drug and biological products.[430] For human prescription drug and biological products subject to the agency's 2006 Physician Labelling Rule, the final rule requires that the labelling include a summary of the risks of using a drug during pregnancy and lactation, a discussion of the data supporting that summary, and relevant information to help healthcare providers make prescribing decisions and counsel women about the use of drugs during pregnancy and lactation. The final rule creates a consistent format for providing information about the risks and benefits of prescription drug and/or biological product use during pregnancy and lactation and by females and males of reproductive potential. These revisions will facilitate prescriber counselling for these populations.

Prenatal maternal alcohol or drug abuse-affected newborns

A 2014 study systematically reviewed available data on the prevalence of alcohol intake during lactation, the influence of alcohol on breastfeeding, the pharmacokinetics of alcohol in lactating women and nursing infants and the effects of alcohol intake on nursing infants, and concluded special recommendations aimed at lactating women were not warranted.[431] The review identified 41 publications and found that about half of all lactating women in Western countries consume alcohol while breastfeeding and alcohol intake inhibits the milk ejection reflex, causing a temporary decrease in milk yield. Long-term consequences for the children of alcohol-abusing mothers are yet unknown, but occasional drinking while breastfeeding has not been convincingly shown to adversely affect nursing infants. The authors concluded that lactating women should simply follow standard recommendations on alcohol consumption.

Neonatal abstinence syndrome (NAS) is a result of the sudden discontinuation of foetal exposure to substances that were used or abused by the mother during pregnancy. Affected infants have unique challenges related to breastfeeding but also have significant benefits from it, including improved NAS symptoms with a decreased need for pharmacotherapy. Poor understanding of substance use disorder and treatment, lack of evidence-based recommendations, and vague guidelines from national academies create controversy about breastfeeding eligibility for these women. A 2016 study reported on revised evidence-based institutional breastfeeding guidelines for mothers with opioid use disorder.[57]

The aims of the new guidelines were to:

- Safely promote breastfeeding in all mothers with opioid use disorder who are in recovery
- Improve NAS outcomes through use of breastfeeding as a key non-pharmacologic treatment modality
- Improve staff communication and consistency on the subject of breastfeeding in this patient population.

Interventions in family court, child protection systems and prison settings

There is increasing attention to the human rights aspects of children in the areas of law and justice, and child protection.[29] Children (or mothers) may be deprived of their rights (such as to breastfeed) simply because of the system or setting that their caregiver, or they, are experiencing, rather than because this is in their best interests. This may affect infants and young children in institutional care, as well as those placed in foster care, or separated from their birth mother during adoption or due to surrogacy arrangements.

Children may be deprived of optimal breastfeeding because their parents are in prison, the children have been taken into care by child protection or welfare authorities, or the parents are involved in court proceedings during separation or divorce. However, the Convention on the Rights of the Child (CRC) still has applicability despite the child's or their parents' circumstances. Recent studies identify that fulfilment of the child's rights under the CRC, such as to survival and development, to health and adequate food, should not be comprised by circumstances such as maternal incarceration. For example, a position statement by an international rights-based breastfeeding advocacy group[432] states that the child of an imprisoned mother is innocent and not a prisoner. Within a human rights framework, the circumstance of children of prisoners justifies specific efforts by governments to ensure conditions for adequate antenatal care, delivery and care of the children of incarcerated mothers, particularly during the critical window of opportunity to shape the health and wellbeing of the child. Enabling breastfeeding through the critical period infancy and young childhood is important for immediate and future health and other outcomes for both mother and child. Consistent with other literature on children of imprisoned mothers, IBFAN principles include that imprisonment should be a last resort for pregnant women or mothers with young children.

The Evidence Check found a small number of studies that identified high-level policy interventions, strategies or guidance aimed at protecting the child's rights and opportunity for breastfeeding, consistent with CRC obligations of signatory governments, and where it is in the best interests of the child. Interventions or strategies include reforms to policies, institutional procedures or practices as well as specific parenting support programs with promise for protecting, supporting and promoting breastfeeding. The strategies and interventions in this area are considered below.

Custody proceedings and family law

The Australian Parliamentary Best Start inquiry recommended consideration of family law issues affecting breastfeeding. No systematic reviews or RCTs were found regarding the effect of family law disputes on children's opportunity to breastfeed.

AUSTRALIAN STUDY: The Evidence Check identified one peer-reviewed publication regarding family law effects on breastfeeding. An Australian study of the application of the Family Law Amendment (Shared

Parental Responsibility) Act 2006[433] in 2010 provided case evidence that the Act, and the decisions made, can work at a macro-level to produce social and health disparities for children exposed to family law disputes, including reduced access to breastfeeding. The Shared Parental Responsibility Act 2006 puts in place a legal presumption of shared parental responsibility for children after separation and emphasises 'equal time' parenting arrangements. Equal time places expectations on both parents to participate — equally — in childcare regardless of the child's age. Breastfeeding is optimal for infants and requires the infant and mother to spend significant time together. The expectation of equal time or substantial and significant parenting arrangements becomes problematic when considering breastfed children. The article discusses decisions regarding shared parenting of breastfed children made as a consequence of the 2006 amendments that do not always appear to be in the best interests of children's health and wellbeing.

Remand and imprisonment policies

Women are an increasing minority of prisoners worldwide, and most are of childbearing age. The Evidence Check identified several peer-reviewed articles and government reviews indicating multiple barriers for pregnant or breastfeeding women in prisons, either on remand or convicted, as well as beneficial strategies for supporting breastfeeding in prison. Some studies identified by this Evidence Check examined the effects on breastfeeding of imprisoned mothers of infants or young children.

Several studies suggest that prisons offer unique opportunities for improving the pregnancy and breastfeeding outcomes of this subgroup of high-risk women and their infants and young children, in the context of public policies and programs to break cycles of disadvantage and adverse health behaviours.

In a randomised trial in the US within a larger intervention study, attachment was assessed using the Strange Situation Procedure for 30 infants who co-resided with their mothers in a prison.[103] Sixty per cent of infants were classified as secure, 75% who co-resided at the prison for a year or more and 43% who co-resided for less than a year, all within the range of normative community samples. The year-long co-residing group had significantly more secure and fewer disorganised infants than predicted by their mothers' attachment status, measured by the Adult Attachment Interview, and a significantly greater proportion of secure infants than meta-analysed community samples of mothers with low income, depression or drug/alcohol abuse. Using intergenerational data collected using rigorous methods, this study provides the first evidence that mothers in a prison nursery can raise infants who are securely attached to them at rates comparable to healthy community children, even when the mother's own internal attachment representation has been categorised as insecure.

A 2011 exploratory study of women incarcerated in a US city found breastfeeding was valued by incarcerated women; being pregnant and planning to breastfeed represented a new start and the opportunity for a socially at-risk population of women to positively redefine their maternal identity and roles.[104]

A report in Britain by a national organisation led by the first Children's Commissioner for England, Professor Sir Al Aynsley-Green, called for further consideration of the needs of babies born to mothers in prison or whose mothers were imprisoned when their children were very young.[434] Although having either a mother or a father in prison is a risk factor for children, there are special considerations that apply to mothers. For example, some may be pregnant when sentenced and others may be caring for very young babies and may be breastfeeding at the time of their incarceration. The fact that so many women in prison are single parents (up to one-third), and therefore the primary caregiver for their children, needs to be taken into account when developing policy in this area.[434]

- For 85% of mothers, prison was the first time they had been separated from their children for any significant length of time

- Only 9% of children whose mothers are in prison are cared for by their fathers in their mothers' absence
- Just 5% of women prisoners' children remain in their own home once their mother has been sentenced
- About 18,000 children are separated from their mothers by imprisonment each year
- At least one-third of women in prison are lone parents
- One-third of women in prison have a child under five
- Women in custody are five times more likely to have a mental health concern than women in the general population
- Children of prisoners are three times more likely to have mental health problems and exhibit antisocial behaviour compared with other children.

A 2011 literature review study by the Australian institute of Criminology on Good Practice in Women's Prisons discussed female prisoners' parental responsibilities.[105] Female prisoners are more likely than their male counterparts to have parental and other carer responsibilities. The report considered the impact of such responsibilities and presented healthy models for maintaining parent–child relationships. Key relevant practices in Australia were discussed, including measures to meet the needs of Indigenous women. Some key international measures were also explored, including the development of the Children of Prisoners: Draft Framework for Decision making to Take Account of the Best Interests of the Child. The report noted positive developments in Denmark, Germany, New Zealand, Northern Ireland and Spain and discussed requirements for effective parenting–child intervention programs.

A report for the NSW Department of Corrective Services in 2012 noted that children of incarcerated mothers are under-studied, under-resourced and at serious risk of developmental, behavioural, educational and psychiatric problems.[435] When a mother is incarcerated, the children are themselves victims of (their parents') crimes but their needs are rarely considered in the justice and welfare systems. This is in possible violation of their rights under the Convention on the Rights of the Child. This report discussed the harm of separating children under three years from their mothers and the importance of maintaining positive attachment. It also discussed the provision of residential programs for mothers and children and other high-quality contact options between infants and children whose mothers have been incarcerated, through the provision of visit coaching, parental skills training, family centres in prisons, and extended visiting for older children. It noted that a number of successful programs based on attachment theory have been implemented for incarcerated mothers and their infants and young children. Although these programs are in the formative stages, early results show promise in meeting the dual goals of enhancing maternal attunement and, consequently, secure attachment in their children.

A cluster randomised trial in the US examined the outcomes for 88 mothers and babies participating in the New Beginnings program and 75 dyads residing in prisons where the intervention did not take place.[106] New Beginnings is an attachment-based group intervention designed specifically for mothers and babies in prison. Outcomes were measured in terms of parental reflective functioning, the quality of parent–infant interaction, maternal depression and maternal representations. Mothers in the control group deteriorated in their level of reflective functioning and behavioural interaction with their babies over time, whereas the mothers in the intervention group did not. There were no significant group effects on levels of maternal depression or mothers' self-reported representations of their babies over time. An attachment-based intervention may mitigate some of the risks to the quality of the parent–infant relationship for these dyads.

A 2012 US study led by Byrne[436] noted that prison nurseries prevented maternal separations related to incarceration for the small subset of children whose pregnant mothers were incarcerated in states with such programs. Subsequent separation patterns were analysed for a cohort of 100 children accepted by corrections into one prison nursery. The largest numbers of separations were caused by corrections' removal

of infants from the nursery and infants reaching a one-year age limit. Criminal recidivism and substance abuse relapse threatened continued mothering during re-entry. The study noted focused and coordinated services were needed during prison stay and re-entry years to sustain mothering for women and children accepted into prison nursery programs.

A 2012 British scoping review[107] that aimed to reduce prisoner health inequalities identified a number of modifiable factors that could improve maternal health and other outcomes for childbearing women in prison. Based on consultation with staff, prisoners and external agencies, the review report described specific barriers and facilitators of breastfeeding initiation, exclusivity and continuation in prison systems, and reported on key strategies or interventions affecting breastfeeding. Barriers included lack of access to community standards of maternity leave or lactation breaks (such as prison policies or procedures imposing inflexible education and work schedules from six-to-eight weeks postnatally) and difficulties of coordination with external health services and peer support workers from breastfeeding NGOs working in the prison. Data collection on child outcomes was a barrier to informed policy and decision-making on child outcomes; the children of prisoners are typically not counted in prison statistics, as they are not prisoners.

A 2014 US study using Pregnancy Risk Assessment and Monitoring System (PRAMS) data collected by the Centers for Disease Control[108] found recently imprisoned women (or those whose partner had been imprisoned) were also more likely to experience additional stressors such as partner abuse or reliance on WIC or Medicaid for assistance during pregnancy. Imprisonment was also linked to adverse perinatal health behaviours associated with poorer infant and child development, including lower rates of any breastfeeding.

Another 2014 study, in New York, analysed three-year recidivism after release from a prison nursery, a secure unit that allows imprisoned women to care for their infants.[109] The author concluded that women released from a prison nursery have a low likelihood of recidivism. Innovative interventions are needed to address incarceration's public health effects. Nurses can partner with criminal justice organisations to develop, implement and evaluate programs to ensure the health needs are met of people involved in the criminal justice system, and their families.

AUSTRALIAN STUDY: A recent Australian rapid evidence review report for the Department of Justice and Regulation in Victoria identified 34 relevant reports on prison nurseries, finding that there was no evidence of harm to children involved.[110] A meta-analysis of three included studies indicated that nursery program participants were less likely to return to prison than mothers who were separated from their children. Prison nursery rules, such as for child age cut-offs or program participation, were variable, with the average age 18 months to three years, and the importance of breastfeeding being one factor regarding nursery program admission. Studies of mothers' parenting were inconclusive but tended to be positive. The review concluded there was no evidence indicating children were being harmed by prison nursery programs. High-quality programs for improving the parenting of imprisoned mothers would lead to better outcomes for both mothers and their children.

A systematic review by Bard[111] reported maternal and child health and care outcomes in identified studies describing perinatal healthcare programs for imprisoned women; only one of the studies reported breastfeeding outcomes, and the intervention was effective in increasing breastfeeding.

A recently published study of breastfeeding support for criminalised women in Canada[112] identified the multiple barriers to breastfeeding among imprisoned mothers, including, for example, the mother's own experiences of domestic violence or child abuse, as well as barriers specific to the prison setting considered below. The study offers strategies for practitioners to better meet the needs of the criminalised breastfeeding population.

AUSTRALIAN STUDY: Recent studies indicate that the numbers of children under five years potentially affected by maternal incarceration could be higher than commonly perceived. A study in 2016 measured the prevalence of children affected by maternal incarceration in Western Australia and presented the first census of children affected by maternal incarceration within an Australian state.[113] Using linked administrative data, the study identified all children born in WA between 1985 and 2011 whose biological mother was imprisoned during their childhood; descriptive characteristics of the children (n = 9352) and their mothers (n = 3827) are reported. Prevalence was measured in two ways: the proportion of children ever affected in childhood and affected annually. Childhood prevalence of maternal incarceration was 26 times higher (95% CI 23.9–28.2) for Indigenous children born 1992–1996, with 18.8% of Indigenous children and 0.7% of non-Indigenous children aged 0–17 years affected. On average 1544 children were affected each year across 2003–2011, at rates of 2929 per 100,000 Indigenous children and 108 per 100,000 non-Indigenous children. This study identified a large disparity between Indigenous and non-Indigenous populations and highlighted the importance of formal consideration of children of women prisoners in the development of criminal justice policies and practices.

AUSTRALIAN STUDY: A Report to the Minister for Correctional Services on Mother-and-Infant Facilities at Adelaide Women's Prison concluded they were a cost-effective measure in the best interests of the child.[29] The study noted the human rights aspects for children of incarcerated mothers, as well as for women in prison, specifically including the observation that a child has the right to the enjoyment of the highest attainable standard of health, including appropriate prenatal and postnatal healthcare for mothers and (where possible) the health advantages of breastfeeding. This meant that Australia as a party to the Convention has particular obligations to use its best efforts to ensure that all segments of society, in particular parents and children, are informed, have access to education and are supported in the use of basic knowledge of child health and nutrition, and the advantages of breastfeeding. The report noted breastfeeding is clearly established as in the best interests of the child as it plays an important role in infant nutrition, and is associated with healthier physical, brain and social development, and increased resistance to infection. Breastfeeding also encourages attachment and bonding with the mother, contributing to optimal child development. The physical separation of a mother from her infant during a term of incarceration made breastfeeding almost impossible to achieve.

Child protection, welfare and adoption policies

No systematic reviews were retrieved in these areas.

A study by Gribble and Gallagher (2014) of the rights of children in relation to child protection cases in Britain presented two case studies in which child protection authorities had interactions with a breastfeeding mother and child.[114] In the first case, the child protection intervention resulted in the early and permanent cessation of breastfeeding. In the second case, active advocacy allowed breastfeeding to continue. However, in both cases the mothers' insistence that breastfeeding was important to their children and should continue was pathologised. Social workers have a responsibility to protect and uphold the human rights of their clients. For individuals and organisations involved in child protection, the rights of children, as outlined in the United Nations Convention on the Rights of the Child (UNCRC), provide essential guidance. The UNCRC supports the proposition that children have rights in relation to breastfeeding. The study makes recommendations for policies and training for child protection authorities to support the breastfeeding rights of children.

AUSTRALIAN STUDY: A 2015 review study for the South Australian Child Protection Systems Royal Commission noted that breastfeeding was important for attachment and health of children.[115] Few relevant within-scope studies were identified on the effects of child protection interventions on breastfeeding and optimal infant and young child feeding, and no systematic reviews, RCTs or quality cohort studies were

available to inform on the effectiveness of interventions or strategies for increasing breastfeeding in this population of disadvantaged children and women.

ANBS-E Strategy 12

ANBS-E Strategy 12: Continuity of care, referral pathways and support networks

Recent research on complex public health interventions including community-based peer support systems points to more subtle aspects of intervention delivery, including the relationships and networks that influence caregivers' decisions about breastfeeding. Such studies include consideration of how interventions were delivered, in what manner, and by whom, with processes that affect intervention feasibility or outcomes.

We found no systematic reviews in this area. As noted earlier, the WHO Guideline identified evidence regarding Step 10 which addressed health-system linkages and continuity of care. The WHO 2017 Guideline reported that there was very low-quality evidence about Step 10, based on a small number of systematic reviews. Step 10 was interpreted in the WHO 2017 Guideline as being linkages to post-discharge care via the health system. The Evidence Check did identify some systematic review studies providing evidence on home visits and similar maternity care system linkages to breastfeeding support after hospital discharge. However, this area is closely related to consideration of the effectiveness of peer support in the community, considered under ANBS 8, below. The Evidence Check also identified studies on how mode or manner of support influenced effectiveness in increasing breastfeeding, such as through increasing breastfeeding confidence and skills, or 'self-efficacy'.

A 2013 systematic review examined the evidence on the effectiveness of Community Health Workers for preventive health interventions in low- and middle-income countries (LMICs).[116] A search strategy was developed according to the Evidence for Policy and Practice Information and Co-ordinating Centre's (EPPI-Centre) guidelines, and systematic searching of the following databases occurred from 8–11 June, 2012: CINAHL, Embase, Ovid Nursing Database, PubMed, Scopus, Web of Science and POPLINE. Google, Google Scholar and WHO search engines, as well as relevant systematic reviews and reference lists from included articles, were also searched. A total of 17 articles detailing 19 studies were included in the review. Studies came from 10 different countries and consisted of RCTs, cluster randomised controlled trials, before–after, case-control and cross-sectional studies. The overall quality of evidence was found to be moderate. Breastfeeding promotion was one of five main preventive intervention categories that emerged, along with malaria prevention, health education, essential newborn care and psychosocial support. All categories showed some evidence for the effectiveness of Community Health Workers; however, they were found to be especially effective in promoting mother-performed strategies (skin-to-skin care and exclusive breastfeeding).

A recent systematic review by Wood et al. evaluated breastfeeding interventions trialled to date and recommended directions for future needs in breastfeeding research.[283] A literature review was conducted using PubMed, CINAHL Plus and PsycINFO databases to identify studies that evaluated efficacy or effectiveness of breastfeeding interventions on breastfeeding initiation, duration or exclusivity as a primary, secondary or tertiary outcome. Combinations of search terms included breastfeeding, feeding behaviour, prenatal/patient education, health promotion, social support, perinatal/prenatal/intrapartum/postnatal care, and postpartum period. Six studies were included in this review, using PRISMA guidelines. Acquisition of knowledge and skills, emotional support by healthcare providers and self-efficacy regarding a mother's confidence in her ability to breastfeed were factors the intervention studies relied on to affect breastfeeding practices. Although these factors were addressed in the studies, breastfeeding mothers had difficulty transferring what they gained from interventions into their real-life breastfeeding practices, as evidenced by

the highest drop-off rate of exclusive breastfeeding in the early postpartum period. The authors concluded there were conceptual limitations to the reviewed studies: (1) lack of understanding of maternal perception of infant behaviour, and (2) perceived insufficient milk as a remaining primary reason for breastfeeding discontinuation. There were methodological limitations: (1) lack of theory-based interventions, and (2) lack of intervention fidelity. Future studies involving breastfeeding should focus on the causes of the problems, driven by theory-based interventions integrated with intervention fidelity.

A 2016 systematic review of midwife-led versus other models of care examined breastfeeding initiation rates as a secondary outcome, and found no significant difference in initiation rates, though the review demonstrated that women were less likely to experience interventions during labour and birth and reported increased satisfaction with care.[142] Labour and birth interventions have a negative impact on successful early initiation of breastfeeding. A systematic literature review of the role of midwives in supporting breastfeeding identified that midwives working within fragmented postnatal care models tend to provide care as a 'technical expert' rather than a 'skilled companion' due to the barriers of working within a hospital setting.[437] The findings of these reviews suggest breastfeeding outcomes may be positively influenced through scaling up midwifery-led models of maternity care on childbirth interventions.

A 2017 Cochrane systematic review found inconsistent evidence of improved maternal health from scheduled home visits.[438] There was some evidence that more home visits encouraged more women to exclusively breastfeed their babies. At six weeks' postpartum, exclusively breastfeeding was increased by 17% and at up to six months by 38%. For any breastfeeding, no difference was evidenced for those experiencing the home visit intervention. Babies in the intervention groups were less likely to have emergency medical care if mothers had more postnatal visits, However, maternal depression scores averaged higher for those receiving more visits. The authors concluded that more evidence was needed before recommendations of particular schedules could be made.

Other key studies

AUSTRALIAN STUDY: An Australian study using data from the 'Having a Baby in Queensland' Survey, 2010[439] investigated mothers' experiences of maternity care four months after birth in Queensland. A substantial proportion of all mothers spontaneously raised concerns about their experiences of inadequate and/or inconsistent breastfeeding support. Mothers birthing in public facilities were more likely to raise concerns about the quality and/or duration of their hospital stays, while concerns about inadequate post-discharge care were more likely among those birthing in private facilities. The authors concluded that inadequate or inconsistent professional breastfeeding support remains a major issue for early parenting women regardless of birthing sector.

A 2012 pre–post British study found breastfeeding initiation, duration and exclusivity was increased by a Continuous Quality Improvement approach, involving revising routine antenatal, intrapartum and postnatal care systems and processes to support implementation of evidence-based postnatal practice.[440] The intervention involved longer stays in the delivery suite from a maximum of two-to-three hours post vaginal birth to encourage skin-to-skin contact and initiation of breastfeeding, transfer of responsibility for the care of high-risk women from the obstetrician to the midwife immediately after the birth, and postnatal discharge preparation commenced in the delivery suite. After the intervention, there were statistically significant differences in initiation and duration of any breastfeeding, and duration of any breastfeeding to three months. Exclusive breastfeeding at 10 days increased from 65.8% to 70.3% ($p = 0.038$).

AUSTRALIAN STUDY: An evaluation of Australia's National Breastfeeding Helpline in 2012 concluded that the helpline met a clear need for non-clinical breastfeeding information and support, and made an effective and efficient contribution to government policy to achieve better outcomes for mothers and babies.[54] It found that a high level of satisfaction among users of the Breastfeeding Helpline was a testimony to the investment in service infrastructure including quality staff (volunteers). The evaluation noted its effectiveness

in meeting the needs of callers and affecting breastfeeding practices, although no quantitative data was provided on effects on breastfeeding practices. The evaluation identified that the Breastfeeding Helpline gains considerable leverage from its location within the Australian Breastfeeding Association (ABA) and is connected to evidence-based information and training. It benefits from the high profile of the ABA in the community, with stakeholder organisations and as an adviser to governments on policy. Its findings included that the Breastfeeding Helpline generally provided an appropriate and important source of breastfeeding information and support to mothers and their families, and its services were implemented by volunteer counsellors who satisfied core competencies, committed to the Breastfeeding Helpline for two years and offered peer support to mothers. Challenges to the model included: sustaining a sufficient supply of trained volunteer counsellors; ensuring consistency of information and support; adapting to preferred communication methods for users such as calling back in response to text message, video conferencing, and integration with face-to-face visits; promoting awareness of the inclusive nature of Breastfeeding Helpline services; and building on the distinctive features of the Breastfeeding Helpline to reinforce its role within the growing number of related helpline services to benefit both consumers and service providers.

AUSTRALIAN STUDY: Continuity of care through supporting breastfeeding in local communities was tested in a recent cluster RCT in four Victorian local government areas.[121] The intervention involved early home-based breastfeeding support by a maternal and child health nurse (home visit, HV) with or without access to a community-based breastfeeding drop-in centre. There was no difference in breastfeeding at four months in either HV compared with the comparison arm, no difference at three or six months, nor in any LGA in breastfeeding before and after the intervention. Early home-based and community-based support proved difficult to implement because of problems with adherence to the planned protocol. Interventions to increase breastfeeding in complex community settings require sufficient time and partnership-building for successful implementation.

The modality of support offered for breastfeeding was considered in the rapid evidence appraisal by Hector in 2010.[51] Proactive telephone support was found to effective for breastfeeding duration, based on a 2008 systematic review.[441] Major recent reviews have also identified technology including internet and web-based interventions as an element in successful interventions, as an adjunct to face-to-face support.[86, 145, 442] Evidence for effectiveness cited by Sutton et al. included two systematic reviews.

A study in the US by Shah et al. (2014) examined the effects of having a home-visit program using cross-sectional data from the 2007–2008 Virginia Pregnancy Risk Assessment and Monitoring System (PRAMS).[443] *Women who had a home visit during* [pregnancy] were *nearly five times more likely to initiate breastfeeding* (aOR: 4.5, 95% CI: 1.05, 19.54).

Witt and colleagues (2012) examined the effects of integrating routine lactation consultant support into a paediatric practice in a 2012 study in the US, through retrospective chart review of non-formula-feeding (NFF) status of infants attending the practice before and after the intervention.[424] Among mothers in 2007 and 2009 with comparable types of insurance, parity, gestational age, multiple births and caesarean sections, non-formula-feeding was significantly improved after program implementation In 2009, NFF rates at two months, four months, six months and nine months were greater than 2007 rates by 10%, 15%, 11%, and 9%, respectively. Logistic growth curve analysis indicated the difference across these time points was significant.

The authors concluded that routine post-discharge outpatient lactation visits coordinated within a primary care practice improved breastfeeding initiation and intensity, and the effect was sustained for nine months.

Non-nutritive sucking (NNS) is used during gavage feeding and in the transition from gavage to breast/bottle feeding in preterm infants to improve the development of sucking behaviour and the digestion of enteral feedings. The 2016 study by Foster and colleagues assessed the effects of non-nutritive

sucking on physiologic stability and nutrition in preterm infants.[213] A standard search strategy of the Cochrane Neonatal Review group was used to search the Cochrane Central Register of Controlled Trials (CENTRAL; 2016, Issue 1), MEDLINE via PubMed (1966 to 25 February 2016), Embase (1980 to 25 February 2016), and CINAHL (1982 to 25 February 2016). Searches of clinical trial databases, conference proceedings, and the reference lists of retrieved articles for RCTs were also undertaken. Searches were confined to RCTs and quasi-randomised trials that compared non-nutritive sucking with no provision of non-nutritive sucking in preterm infants. Cross-over trials were excluded. Two review authors assessed trial eligibility and risk of bias and undertook data extraction independently.

The treatment effects in the individual trials were analysed and mean differences (MD) for continuous data were reported with 95% confidence intervals (CIs). The authors used a fixed-effect model in meta-analyses. They did not perform subgroup analyses because of the small number of studies related to the relevant outcomes. The GRADE approach was used to assess the quality of evidence; 12 eligible trials were identified, enrolling a total of 746 preterm infants. Meta-analysis, though limited by data quality, demonstrated a significant effect of NNS on transition from gavage to full oral feeding (MD –5.51 days, 95% CI –8.20 to –2.82; N = 87), transition from start of oral feeding to full oral feeding (MD –2.15 days, 95% CI –3.12 to –1.17; N = 100), and the length of hospital stay (MD –4.59 days, 95% CI –8.07 to –1.11; N = 501). Meta-analysis revealed no significant effect of NNS on weight gain. One study found the NNS group had a significantly shorter intestinal transit time during gavage feeding compared with the control group (MD –10.50 h, 95% CI –13.74 to –7.26; N = 30). Other individual studies demonstrated no clear positive effect of NNS on age of infant at full oral feeds, days from birth to full breastfeeding, rates and proportion of infants fully breastfeeding at discharge, episodes of bradycardia, or episodes of oxygen desaturation. None of the studies reported any negative outcomes. These trials were generally small and contained various methodological weaknesses, including lack of blinding of intervention and outcome assessors and variability on outcome measures. The quality of the evidence on outcomes assessed according to GRADE was low to very low.

> *Meta-analysis demonstrated a significant effect of NNS on the transition from gavage to full oral feeding, transition from start of oral feeding to full oral feeding, and length of hospital stay.*

Well-designed, adequately powered studies using reliable methods of randomisation, concealment of treatment allocation and blinding of the intervention and outcome assessors are needed. In order to facilitate meta-analysis of these data, future research should involve outcome measures consistent with those used in previous studies.

> *Breastfeeding offers numerous health advantages to children, mothers, and society. From obstetrics to pediatrics, breastfeeding dyads come in contact with a wide range of healthcare providers. The American Academy of Pediatrics (AAP) calls for pediatricians to support breastfeeding enthusiastically and for all children to have a medical home.*[444]

US researchers Szucs, Miracle and Rosenman (2009) studied an inner-city healthcare system with a Dyson Community Pediatrics Training Initiative Model Medical Home clinic, to explore how a breastfeeding/baby-friendly medical home might be built on this framework.[444] The study described breastfeeding knowledge, attitudes and practices among a full range of providers and healthcare system-level barriers to effective and coordinated breastfeeding services. The study employed eight focus groups using semi-structured interviews: (1) paediatricians; (2) obstetricians; (3) paediatric nurses and allied health professionals; (4) obstetric nurses and allied health professionals; (5) 24-hour telephone triage answering service nurses; (6) public health nurses; (7) Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) personnel; and (8) lactation consultants and peer counsellors. The authors identified gaps in providers' breastfeeding knowledge, counselling skills and professional education and training. Providers' cultures and

attitudes affected their breastfeeding promotion and support, and they used their own breastfeeding experiences to replace evidence-based knowledge and the American Academy of Pediatrics' policy statement recommendations for breastfeeding dyads. There were communication disconnects between provider groups and providers underestimated their own, and overestimated others', influence on breastfeeding. The system lacked a coordinated breastfeeding mission.

This study illuminated key disconnectedness challenges (and, hence, opportunities) for a model medical home in fostering continuous, comprehensive, coordinated, culturally effective and evidence-based breastfeeding promotion and support.

Pate (2009) analysed breastfeeding intervention delivery methods to determine the likelihood of successful breastfeeding outcomes of e-based interventions compared with provider-based interventions.[445] Eligible studies were identified by searching MEDLINE, CINAHL, Academic Search Elite, Health Source: Nursing/Academic Edition, SocINDEX and PsycINFO. Studies were included if they were conducted in a developed country, published from 2004–2008, included a concurrent control group, and reported frequency data on breastfeeding initiation or duration. The suitability of design and quality of execution were evaluated using the Centers for Disease Control procedure for systematic reviews. Twenty-one articles met the criteria for inclusion. Study design, demographics, intervention/control conditions, settings, sampling strategies, potential threats to validity, and breastfeeding outcomes were abstracted and entered into a database for analysis and synthesis. Odds ratios were calculated for each study, and studies were stratified into two groups by intervention delivery type. The pooled results indicated that studies using e-based interventions had a moderate effect on breastfeeding (odds ratio = 2.2 [1.9–2.7], d = 0.5); whereas provider-based interventions had very little or no effect (odds ratio = 1.1 [1.0–1.2], d = 0.03).

Results indicated that breastfeeding promotion programs delivered via the internet may be an appealing alternative to time-consuming and expensive provider-based breastfeeding education and support.

A 2012 pre–post British study by Bick, Murrells and Weavers et al. found breastfeeding initiation, duration and exclusivity was increased by a Continuous Quality Improvement approach involving revision of routine antenatal, intrapartum and postnatal care systems and processes to support implementation of evidence-based postnatal practice.[440] The intervention involved revisions to routine hospital systems and processes to include longer stays in the delivery suite from a maximum of two-to-three hours post vaginal birth to encourage skin-to-skin contact and initiation of breastfeeding. Responsibility for care of women classed as high-risk during pregnancy and/or labour was handed from the obstetrician to the midwife immediately after the birth, if appropriate. Postnatal discharge preparation began in the delivery suite, with midwives asked to complete computer records for women requesting early hospital discharge. After the intervention, there were statistically significant differences in the initiation ($p = 0.050$) and duration of any breastfeeding ($p = 0.020$) and duration of any breastfeeding to three months ($p = 0.016$). There was also increased exclusive breastfeeding (from 65.8%–70.3% ($p = 0.038$). Post intervention, women were less likely to report physical morbidity within the first 10 days of birth and were more positive about their inpatient care.

The authors concluded that a continuous quality improvement approach could improve [breastfeeding] outcomes in routine inpatient care within current resources.

AUSTRALIAN STUDY: Cramer and colleagues (2017) evaluated the implementation of community-based drop-in centres for breastfeeding support in Victoria.[446] Alongside was a three-arm cluster RTC (Supporting breastfeeding In Local Communities — SILC) to determine whether early home-based breastfeeding support by a maternal and child health nurse (SILC-MCHN), with or without access to a community-based breastfeeding drop-in centre, increased the proportion of infants receiving any breast milk at three, four and six months. The trial was conducted in 10 Local Government Areas (LGAs). This paper's primary aim was to describe the three drop-in centres established during the trial and the profiles of women who accessed

them. The secondary aim was to explore the views and experiences of the drop-in centre staff, and the challenges they faced in establishing and maintaining a breastfeeding drop-in centre.

The evaluation of the three LGAs with drop-in centres was multifaceted and included observational visits and field notes; data collected from attendance log books from each drop-in centre; a written survey and focus groups with maternal and child health (MCH) nurses who ran the drop-in centres; and semi-structured interviews with MCH coordinators from the participating LGAs. The three LGAs developed and ran different models of breastfeeding drop-in centres. They reported challenges in finding convenient, accessible locations. Overall, attendance was lower than expected, with an average of only one attendee per session. Two global themes were identified regarding staff views: implementation challenges including finding accessible, available space, recruiting volunteers to provide peer support, and frustration when women did not attend; and the work of SILC-MCHNs, including themes of satisfying and rewarding work, juggling roles, and benefits to women, babies and the community.

The authors concluded that providing community-based breastfeeding support was satisfying for the drop-in centre staff but proved difficult to implement, reflected in the lower than anticipated attendances at all the drop-in centres. Interventions to increase breastfeeding in complex community settings require sufficient time to build partnerships with the existing services and the target population; to understand when and how to offer interventions for optimum benefit.

Appendix 5: Supplementary narrative summaries on health settings studies

ANBS-E Strategies 4–7

ANBS-E Strategy 4

In a 2012 systematic review, Semenic et al. examined barriers and facilitators to BFHI implementation.[222] This integrative review aimed to identify and synthesise information on the barriers, facilitators and recommendations related to the BFI from the international peer-reviewed literature. The authors searched 13 databases using the keywords Baby Friendly, Baby-Friendly Hospital Initiative, BFI, BFHI, Ten Steps, implementation, adoption, barriers, facilitators, and their combinations. A total of 45 English-language articles from 16 countries met the review's inclusion criteria for. Data analysis was guided by Cooper's five stages of integrative research review. Using a multiple intervention program framework, the findings were categorised into socio-political, organisational-level, and individual-level barriers and facilitators to implementing the BFI, as well as intra-, inter-, and extra-organisational recommendations for strengthening BFI implementation. The study identified a wide variety of obstacles and potential solutions to BFI implementation. The findings suggested some priority issues to address when pursuing Baby Friendly designation, including the endorsements of both local administrators and government policy makers, effective leadership of the practice change process, healthcare worker training, the marketing influence of formula companies, and integrating hospital and community health services. *The authors concluded that framing the BFI as a complex, multilevel, evidence-based change process and using context-focused research implementation models to guide BFI implementation efforts may help identify effective strategies for promoting wider adoption of the BFI in health services.*

AUSTRALIAN STUDY: In 2010, Brodribb investigated the effects of BFHI designation and Queensland hospital care practices on breastfeeding rates at one and four months using maternal recall.[224] After adjusting for significant maternal, infant, clinical and hospital variables, women who birthed in BFHI-accredited hospitals had significantly lower odds of breastfeeding at one month than those who birthed in non-BFHI-accredited hospitals, and there were no significant effects of breastfeeding at four months or exclusive breastfeeding at one or four months. Four in-hospital practices (early skin-to-skin contact, attempted breastfeeding within the first hour, rooming-in, and no in-hospital supplementation) were experienced by 70%–80% of mothers, with 50.3% experiencing all four; and where women experienced all four of these practices they were two-to-three times more likely to be breastfeeding at one and four months than women who experienced fewer than four. *The authors concluded that accreditation has less effect on duration where there are high initiation rates and BFHI has become embedded in the community. It can, however, play an important role in areas where breastfeeding rates are low. Continued compliance with the Ten Steps is imperative, and implementation of other strategies to support breastfeeding in the community is required.*

Hawkins (2015) evaluated the impact of the Baby Friendly Hospital Initiative (BFHI) on breastfeeding initiation and duration overall, and according to maternal education.[226] The study was quasi-experimental in

design, using data from five US states (Alaska, Maine, Nebraska, Ohio, Washington) that participated in the Pregnancy Risk Assessment Monitoring System (PRAMS) from 1999–2009. Using differences-in-differences models that included year and hospital fixed effects, the study compared rates of breastfeeding initiation and duration (any and exclusive breastfeeding for > = 4 weeks) before and after BFHI accreditation between mothers who gave birth in hospitals that were accredited or became accredited and mothers from matched non-BFHI facilities. Analyses were stratified into lower and higher education groups. The study was conducted in 13 BFHI hospitals and 19 matched non-BFHI facilities across the five states and involved mothers (n 11,723) who gave birth in BFHI hospitals and mothers (n 13,604) from matched non-BFHI facilities. The authors did not find overall differences in breastfeeding initiation between birth facilities with BFHI accreditation and non-BFHI facilities (adjusted coefficient = 0.024; 95% CI –0.00, 0.51). Breastfeeding initiation increased by 3.8 percentage points among mothers with lower education who gave birth in BFHI facilities (P = 0.05), but not among those with higher education (adjusted coefficient = 0.002; 95% CI –0.04, 0.05). BFHI accreditation also increased exclusive breastfeeding for > = 4 weeks by 4.5 percentage points (P = 0.02) among mothers with lower education who delivered in BFHI facilities. *The authors concluded that by increasing breastfeeding initiation and duration among mothers with lower education, the BFHI may reduce socioeconomic disparities in breastfeeding.*

A systematic review by Jones et al. published in 2015 points to racial and ethnic disparities in breastfeeding arising from differential availability of support in the US.[230] This article aimed to review the literature on racial and ethnic disparities in breastfeeding rates and practices, address barriers to breastfeeding among minority women, conduct a systematic review of breastfeeding interventions, and provide obstetrician-gynaecologists with recommendations on how they can help increase rates among minority women. The authors reviewed the literature of racial and ethnic disparities in breastfeeding rates and barriers among minority women and conducted a systematic review of breastfeeding interventions among minority women on PubMed and MEDLINE. Racial and ethnic minority women continue to have lower breastfeeding rates than white women and are not close to meeting the Healthy People 2020 goals. Minority women report many barriers to breastfeeding. *The study concluded that major efforts are still needed to improve breastfeeding initiation and duration rates among minority women in the US.*

Tsai and colleagues (2015) investigated the change in, and correlates of, breastfeeding practices in Taiwan after delivery at a hospital and at one, three and six months postpartum among first-time mothers.[227] The study sample consisted of a cohort of 300 primiparous mothers who gave birth at two hospitals in 2010–11. Logistic and Cox regression analyses were performed to determine factors that were correlated with breastfeeding practices. In the study sample, the rate of exclusive breastfeeding during the hospital stay was 66%; it declined to 37.5% at one month and 30.2% at three months postpartum. Only 17.1% of women reported continuing breastfeeding at six months. Early initiation of breastfeeding, rooming-in practice and self-efficacy were significantly related to exclusive breastfeeding during the hospital stay. After discharge, health literacy, knowledge, intention and self-efficacy were positively and significantly associated with breastfeeding exclusivity. Later initiation (hazard ratio = 1.53; 95% confidence interval, 1.05, 1.97), shorter intention (hazard ratio = 1.42; 95% confidence interval, 1.13, 1.68), and self-efficacy (hazard ratio = 0.98; 95% confidence interval, 0.96, 0.99) were important predictors of breastfeeding cessation within six months postnatally. The authors found continuous breastfeeding for six months is challenging and difficult for new mothers. Results showed factors related to breastfeeding varied over time after delivery. *The study concluded that interventions seeking to sustain breastfeeding should consider new mothers' needs and barriers at different times.*

Passanha et al. (2015) evaluated whether the support offered by maternity hospitals is associated with higher prevalence of exclusive and predominant breastfeeding.[228] This was a cross-sectional study including a representative sample of 916 infants less than six months of age who were born in maternity hospitals in Ribeirao Preto in Sao Paulo, Brazil, in 2011. The maternity hospitals were evaluated in relation to their

fulfilment of the Ten Steps to Successful Breastfeeding. Data were collected regarding breastfeeding patterns, the birth hospital and other characteristics. The individualised effect of the study factor on exclusive and predominant breastfeeding was analysed using Poisson multiple regression with robust variance. The study found a tendency for predominant breastfeeding to be more prevalent when the number of fulfilled steps was higher (p of linear trend = 0.057). Two steps — 'offer no artificial teats or pacifiers to breastfed infants' and 'foster the establishment of breastfeeding support groups' — were associated, respectively, with a higher prevalence of exclusive (PR = 1.26; 95% CI 1.04; 1.54) and predominant breastfeeding (PR = 1.55; 95% CI 1.01; 2.39), after an adjustment was performed for confounding variables. *The authors observed a positive association between support offered by maternity hospitals and prevalence of exclusive and predominant breastfeeding. The authors concluded the results could be useful to other locations with similar characteristics (cities with hospitals that fulfil the Ten Steps to Successful Breastfeeding) in promoting, protecting and supporting breastfeeding in maternity hospitals*.

Patterson et al. (2016) examined the relationship between population demographics, including poverty and race, and exclusive breastfeeding outcomes in hospitals with and without the BFHI designation.[231] The study used data from a leading US hospital accreditation agency, the Joint Commission, to compare 283 BFHI hospitals with 1071 hospitals that did not have BFHI designation. Using multiple linear regression to control for socio-demographic variables (total population, proportion of white, African-American, Hispanic and Asian people; educational status and household income) in the zip code area surrounding each hospital, *the study found that hospitals with BFHI designation had exclusive breastfeeding rates that were on average 10%–15% higher than hospitals without BFHI designation, regardless of demographics.* BFHI designation explained 22% of the variability between women in exclusive breastfeeding rates. However, *exclusive breastfeeding rates within the hospital were higher in local areas with a greater proportion of white, tertiary educated and high-income residents*, while the converse applied for other ethnic groups (African-American, Hispanic) and population living at less than 200% of the poverty line.

Temple Newhook and colleagues (2017) examined the determinants of non-medically indicated supplementation (Step 6) on breastfeeding outcomes among mothers intending to exclusively breastfeed in two Canadian locations.[242] About 17% were supplemented in hospital. *Multivariate analysis identified four factors were significant in determining which babies were supplemented: those with low total prenatal Iowa Infant Feeding Attitude Scale score, no previous breastfeeding experience, negative first impression of breastfeeding, and receiving breastfeeding advice from a hospital physician.* Babies were two-to-three times more likely to be supplemented despite their mother intending to exclusively breastfeed.

A large population-based intervention study in Norway by Baerug, Laake, Løland et al. (2017) found socioeconomic inequalities in *exclusive breastfeeding at five months were largely explained by sociodemographic factors, but that modifiable factors such as breastfeeding difficulties were also important* and could be modified with appropriate support.[233]

In a study to assess the impact of Baby Friendly hospital and other maternity-care practices on breastfeeding duration, DiGirolamo, Grummer-Strawn and Fein (2008) showed that adherence to just six of the Ten Steps could reduce early termination of breastfeeding dramatically (13-fold at four-to-six weeks) among mothers who had expressed an intention to breastfeed to two months or more.[447] Analysis of the Infant Feeding Practices Study II focused on mothers who initiated breastfeeding and intended prenatally to breastfeed for > 2 months, with complete data on all variables (n = 1907). Predictor variables included indicators of six Baby Friendly practices (breastfeeding initiation within one hour of birth, giving only breastmilk, rooming-in, breastfeeding on demand, no pacifiers, fostering breastfeeding support groups) along with several other maternity care practices. The main outcome measure was breastfeeding termination before six weeks. Only 8.1% of the mothers experienced all six Baby Friendly practices. The practices most consistently associated with breastfeeding beyond six weeks were initiation within one hour

of birth, giving only breastmilk and not using pacifiers. Bringing the infant to the room for feeding at night if not rooming-in and not giving pain medications to the mother during delivery were also protective against early breastfeeding termination. Compared with the mothers who experienced all six Baby Friendly practices, mothers who experienced none were approximately 14 times more likely to stop breastfeeding early. Additional practices decreased the risk of early termination. *The study concluded that increased Baby Friendly hospital practices, along with several other maternity care practices, improve the chances of breastfeeding beyond six weeks.* The need to work with hospitals to implement these practices continues to exist, as illustrated by the small proportion of mothers who reported experiencing all six of the Baby Friendly hospital practices measured in this study.

Feldman-Winter, Grossman and Palaniappan et al. (2012) reported a 2009–10 study of postpartum mothers at Cooper University Hospital, an urban New Jersey hospital, which prospectively examined hospital-based and breastfeeding outcomes associated with removal of industry-sponsored formula sample packs from the hospital.[448] For the first six months, all women received industry-sponsored formula samples packs (control group); for the next six months, all postpartum women received hospital-sponsored bags with no formula at source (intervention group). Research assistants blinded to the design called subjects weekly for 10 weeks to determine feeding practices. A total of 527 breastfeeding women (284 control; 243 intervention) were enrolled in the study. At 10 weeks postpartum, 82% of control and 36% of intervention women ($P < .001$) reported receiving formula in the 'diaper discharge bag'. Kaplan-Meier curves for any breastfeeding showed the intervention was associated with increased breastfeeding ($P = .03$); however, exclusive breastfeeding was not significantly different between intervention and controls ($P = .46$). In post hoc analysis, receiving no take-home formula in bottles from the hospital was associated with increased exclusive breastfeeding in control ($P = .02$) and intervention ($P = .03$) groups at 10 weeks. The study concluded that although the hospital-branded replacement contained no formula at source, many women reported receiving bottles of formula from the hospital. *Change in practice to remove industry-sponsored formula sample packs was associated with increased breastfeeding over 10 weeks*, but the intervention may have had a greater impact had it not been contaminated.

> *Despite recommendations from the WHO, by six months of age 40% of Australian infants are receiving no breastmilk*

AUSTRALIAN STUDY: McLachlan, Forster and Amir et al. (2016) conducted a randomised trial of the implementation of two community-based interventions to increase breastfeeding duration in 10 Local Government Areas (LGAs) in Victoria, with breastfeeding initiation rates below the state average and > 450 births/year.[121] The three-arm cluster randomised trial found that having a community drop-in centre, in addition to home visits by a nurse midwife, did not increase breastfeeding. The LGA was the unit of randomisation, and maternal and child health centres in the LGAs comprised the clusters. Early home-based breastfeeding support by a maternal and child health nurse (home visit — HV) with or without access to a community-based breastfeeding drop-in centre (HV+drop-in). The study measured the proportion of infants receiving 'any' breast milk at three, four and six months (women's self-report). Four LGAs were randomised to the comparison arm and provided usual care (n = 41 clusters; n = 2414 women); three to HV (n= 32 clusters; n = 2281 women); and three to HV+drop-in (n = 26 clusters; 2344 women). There was no difference in breastfeeding at four months in either HV (adjusted OR 1.04; 95% CI 0.84–1.29) or HV+drop-in (adjusted OR 0.92; 95% CI 0.78–1.08) compared with the comparison arm, no difference at three or six months, nor in any LGA in breastfeeding before and after the intervention. Some issues were experienced with intervention protocol fidelity. *The study found that early home-based and community-based support proved difficult to implement and that interventions to increase breastfeeding in complex community settings require sufficient time and partnership-building for successful implementation.* Authors were unable to

conclude that additional community-based support is ineffective in improving breastfeeding maintenance given the level of adherence to the planned protocol.

> *While Australia has high breastfeeding initiation, there is a sharp decline in the first weeks postpartum and this continues throughout the first year.*

AUSTRALIAN STUDY: A study by Cramer, McLachlan and Shafiei et al. (2017): *Supporting breastfeeding In Local Communities (SILC),* was a three-arm cluster RCT to determine whether early home-based breastfeeding support by a maternal and child health nurse (SILC-MCHN), with or without access to a community-based breastfeeding drop-in centre, increased the proportion of infants receiving any breastmilk at three, four and six months.[446] The trial was conducted in 10 Local Government Areas (LGAs) in Victoria. This paper's primary aim was to describe the three drop-in centres established during the trial and the profiles of the women who accessed them. The secondary aim was to explore the views and experiences of the drop-in centre staff, and the challenges they faced in establishing and maintaining a breastfeeding drop-in centre. The evaluation of the three LGAs with drop-in centres was multifaceted and included observational visits and field notes; data collected from attendance log books from each drop-in centre; a written survey and focus groups with maternal and child health (MCH) nurses who ran the drop-in centres; and semi-structured interviews with MCH coordinators from the participating LGAs. The three LGAs developed and ran different models of breastfeeding drop-in centres. They reported challenges in finding convenient, accessible locations. Overall, attendance was lower than expected, with an average of only one attendee per session. Two global themes were identified regarding staff views: implementation challenges, encompassing finding accessible, available space, recruiting volunteers to provide peer support, and frustration when women did not attend; and the work of SILC-MCHNs, including themes of satisfying and rewarding work, juggling roles, and benefits to women, babies and the community. *The study concluded that providing community-based breastfeeding support was satisfying for the drop-in centre staff but proved difficult to implement, reflected by the lower than anticipated attendances at all the drop-in centres. Interventions to increase breastfeeding in complex community settings require sufficient time to build partnerships with the existing services and the target population; to understand when and how to offer interventions for optimum benefit*. Trial registration: Australian New Zealand Clinical Trials Registry ACTRN12611000898954.

> *Breastfeeding has been shown to result in extensive physical and psychological benefits for both the mother and the newborn. However, the rate and duration of exclusive breastfeeding (EBF) remains low worldwide. Mother–infant skin-to-skin contact (SSC) immediately after birth has demonstrated results that support the argument for breastfeeding continuation.*

Vila-Candel, Duke and Soriano-Vidal et al. (2017) investigated the prevalence of EBF three months postpartum and the effect of early SSC in maintaining optimal EBF practices for mothers and their healthy newborns.[449] They conducted an observational, retrospective study in Spain from 2013 to 2015. Pregnant women were interviewed immediately postpartum and again at three months postpartum regarding variables associated with breastfeeding initiation and continuation. A total of 1071 women were recruited. Early SSC was performed in 92% of vaginal births but only 57% of urgent caesarean births. Of women breastfeeding at discharge, 69.5% performed SSC with their newborn; 68.6% of women were exclusively breastfeeding at discharge and 46.7% at three months postpartum. Type of feeding at discharge, country of origin and parity were found to be associated with each other ($p = .003$, $p = .001$, respectively). Early SSC was also significantly associated with type of feeding at discharge, one month, two months and three months postpartum ($p < .001$). Hypogalactia (19.8%) was the most frequently reported reason for

discontinuing breastfeeding. The authors concluded that *breastfeeding promotion interventions are likely to improve breastfeeding rates at three months postpartum. Social and economic factors should be taken into account when such programs are planned to be implemented.*

> *Although 80% of US mothers begin breastfeeding their infants, many do not continue breastfeeding as long as they would like to. Experiences during the birth hospitalisation affect a mother's ability to establish and maintain breastfeeding. The Baby Friendly Hospital Initiative is a global program launched by the World Health Organization and the United Nations Children's Fund, and has at its core the Ten Steps to Successful Breastfeeding (Ten Steps), which describe evidence-based hospital policies and practices that have been shown to improve breastfeeding outcomes.*

Perrine, Galuska, Dohack et al. (2015) reported on Centers for Disease Control and Prevention (CDC) biennial surveys of Maternity Practices in Infant Nutrition and Care (mPINC) in all birth facilities in all US states, the District of Columbia and territories.[450] CDC analysed data from 2007 (baseline), 2009, 2011 and 2013 to describe trends in the prevalence of facilities using maternity care policies and practices that are consistent with the Ten Steps to Successful Breastfeeding. The percentage of hospitals that reported providing prenatal breastfeeding education (range = 91.1%–92.8%) and teaching mothers breastfeeding techniques (range = 87.8%–92.2%) was high at baseline and across all survey years. Implementation of the other eight steps was lower at baseline. From 2007–2013, six of these steps increased by 10–21 percentage points, although limiting non-breastmilk feeding of breastfed infants and fostering post-discharge support only increased by 5–6 percentage points. Nationally, hospitals implementing more than half of the Ten Steps increased from 28.7% in 2007 to 53.9% in 2013. Maternity care policies and practices that support breastfeeding are improving nationally; however, more work is needed to ensure all women receive optimal breastfeeding support during the birth hospitalisation. *The authors report that because of the documented benefits of breastfeeding to both mothers and children, and because experiences in the first hours and days after birth help determine later breastfeeding outcomes, improved hospital policies and practices could increase rates of breastfeeding nationwide, contributing to improved child health.*

The aim of a study by O'Connor, Allen and Kelly et al. (2017) was to investigate the maternity care factors associated with exclusive breastfeeding duration at three months and six months postpartum in a setting without BFHI accreditation.[451] The study used a prospective cohort design. Participants from one tertiary maternity hospital were eligible if they intended to exclusively breastfeed; had birthed a live, term baby; were breastfeeding at recruitment; were rooming-in with their baby; were healthy and well; and understood English. Participants completed an infant feeding survey using 24-hour recall questions at three time-points. Data were analysed using descriptive statistics, bivariate analysis and regression modelling. A total of 424 participants were recruited, of whom 84% (n = 355) responded to the survey at three months and 79% (n = 335) at six months. *Women who avoided exposure to intrapartum opioid analgesia (e.g. intramuscular, intravenous or epidural) were more likely to be exclusively breastfeeding at three months postpartum* (adjusted odds ratio (aOR) 2.09, 95% confidence interval (CI) 1.15–3.80, probability value (p) 0.016). The only other modifiable predictor of exclusive breastfeeding at three months was non-exposure to artificial formula on the postnatal ward (aOR 2.44, 95% CI 1.43–4.18, $p<0.001$). At six months postpartum, the rate of exclusive breastfeeding had reduced to 5% (n = 16), which rendered regression modelling untenable. *The authors suggest strategies to decrease both exposure to opioid analgesia in birth settings and the use of infant formula on the postnatal ward may improve exclusive breastfeeding at three months. Results suggest both intrapartum and postpartum maternity care practices can predict long-term breastfeeding success.*

Implementation of the Baby Friendly Health Initiative (BFHI) is associated with increases in breastfeeding initiation and duration of exclusive breastfeeding and 'any' breastfeeding. However, implementation of the BFHI is challenging.

A US study in 2015 by Whalen and colleagues concluded that a statewide improvement collaborative had facilitated increases in Ten Step achievement and in-hospital breastfeeding for hospitals participating in an intensive collaborative program.[229] *Active work in Ten Step implementation, including staff education, was found to be more effective in increasing in-hospital breastfeeding than BFHI designation alone*. The intervention aimed to increase achievement of the Ten Steps in New Hampshire's birthing hospitals, facilitate Baby Friendly Hospital Initiative (BFHI) designation for interested hospitals, and improve rates of in-hospital any and exclusive breastfeeding. After conducting a needs assessment in 2010, the authors conducted two statewide workshops targeting six of the Ten Steps found to be most deficient among New Hampshire birthing hospitals. Eighteen of 20 hospitals attended at least one workshop and six participated in an intensive collaborative. In 2013, interval Ten Step achievement and in-hospital breastfeeding trends were analysed. The intervention results suggested staff education showed the greatest improvement, increasing step two achievement from one to six hospitals (P = .05). Although the number of hospitals implementing step six (breastmilk only) and step nine (no artificial nipples) increased, differences were not statistically significant. Intensive collaborative hospitals achieved an average of 1.5 new steps, whereas non-Baby Friendly hospitals lost 0.7 steps (P = .05). In-hospital breastfeeding rates increased in intensive collaborative hospitals and were significantly higher than those in non-Baby Friendly hospitals by the end of the study (any breastfeeding, 89% vs. 73%, P = .03; exclusive breastfeeding, 84% vs. 61%, P < .001).

Munn (2016) examined two national policy documents and 16 original studies to evaluate the impact of the BFHI on breastfeeding and early infant health outcomes in the US.[232] The study used the Social Ecological Model as a guiding theoretical framework. Results were categorised into four interrelated multilevel factors: (1) maternal–infant dyad factors, (2) provider factors, (3) hospital organisational factors, and (4) policy/systems factors. Results from the review were said to support the BFHI's success in facilitating successful breastfeeding initiation and exclusivity. Breastfeeding duration appeared to increase when mothers had increased exposure to Baby Friendly practices, but deficiencies in breastfeeding tracking mechanisms limited reliable breastfeeding duration data. *Of the 10 Steps of the BFHI, Step 3, prenatal education, and Step 10, postnatal breastfeeding support, were found to be the most difficult steps to implement; however, those steps had the potential to significantly affect maternal breastfeeding decisions.*

Howe-Heyman et al. (2016) conducted a systematic review and synthesis of the BFHI as an intervention to improve breastfeeding rates, and found 25 studies for review.[117] More studies supported the BFHI than demonstrated no effect of the intervention. Design weaknesses, settings outside the US, and disparate methods impeded the ability of the authors to reach firm conclusions regarding the effectiveness of the BFHI in improving breastfeeding initiation, duration and exclusivity rates in the US. The conclusions were based on a review of literature published from 1991 to October 2014 using MEDLINE, CINAHL, PsycINFO, and Web of Knowledge with the search term 'Baby-Friendly Hospital Initiative'. The 724 titles initially identified were reviewed using these inclusion criteria: English language, primary research, and available electronically or via interlibrary loan. Studies were excluded if they explicitly stated that they had omitted specific portions of the BFHI or did not fully implement the intervention; considered breastfeeding rather than the BFHI as an intervention; used the BFHI to improve neonatal intensive care unit outcomes specifically; or measured outcomes other than breastfeeding initiation, duration or exclusivity. This yielded 25 studies for review. *The authors identified the need for research conducted in the US and experimental designs in order to more conclusively determine the effectiveness of the BFHI as an intervention to improve US breastfeeding rates.*

A study by Feldman-Winter and colleagues (2017) considered an intervention instituted by the US Centers for Disease Control and Prevention (CDC), which funded the National Institute for Children's Health Quality to conduct a national quality improvement initiative between 2011 and 2015.[236] *It was concluded that the nationwide initiative in maternity care hospitals accomplished rapid transformative changes to achieve Baby Friendly designation, and the changes were accompanied by a significant increase in exclusive breastfeeding.* The intervention was in response to the low number of BF-designated hospitals in the US. The initiative, entitled Best Fed Beginnings, enrolled 90 hospitals in the nationwide initiative. The intervention period lasted from July 2012 to August 2014. During that period, data on process indicators aligned with the Ten Steps to Successful Breastfeeding and outcome measures (overall and exclusively related to breastfeeding) were collected. In addition, data on the Baby Friendly designation were collected after the end of the intervention through until April 2016. Hospitals assembled multidisciplinary teams that included parent partners and community representatives. Three in-person learning sessions were interspersed with remote learning and tests of change, and a web-based platform housed resources and data for widespread sharing. By April 2016, a total of 72 (80%) of the 90 hospitals had received Baby Friendly designation, nearly doubling the number of designated hospitals in the US. Participation in the Best Fed Beginnings initiative had significantly high correlation with BFH designation compared with hospital applicants not in the program (Pearson's r [235]: 0.80; P < .01). Overall breastfeeding increased from 79% to 83% (t = 1.93; P = .057), and exclusive breastfeeding increased from 39% to 61% (t = 9.72; P < .001).

Spaeth, Merten and Zemp et al. (2017) investigated the association of BFH designation (current, former, and never) and compliance with Baby Friendly (BF) practices on breastfeeding in Switzerland, using data from a combined nationwide survey on breastfeeding and BFH monitoring data, and found BFHI implementation in Switzerland was associated with higher breastfeeding rates.[237] The study also asked whether beneficial effects persist beyond a facility's designation as a BFH. In this cross-sectional study, 1326 children were born in 34 current (N = 508), 28 former (N = 425) and 34 never-designated BFHs (N = 393). The study compared exclusive and any breastfeeding according to BFH designation over the first year of life, using Kaplan-Meier Survival curves. Logistic regression models were applied to analyse breastfeeding prevalence and Cox-regression models were used for exclusive (0–6 months) and continued (6–12 months) breastfeeding duration. Average duration of exclusive breastfeeding (13.1 weeks, 95% confidence interval [12.0, 17.4]) and any breastfeeding (32.7 weeks, 95% confidence interval [30.5, 39.2]) were the longest for babies born in currently accredited BFHs. *Exclusive breastfeeding was associated with high compliance with monitored BF practices in current BFHs and with the number of BF practices experienced in all hospitals. Continued breastfeeding was significantly longer when babies were born in current BFHs* (cessation hazard ratio 0.60, 95% confidence interval [0.42, 0.84]) or in former BFHs (cessation hazard ratio 0.68, 95% confidence interval [0.48, 0.97]). Overall, the results support continued investment in BFHs, because babies born in current BFHs are breastfed the most and longest, whereas a former BFH designation shows a sustained effect on continued breastfeeding.

Strauch, Rohrer and Refaat et al. (2016) examined whether initiation of breastfeeding and exclusive breastfeeding on discharge in first-time mothers increased after a change in hospital policy increased reporting requirements about breastfeeding by new mothers.[234] The study reported that mandated reporting of breastfeeding outcomes increased breastfeeding initiation but not duration of breastfeeding. The study looked at 500 women who gave birth to their first child, with half giving birth prior to reporting requirements and half giving birth after reporting began. It was expected that there would be an increase in maternity care practices designed to promote breastfeeding after the implementation of mandatory reporting requirements through an accrediting body. Medical records of the women were reviewed to identify key variables, including age, race/ethnicity, marital status, education level, health insurance, type of delivery, gestational age, initiation of breastfeeding and exclusive breastfeeding throughout the hospital stay. The study found there was an 18.7% increase in initiation of breastfeeding the year the mandatory

reporting began. However, there was a 5.9% decrease in exclusive breastfeeding that year. The odds of initiating breastfeeding were greater after implementation of mandatory reporting measures (OR = 2.07; P = 0.0007), yet the odds for exclusive breastfeeding on discharge did not show a statistically significant change (OR = 0.94; P = 0.7507). Other variables that had a significant effect on both initiation and exclusive breastfeeding included being non-Hispanic white, of other race/ethnicity, marital status and type of insurance (exclusive breastfeeding only). *The authors concluded that professional support offered to new mothers may have a positive effect on their decision to breastfeed but a hospital policy change that increases reporting requirements may not have a long-term impact on breastfeeding*. Longer-term and multi-site studies were needed.

A 2016 study in Brazil by Carvalho and colleagues analysed the association between delivery in a BFH (main exposure) compared with a non-BFH, and timely initiation of breastfeeding using data from a sample of 22,035 mothers/babies from a nationwide hospital-based study of postpartum women and their newborns.[235] Among all births, 40% occurred in hospitals accredited or in accreditation process for the BFHI and 52% of women underwent caesarean section. Using hierarchical logistic regression modelling to accommodate the complexity of the data, the study found the chance of being breastfed in the first hour after birth in Baby Friendly hospitals was twice as high as at non-accredited hospitals. Overall, there was a higher chance of timely initiation of breastfeeding if mothers were less than 35 years old, lived in the north region of the country, received prenatal care in the public sector and advice on breastfeeding during pregnancy, if birth occurred in a BFH and it was vaginal delivery. *Prematurity and low birthweight reduced the chance of timely initiation of breastfeeding.*

Rosenberg, Stull and Adler et al. (2008) explored the association between the BHFI Ten Steps and breastfeeding at two days and two weeks through a 65-question institutional survey used to assess and score compliance with the Ten Steps for each of Oregon's 57 birthing hospitals.[225] Hospital breastfeeding outcomes were obtained from the newborn metabolic screening forms. Hospitals' overall breastfeeding support scores ranged from 49.4 to 98.2 out of a possible total score of 100. Hospital compliance with individual steps ranged from 5.3% for Step 2 (staff training) to 93% for Step 4 (helping with breastfeeding initiation) and Step 8 (encouraging feeding on demand). After controlling for institutional differences (by multivariate linear regression) the authors found that increases in overall hospital scores were associated with increases in the percentage of women breastfeeding at two days ($p = 0.021$) and at two weeks postpartum ($p = 0.011$). After analysing each step individually, however, only the presence of a written hospital policy was independently associated with breastfeeding percentage ($p = 0.028$). *The authors concluded that increased implementation of the Ten Steps is associated with increased breastfeeding and that hospitals with comprehensive breastfeeding policies are likely to have better breastfeeding support services and better breastfeeding outcomes.*

In a 2017 study of the operationalisation of the BFHI, WHO demonstrated the need for countries to monitor their activities on BF outcomes at a national level including via regulation of breastfeeding support standards and integration of the BFHI into the health system.[452] The Evidence Check identified two relevant studies for Australia that examined system-level aspects of BFHI implementation.

AUSTRALIAN EXPERT REVIEW: Atchan, Davis and Foureur (2017) conducted an extensive investigation into implementation of the BFHI in Australia.[238, 239] An instrumental case study design and multiple sources of data critically examined the enabling factors and barriers to the implementation and dissemination of a global health strategy to support breastfeeding in a national setting. The combined findings of the document and interview analyses demonstrated that historical events and situational context are interrelated and both exert either an enabling influence or barrier on the awareness, acceptance, sense of applicability and uptake of the Baby Friendly Health Initiative (BFHI) strategy at all levels of the health system in Australia. The presence of both enabling factors and barriers has significantly influenced the

dissemination of the BFHI in Australia. Enabling factors were found to be intangible in nature, consisting of an altruistic belief in breastfeeding support as being important for women, babies and the world. In contrast, the barriers were found to be tangible: namely inadequate resourcing at all levels of the healthcare system constraining delivery of the BFHI at local levels. Recommendations included that any future expansion requires authentic government engagement and tangible incentives in collaboration with key stakeholders. *The authors concluded that prioritisation, stakeholder collaboration and adequate resourcing of the BFHI is required to create a supportive and enabling environment for Australian women to determine and practise their preferred infant feeding method.*

AUSTRALIAN STUDY: In a 2017 review, Esbati and colleagues analysed publicly available legislation, policy and guidelines relevant to national and state government policy support for BFHI and its uptake and implementation in Australia, and examined trends and coverage of BFHI in Australia.[240] *They found a declining number of maternity facilities have been accredited since 2011, with only one in five accredited by 2016. The study found legislation documents contained no direct references to the BFHI or Code of Marketing of Breastmilk Substitutes, despite the documents being supportive of breastfeeding.* There was little reference to the Code or to monitoring the Marketing in Australia of Infant Formulas (MAIF) Agreement at national and state levels. They also identified gaps in documentation for monitoring breastfeeding rates at the national level.

BFHI and human milk banking

EXPERT REVIEW: The WHO has stated (2013) that where a child cannot be breastfed by its mother, the next best option after receiving her expressed milk is to be breastfed or receive the milk of another woman.[3] In 2011, WHO also stated that low-birthweight infants, including those with very low birthweight, who cannot be fed mother's own milk should be fed donor milk (where safe and affordable milk-banking facilities are available). In 2017 WHO[71] stated that low-birthweight infants who cannot be fed their mothers own milk should receive donor milk (p.19), citing previous guidance of 2009.

EXPERT REVIEW: The 2016 PAHO *review of BFHI implementation suggested it would be strengthened by linking it to the establishment of human milk banks and other initiatives, and identifying cost savings to hospitals from BFHI adoption.*[200]

EXPERT REVIEW: Interventions to support breastfeeding and human milk feeding of sick or vulnerable infants are incorporated into the WHO 2017 BFHI, and specifically addressed in the Neo-BFHI for Neonatal Wards.[243]

In 2009, Renfrew, Craig and Dyson et al. undertook a major health technology assessment (HTA) of the effectiveness and cost-effectiveness of interventions that promote or inhibit breastfeeding or feeding with breastmilk for infants admitted to neonatal units.[18] This systematic review and economic analysis identified 48 studies of effectiveness, though no studies met the selection criteria for the health economics review. *The study found strong evidence that short periods of kangaroo skin-to-skin contact for infants in neonatal intensive care units (NICUs) increased the duration of any breastfeeding for one month after discharge* [risk ratio (RR) 4.76, 95% confidence interval (CI) 1.19–19.10] and for more than six weeks (RR 1.95, 95% CI 1.03–3.70) among clinically stable infants in industrialised settings. It also found strong evidence for the effectiveness of peer support at home (in Manila) for mothers of term, low-birthweight infants on any breastfeeding up to 24 weeks (RR 2.18, 95% CI 1.45–3.29) and exclusive breastfeeding from birth to six months (RR 65.94, 95% CI 4.12–1055.70), and for the effectiveness of peer support in hospital and at home for mothers of infants in special care baby units on providing any breastmilk at 12 weeks [odds ratio (OR) 2.81, 95% CI 1.11–7.14; p = 0.01]. It found more limited evidence for the effectiveness of skilled professional support in a US neonatal intensive care unit on infants receiving any breastmilk at discharge (OR 2.0, 95% CI 1.2–3.2, p = 0.004), and for multidisciplinary staff training, which may increase knowledge and can increase initiation rates and duration of breastfeeding. Lack of staff training was identified as an important barrier to

implementation of effective interventions. Baby Friendly accreditation of the associated maternity hospital was found to result in improvements in several breastfeeding-related outcomes for infants in neonatal units. Limited evidence suggests that cup feeding (versus bottle feeding) may increase breastfeeding at discharge and reduce the frequency of oxygen desaturation. Breastmilk expression using simultaneous pumping with an electric pump has advantages in the first two weeks. Pharmaceutical galactagogues have little benefit among mothers who have recently given birth.

The economic analysis by the Renfrew team found additional skilled professional support in hospital was more effective and less costly (due to reduced neonatal illness) than normal staff contact. Additional support ranged from 0.009 quality-adjusted life-years (QALYs) to 0.251 QALYs more beneficial per infant and ranged from £66 to £586 cheaper per infant across the birthweight subpopulations. Donor milk would become cost-effective given improved mechanisms for its provision. The HTA concluded that despite the limitations of the evidence base, kangaroo skin-to-skin contact, peer support, simultaneous breastmilk pumping, multidisciplinary staff training and the Baby Friendly accreditation of the associated maternity hospital were effective, and skilled support from trained staff in hospital is potentially cost-effective. The authors concluded that, as many of these interventions are interrelated, it was unlikely that specific clinical interventions would be effective if used alone in NICUs.

EXPERT REVIEW: Arslanoglu and colleagues (2013) reported on current evidence and research directions for donor human milk for preterm infants for the Committee on Nutrition of the European Society for Pediatric Gastroenterology, Hepatology and Nutrition.[246] The aim of the review was to document the existing evidence of the benefits and common concerns deriving from the use of donor human milk (DHM) in preterm infants. The study outlines gaps in knowledge and gives recommendations for practice and suggestions for future research directions. Protection against necrotising enterocolitis is the major clinical benefit deriving from the use of DHM when compared with formula. Limited data also suggest unfortified DHM is associated with improved feeding tolerance and with reduced cardiovascular risk factors during adolescence. *Presence of a human milk bank (HMB) does not decrease breastfeeding rates at discharge, but decreases the use of formula during the first weeks of life. This commentary emphasises that fresh own mother's milk (OMM) is the first choice in preterm infant feeding and strong efforts should be made to promote lactation. When OMM is not available, DHM is the recommended alternative. When neither OMM nor DHM is available, preterm formula should be used.* DHM should be provided from an established HMB, which follows specific safety guidelines. Storage and processing of human milk reduces some biological components, which may diminish its health benefits. From a nutritional point of view, DHM, like HM, does not meet the requirements of preterm infants, necessitating a specific fortification regimen to optimise growth. Future research should focus on the improvement of milk processing in HMB, particularly of heat treatment; on the optimisation of HM fortification; and on further evaluation of the potential clinical benefits of processed and fortified DHM.

AUSTRALIAN EXPERT REVIEW: A 2014 paper by the Commonwealth of Australia Department of Health reported that emerging projects should be guided by operating principles already in use and existing legal frameworks.[252] It concluded regulatory considerations for milk banks were too complex to be pursued. The paper discussed the financial, legal and regulatory barriers to establishing milk banks in Australia, and considered that decisions about establishing, managing and resourcing milk banks should be made by local hospital networks, subject to local priorities.

Arnold (2006) examined the role of donor human milk banking in international human rights documents and global health policies.[254] The review reported that *for countries looking to improve child health, the promotion, protection and support of donor human milk banks has an important role to play for the most vulnerable of infants and children.* This review is based on qualitative triangulation research conducted for a doctoral dissertation. The three methods used in triangulation were 1) writing as a method of inquiry, 2) an

integrative research review, and 3) personal experience and knowledge of the topic. Discussion of the international human rights documents and global health policies shows there is a wealth of documentation to support promotion, protection and support of donor milk banking as an integral part of child health and survival. By using these policy documents, health ministries, professional associations and donor milk banking associations can find rationales for establishing, increasing or continuing to provide milk banking services in any country, and thereby improve the health of children and future generations of adults.

Arnold (2008) reported that *barriers to the use of banked donor milk are numerous, and many patients are denied access to it because of lack of policy explicitly addressing its use.*[254] This examination of US health policies, both governmental and professional, addressing child health and breastfeeding suggests where donor milk banking services should be included to fulfil the ethical principles of justice (fair access) and autonomy. It also highlights the need for research to support future policy development.

In 2015 Stevens and colleagues conducted a study into how research on charitable giving can inform strategies to promote human milk donations to milk banks.[453] Many hospitalised preterm infants do not exclusively receive mother's own milk, so milk from another mother may be sought. Previous research indicated that just 1% of US women who express breastmilk donate it for another family. The authors said *strategies to boost donation rates should be identified*. They drew on the experimental literature on charitable giving of monetary donations to offer six strategies to promote breastmilk donations to milk banks in North America. These strategies included: (1) highlighting a potential identifiable recipient of donated breastmilk as opposed to highlighting groups of potential recipients; (2) emphasising similarities between the potential donor and potential beneficiaries; (3) emphasising similarities between the potential donor and previous donors; (4) using negative arousal to promote donations; (5) emphasising the self-interest of those asking for breastmilk donations; and (6) highlighting the specific effect of breastmilk donations. Potential limitations of these strategies were discussed.

EXPERT REVIEW: A study by PATH (formerly the Program for Appropriate Technology in Health) in 2013 provided guidelines that reflected the objective of encouraging the nationwide expansion of hospital milk banking for preterm and very low-birthweight infants (in accordance with WHO recommendations for appropriate donor human milk use) in a way that supports rather than displaces maternal breastfeeding.[74]

EXPERT REVIEW: DeMarchis and colleagues reported in (2017) that the provision of donor human milk can significantly reduce morbidity and mortality among vulnerable infants and is recommended by the WHO as the next best option when a mother's own milk is unavailable.[256] Regulated human milk banks can meet this need, but scale-up has been hindered by the absence of an appropriate model for resource-limited settings and a lack of policy support for human milk banks and for the operational procedures supporting them. *To reduce infant mortality, human milk banking systems need to be scaled up and integrated with other components of newborn care.* This article draws on current guidelines and best practices from human milk banks to offer a compilation of universal requirements that provide a foundation for an integrated model of newborn care that is appropriate for low- and high-resource settings alike.

In Britain, formal National Health Service costing guidelines have been developed (2010) to support milk banking by NICU units.[259] This stands alongside National Institute for Health and Care Excellence (NICE) guidelines for donor milk banking.

EXPERT REVIEW: The 2017 review by Meier[244] canvassed methods to promote human milk feeding in the preterm infant. The review raised concerns at the increasing tendency in quality improvement research to combine mother's HM and donor HM into the same metric, often referred to as 'human milk fed' or 'breastmilk fed'. The distinction is critical as pasteurised donor human milk does not provide the same reduction in clinical risks for the recipient infant as mother's own milk. The authors note that there is funding competition between milk banks and lactation support services, with scarce funds often invested in milk bank infrastructure rather than in acquiring milk from the infant's own mother.

EXPERT REVIEW: In 2017, Hartmann reported that the provision of donor human milk avoids the risks associated with early infant formula feeding only when maternal milk is unavailable.[257] Donor human milk-banking services (DHMBS) should provide an effective clinical service that causes no harm to donors or recipients. This article aims to begin the process of defining the minimum acceptable standard required for safe donor human milk banking in the neonatal unit. An assessment process is established to consider the potential risks and benefits of milk banking to both recipients and donors. These risks and benefits define the clinical and social responsibilities of DHMBS.

In a 2013 study, Lutter and Morrow considered protection, promotion and support of, and global trends in breastfeeding.[60] They reported that a number of case studies have shown that promotion of breastfeeding (BF) coincides with improved BF and exclusive breastfeeding (EBF) practices. They quantified the relationship between BF promotion and changes in BF practices by analysing the relationship between implementation of the Global Strategy for Infant and Young Child Feeding (GSIYCF), as measured by the World Breastfeeding Trends Initiative (WBTi), and trends in EBF and BF duration over the past 20 years in 22 countries in Africa, Asia, the Middle East and Latin America. The median annual increase in EBF was 1.0% a year in countries in the upper 50th percentile of WBTi scores, indicating national policies and programs most consistent with WHO/UNICEF recommendations, whereas the median increase in EBF was only 0.2% a year in countries with the lowest WBTi scores (P = 0.01). The median annual increase in BF duration in all countries was < 0.1% a year. The annual increase in EBF was not associated with maternal demographic factors, such as urban residence, paid maternal employment, maternal education, or gross national income. *The results showed the association between BF protection, promotion and support and improved EBF is measurable and, strengthened by case studies, possibly causal.*

Hospital milk banks

A systematic review by Buckle and Taylor (2017) studied the cost and cost-effectiveness of donor human milk in preventing necrotising enterocolitis (NEC).[60] Necrotising enterocolitis is a costly gastrointestinal disorder that mainly affects preterm and low-birthweight infants and can lead to considerable morbidity and mortality. Mother's own milk is protective against NEC but is not always available. In such cases, donor human milk has also been shown to be protective (although to a lesser extent) compared with formula milk, but it is more expensive. This systematic review aimed to evaluate the cost of donor milk, the cost of treating NEC, and the cost-effectiveness of exclusive donor milk versus formula milk feeding to reduce the short-term health and treatment costs of NEC. A systematic search of five relevant databases found studies with verifiable costs or charges for donor milk and/or treatment of NEC and any economic evaluations comparing exclusive donor milk with exclusive formula milk feeding. All search results were double-screened. Seven studies with verifiable donor milk costs and 17 with verifiable NEC treatment costs were included. The types of cost or charge varied considerably across studies, so the authors did not attempt quantitative synthesis. Estimates of the incremental length of stay associated with NEC were approximately 18 days for medical NEC and 50 days for surgical NEC. Two studies claimed to report economic evaluations but did not do so in practice. *The authors concluded that it is likely that donor milk provides short-term cost savings by reducing the incidence of NEC.* Future studies should provide more details on cost components included; and a full economic evaluation, including long-term outcomes, should be undertaken.

NEC is a costly morbidity in very low birthweight (VLBW: < 1500 g birthweight) infants that increases hospital length of stay and requires expensive treatment.[262] The 2015 study by Johnson, Patel and Bigger et al. aimed to evaluate the cost of NEC as a function of dose and exposure period of human milk (HM) feedings received by VLBW infants during neonatal intensive care unit (NICU) hospitalisation and determine the drivers of differences in NICU hospitalisation costs for infants with and without NEC. The study included 291 VLBW infants enrolled in a US National Institutes of Health (NIH)-funded prospective observational cohort study between February 2008 and July 2012. It examined the incidence of NEC, NICU hospitalisation

cost, and cost of individual resources used during the NICU hospitalisation. Twenty-nine (10.0%) infants developed NEC. The average total NICU hospitalisation cost (in 2012 USD) was US$180,163 for infants with NEC and US$134,494 for infants without NEC (p = 0.024). NEC was associated with a marginal increase in costs of US$43,818 after controlling for demographic characteristics, risk of NEC and average daily dose of HM during days 1–14 (p < 0.001). Each additional ml/kg/day of HM during days 1–14 decreased non-NEC-related NICU costs by US$534 (p < 0.001). *The study concluded that avoidance of formula and use of exclusive HM feedings during the first 14 days of life is an effective strategy to reduce the risk of NEC and resultant NICU costs in VLBW infants.* Hospitals investing in initiatives to feed exclusive HM during the first 14 days of life could substantially reduce NEC-related NICU hospitalisation costs.

Human milk (HM) feeding is associated with lower incidence and severity of costly prematurity-specific morbidities compared with formula feeding in very low birthweight (VLBW: < 1500 g) infants. Jegier et al. (2010) reported that the costs of providing HM are not routinely reimbursed by payers and can be a significant barrier for mothers.[49] This study determined the initial maternal cost of providing 100 mL of HM for VLBW infants during the early NICU stay. This secondary analysis examined data from 111 mothers, who provided HM for their VLBW infants during the early NICU stay. These data were collected during a multi-site RCT in which milk output and time spent pumping were recorded for every pumping session (n = 13,273). The cost analysis examined the cost of the breast pump rental, pump kit, and maternal opportunity cost (an estimate of the cost of maternal time). Mean daily milk output and time spent pumping were 558.2 mL (SD = 320.7; range = 0–2024) and 98.7 minutes (SD = 38.6; range = 0–295), respectively. The mean cost of providing 100 mL of HM varied from $2.60 to $6.18 when maternal opportunity cost was included and from $0.95 to $1.55 when it was excluded. The cost per 100 mL of HM declined with every additional day of pumping and was most sensitive to the costs of the breast pump rental and pump kit. *These findings indicate that HM is reasonably inexpensive to provide and that the maternal cost of providing milk is mitigated by increasing milk output over the early NICU stay.*

In a 2012 review, Carroll (2012) reported that there is an increased use of pasteurised donor human milk (PDHM) in North American NICUs in order to achieve exclusive human milk (EHM) feeding for preterm infants.[251] Australia, on the other hand, is relatively new to introducing PDHM to NICUs. Very little is known about the perceptions of PDHM within multidisciplinary NICU teams. The article reported on a survey of 89 NICU clinicians that was implemented during the first weeks of PDHM use in an American NICU, and was repeated six months later. The clinicians' knowledge and opinions of PDHM and their inclination to recommend its use were evaluated using thematic coding and descriptive statistics. The study found after a six-month trial, preparedness to recommend PDHM increased to 93%; NICU clinicians' support for PDHM exceeded their knowledge of its risks and benefits and they requested education about various aspects of PDHM. *The research in this article aims to assist clinical staff educators as they go about introducing PDHM in NICUs.*

Donor human milk (DHM) is increasingly being used in NICUs to achieve EHM feedings in preterm infants. In 2013, Carroll and Herrmann conducted a study to determine the cost of DHM to achieve EHM feeding for very preterm infants.[48] The hypothesis was that the cost of DHM per infant is modulated by the availability of mother's own milk (MOM). Preterm infants (< 1500 g at birthweight or < 33 weeks in gestational age) were retrospectively evaluated for a one-year interval. MOM, DHM and formula feeding categories were determined. A DHM feeding log was retrospectively analysed for feeding volumes (in millilitres) and duration (in days). Four categories were created, based on maternal ability to provide sufficient breastmilk volumes and her intention to breastfeed. The volume, duration and cost of DHM were calculated for each category. Forty-six of the 64 (72%) infants admitted to the NICU who were < 33 weeks in gestational age received DHM. Four categories of DHM use were observed. The mean costs of DHM were $27 for infants of mothers who provided sufficient breastmilk through to discharge, $154 for infants of mothers who had insufficient milk supply during admission, $281 for infants of mothers who went home on formula but

received any volume of MOM during admission, and $590 for infants who received no MOM during admission. *Most NICU mothers (72%) of very preterm infants were unable to provide all the milk necessary for an EHM diet.* Few infants (15%) received exclusively DHM. The cost of DHM per NICU infant ranged from $27 to $590 and was influenced by the mother's willingness or ability to provide human milk.

In a 2017 study of the effect of dedicated lactation support services on breastfeeding outcomes in extremely low-weight neonates, Gharib et al. reported that breastfeeding was associated with major benefits for high-risk infants born prematurely, yet this population faced significant challenges in breastfeeding.[427] Lactation services provide successful interventions, yet the impact of lactation services on breastfeeding outcomes in preterm infants is understudied. The study sought to examine whether the provision of full-time lactation support in the NICU would improve quantitative breastfeeding measures in premature infants. A longitudinal retrospective nonexperimental design was used. Data were collected from medical records of breastfeeding outcomes in patients of 30 weeks' gestational age and under admitted to a level-IV regional NICU over three epochs of varying levels of lactation services, from none to full time. Demographic, medical and breastfeeding data were collected. Data analysis was performed using standard statistical tests and hierarchical regression analysis. A significant increase in the number of lactation consults was observed across epochs, and the number of infants who received human milk via feeding at the breast, as the first oral feeding, increased across epochs. After controlling for covariates, the odds of infants receiving any human milk compared with exclusive formula feeding increased across epochs. *The authors concluded that the provision of full-time dedicated NICU lactation support is associated with an increase in breastfeeding outcome measures for high-risk preterm infants.*

EXPERT REVIEW: Meier et al. (2017) studied evidence-based methods that promote human milk feeding of preterm infants. They reported that best practices translating the evidence for high-dose human milk (HM) feeding for preterm infants during NICU hospitalisation have been described, but their implementation has been compromised.[244] Although the rates of any HM feeding have increased over the past decade, efforts to help mothers maintain HM provision through to NICU discharge have remained problematic. *Special emphasis should be placed on prioritising the early lactation period of coming to volume so that mothers have sufficient HM volume to achieve their personal HM feeding goals.* DHM does not provide the same risk reduction as own mother's milk.

Studies by Kantorowska et al. (2016) examined the impact of donor milk availability on breastmilk use in NICUs.[247] The aim was to examine the availability of DHM in a population-based cohort and assess whether its availability was associated with rates of breastmilk feeding at NICU discharge and rates of NEC. Individual patient clinical data for very low-birthweight infants from the California Perinatal Quality Care Collaborative were linked to hospital-level data on DHM availability from the Mothers' Milk Bank of San Jose for 2007–2013. Trends of DHM availability were examined by level of NICU care. Hospitals that transitioned from not having DHM to having DHM availability during the study period were examined to assess changes in rates of breastmilk feeding at NICU discharge and NEC. The availability of DHM increased from 27 to 55 hospitals during the study period. The availability increased for all levels of care including regional, community and intermediate NICUs, with the highest increase occurring in regional NICUs. By 2013, 81.3% of premature infants cared for in regional NICUs had access to DHM. Of the 22 hospitals that had a clear transition to having DHM available, there was a 10% increase in breastmilk feeding at NICU discharge and a concomitant 2.6% decrease in NEC rates. *The study concluded that the availability of DHM has increased over time and has been associated with positive changes, including increased breastmilk feeding at NICU discharge and a decrease in NEC rates.*

Parker et al. (2016) reported that it was unclear whether use of donor milk (DM) changes the provision of mother's own milk (MOM) to very low-birthweight (VLBW) infants in the NICU.[248] The study sought to determine: (1) the rates of any MOM and human milk consumption at feeding initiation and discharge, and

(2) whether the proportion of VLBW infants who stopped consuming any MOM and human milk during hospitalisation changed in the two years before and after implementation of a DM program in a US inner-city level-III NICU. The study focused on VLBW infants admitted to Boston Medical Center in the two years before (n = 74) and after (n = 80) implementation of the DM program in June 2011. Multivariable logistic regression was used to compare milk consumption at feeding initiation and discharge and Cox proportional hazards to compare the proportion of infants who stopped consuming milk during the hospitalisation pre and post the DM program. After adjustment for maternal race, age, insurance, delivery type, gestational age and birthweight, the study found a sixfold increased odds (95% CI, 2.0–17.7) of consuming MOM at discharge and a 49% reduction in the cessation of MOM consumption during hospitalisation (hazard ratio [HR], 0.51; 95% CI, 0.28–0.93) in the two years after versus before the DM program. The authors concluded that the implementation of a DM program was associated with greater consumption of MOM throughout hospitalisation and at discharge among VLBW infants. *Implementation of DM programs may augment support of mothers to provide breastmilk in level-III NICUs.*

Dritsakou et al. (2016) examined outcomes of feeding low-birthweight infants with predominantly raw human milk versus donor milk and formula and found breastfeeding initiation occurred two weeks earlier in the former group.[249] The study investigated the benefits of treating low-birthweight infants predominantly with mother's own raw milk and early initiation of breastfeeding (raw human milk/breastfed infants) in comparison with feeding only with donor-banked milk (until the third week of life) and afterwards a preterm formula until hospital discharge (donor-banked/formula-fed infants). A total of 192 predominantly raw-human-milk-fed infants (70% of raw and 30% of donor milk) were matched to 192 donor/formula-fed ones (on 1:1 ratio). Aggressive nutrition policy and targeted fortification of human milk were implemented in both groups. The two groups showed similar demographic and perinatal characteristics. Predominantly raw-milk-fed infants regained their birth weight earlier, suffered fewer episodes of feeding intolerance and presented a higher body length and head circumference at discharge ($p < 0.001$). Those treated mainly with their mothers' milk were able to initiate breastfeeding almost two weeks earlier compared with those fed with donor milk, who were bottle-fed later on post-conceptual age ($p < 0.001$). Infants breastfed until the eighth month of life had fewer visits to a paediatrician for a viral infection compared with those in the other group ($p < 0.001$). *The authors concluded that feeding predominantly with mother's raw milk seems to result in optimal neonatal outcomes.*

Assad et al. (2016) found decreased cost and more rapid progression to full feeds among VLBW infants fed an exclusively human milk diet.[454] Human milk is the best form of nutrition for preterm infants and has been associated with a lower incidence of NEC. Infants who develop NEC have a higher incidence of feeding intolerance and longer hospitalisations. The combination of a donor milk bank and donor milk-derived fortifier has changed feeding practices in NICUs. This study assessed the benefits and cost of an exclusive human milk (EHM) diet in VLBW infants in a community level-III NICU. The study was retrospective and included preterm infants of 28 weeks and/or VLBW (1500 g) who were enrolled from March 2009 until March 2014. Infants were grouped as follows: group H (entirely human milk-fed, born March 2012 to 2014), group B (bovine-based fortifier and maternal milk, born March 2009 to 2012), group M (mixed combination of maternal milk, bovine-based fortifier and formula, born March 2009 to 2012) and group F (formula-fed infants, born March 2009 to 2012). Baseline characteristics among the four groups were similar. The study included 293 infants between gestational ages of 23 and 34 weeks and birthweights between 490 g and 1700 g. Feeding intolerance occurred less often ($P < 0.0001$), number of days to full feeds was lower ($P < 0.001$), incidence of NEC was lower ($P < 0.011$), and total hospitalisation costs were lower by up to $106,968 per infant ($P < 0.004$) in those fed an EHM diet compared with the other groups. Average weight gain per day was similar among the four groups (18.5–20.6 g per day). The authors concluded that *implementing an EHM diet in VLBW infants leads to a significant decrease in the incidence of NEC. Other benefits of this diet*

include: decreased feeding intolerance, shorter time to full feeds, shorter length of stay, and lower hospital and physician charges for extremely premature and VLBW infants.

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In a 2017 Canadian study, Gharib et al.[427] showed improved breastfeeding outcomes from dedicated lactation consultant support in NICUs in an uncontrolled before–after study. Relevant studies on targeted support are considered under Q2 regarding at-risk mothers and babies.

ANBS-E Strategy 7

Noting evidence that increased maternal confidence and professional and peer support are key determinants in increasing breastfeeding duration, a 2008 RCT study in a single hospital in Northern Ireland by Stockdale and colleagues compared the effects of current breastfeeding instruction with a motivationally enhanced version in a RCT.[455] Participants were first-time mothers (n = 182) recruited at the 20-week antenatal appointment. A model of motivational instructional design was applied to routine breastfeeding instruction to create an intervention package intended to increase maternal confidence and align expectations with postnatal experience through routine antenatal and postnatal instruction. Participants were encouraged to think of breastfeeding as a learnt behaviour rather than being 'instinctive' or 'natural', and were introduced prenatally to common breastfeeding challenges along with information about how to increase their control and confidence in managing the postnatal environment. The primary measured outcome was women's motivation to sustain breastfeeding. The trial showed that motivationally enhanced instruction significantly increased maternal confidence and perceived midwife support. Secondary outcomes included increased persistence with breastfeeding on discharge (64% versus 44%) and at three weeks postnatally (53% vs. 20% in control group). The author concluded that as breastfeeding is a complex behaviour, breastfeeding educators and researchers should further explore the role of expectation of success in relation to women's perceived experience of breastfeeding, and re-direct development and testing of interventions based on the trial findings.

Wong et al. (2014) tested the effects of a professional one-to-one antenatal breastfeeding support and education intervention to increase exclusive breastfeeding (EBF) and duration through an RCT among 469 primiparous women who attended the antenatal clinics of two geographically distributed public hospitals in Hong Kong.[456, 457] The EBF rate in the intervention group was 37.8% at six weeks postpartum compared with 36.4% in the standard care group (P = .77; 95% confidence interval [CI] –0.08 to 0.11). There were no significant differences between the two groups in EBF rates at three and six months or in the overall duration of any or exclusive breastfeeding. The authors concluded that *one-to-one antenatal breastfeeding support and education did not increase the exclusivity or duration of breastfeeding in this setting.*

An RCT by Su et al. (2007) examined whether antenatal education and postnatal support improved rates of exclusive breastfeeding, finding that *antenatal breastfeeding education and postnatal lactation support, as single interventions based in hospital, both significantly improved rates of exclusive breastfeeding up to six months after delivery.*[458] Postnatal support was marginally more effective than antenatal education.

AUSTRALIAN STUDY: An extended postnatal midwifery program tested in an RCT in Australia by McDonald, Henderson and Faulkner et al. (2010) showed no difference between the groups at six months postpartum for either full breastfeeding or any breastfeeding.[459] Home visiting services were also examined by Kemp et al. (2011) for their effectiveness in supporting breastfeeding.[460] The study reported an RCT involving a long-term nurse home visitation program in an area in Sydney. Breastfeeding duration was about eight weeks longer for intervention mothers than comparison mothers.

Appendix 6: Included review studies

Abe, S., J. Jung, M. Rahman, et al., 2016, Hospitals with a written breastfeeding policy statement and implementation of the steps of breastfeeding: a systematic review [protocol]. PROSPERO. 2016:CRD42016038143 (http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42016038143). *PROSPERO*.

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Conde-Agudelo, A. and J. L. Díaz-Rossello, 2016, Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database of Systematic Reviews* (8): CD002771, 2016 Aug 23.

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de Jesus, P. C., M. I. de Oliveira and S. C. Fonseca, 2016, Impact of health professional training in breastfeeding on their knowledge, skills, and hospital practices: a systematic review. *Jornal de Pediatria* **92**(5): 436–450.

Dennis, C.L. and Kingston, D., 2008, A Systematic Review of Telephone Support for Women During Pregnancy and the Early Postpartum Period. *Journal of Obstetric, Gynecologic, & Neonatal Nursing* **37**(3): 301–314.

Dyson, L., M. J. Renfrew, A. McFadden, et al., 2010, Policy and public health recommendations to promote the initiation and duration of breast-feeding in developed country settings. *Public Health Nutrition* **13**(1): 137–44.

European Commission. Directorate Public Health and Risk Assessment, 2008, EU Project on Promotion of Breastfeeding in Europe. Protection, promotion and support of breastfeeding in Europe: a blueprint for action (revised). Luxembourg, European Commission, Directorate Public Health and Risk Assessment.

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Figures and tables

Figure 1 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram

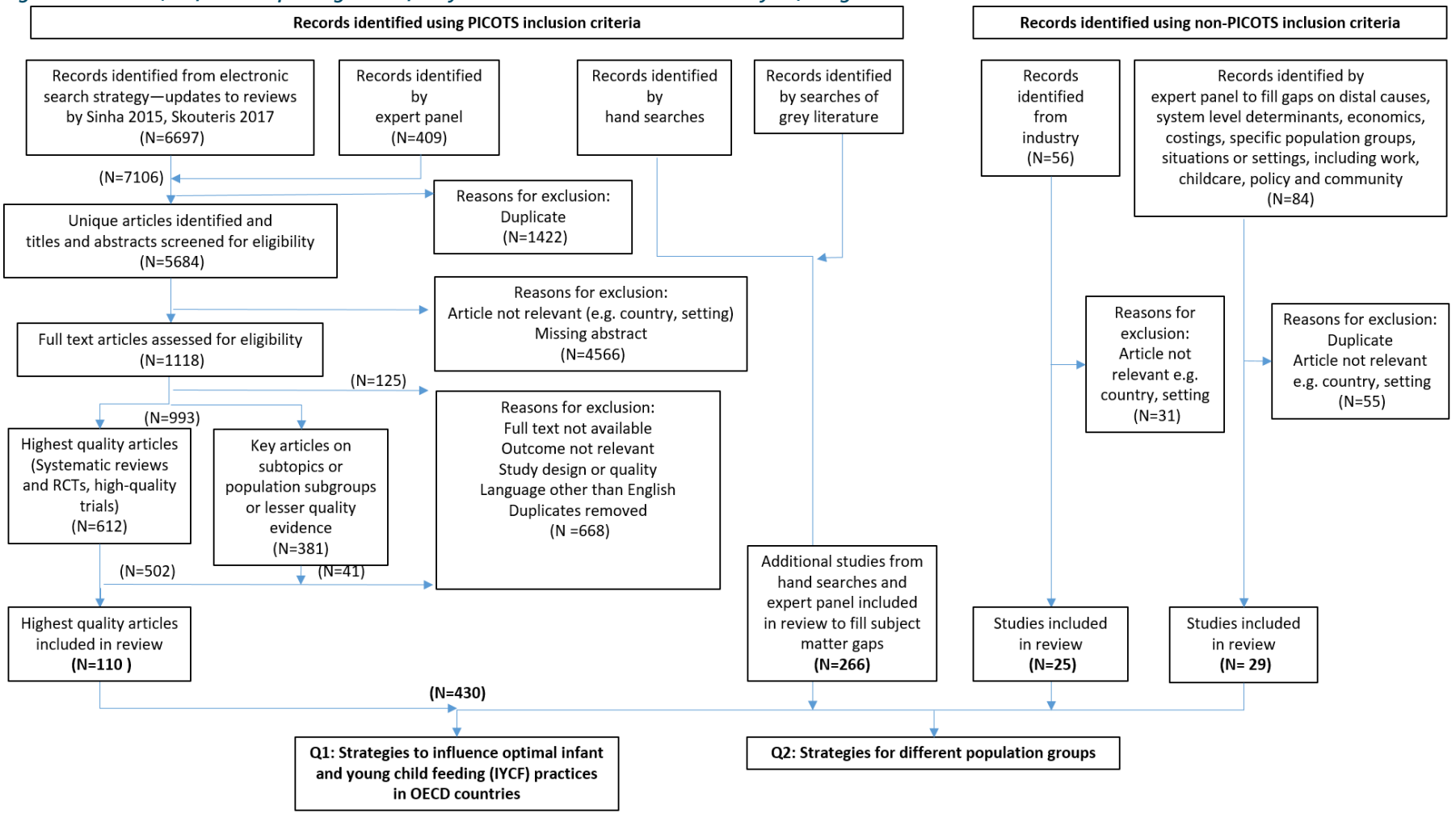

Table 1 Information source summary

Information source	Searches	Identified literature	Filters (date)	Filters (study design)	Databases
1. Selected online databases	Updates of key systematic reviews (Rollins 2015 & Skouteris 2017)	Identified new academic literature	From search end dates of named systematic reviews	Systematic reviews, RCTs and high-quality reviews, population-based cohort studies and pre–post studies	Cochrane, MEDLINE, PsycINFO, PubMed CINAHL
2. Expert panel	Expert panel	Identified quality systematic reviews and key papers	2007–2017	Systematic reviews and key papers for individual strategies	n.a.
3. Hand searches	Back/forward tracing from SR reference lists	Identified grey literature and post SR academic literature	2007–2017	Evaluated strategy (all strategies)	ABA Breastfeeding Information and Research Service
4. Targeted online search of databases	Dragnet — strategy specific 'gap filler'	Identified academic and grey literature	2007–2017	Evaluated strategy (policy, community, work settings)	Google Scholar, PubMed, Scopus, Proquest, SuperSearch CINAHL
5. Industry studies	Industry report content	Identified industry literature	Most recent country or strategy report	Evaluated strategy (marketing, social marketing)	Euromonitor Passport

Table 3 Keyword groupings used to form database search strategy

See over page

PICOTS	Groupings	Example search terms
Population	Women with infants or young children (0–36 months) Subgroups of mothers at risk of premature cessation of breastfeeding or lactation Subgroups of infants at risk of premature weaning from optimal breastfeeding Other social and cultural groups that may be the subject of interventions that indirectly affect mother's breastfeeding outcome	Breastfeeding mother, women of reproductive age Socio-economic-demographic risk factors: adolescent, teenage, under 25 years, young, low socioeconomic status, low income, poor, low SES, low education, social gradient, unmarried, sole parent, disadvantaged, economic insecurity, Centrelink indigenous, aboriginal, Aboriginal and Torres Strait Islander (ATSI); culturally and linguistically diverse (CALD), immigrant, migrant, ethnicity, refugee Early postnatal return to work Situational risk factors: detention, prison, incarcerated, emergency, disaster Health or maternal trauma risk factors: HIV/AIDS, lactation disorders, smoking, diabetes, obesity, depression, mental health, family violence, sexual abuse, assisted delivery, method of delivery/birth type e.g caesarean, delayed initiation, peri-natal or post-natal post-traumatic stress disorder (PTSD) Premature, pre-term, multiple birth, low birthweight, ankyloglossia, tongue-tie, hypoglycaemia, jaundice, hyperbilirubinemia, cleft lips and palate, unwell unsettled, cry-fuss behaviours Women who donate/share/sell breastmilk Women whose infant receives donated/shared/sold breastmilk Family, peer, social network, father/partner, grandmother Health worker, physician, family practice, [MeSH], Lactation consultant, health professional, health personnel, general practitioner, doctor, paediatrician, midwife, nurse, maternal and child health nurse, family nurse, maternal health service, dietitian, pharmacist, baby whisperer Employer, co-worker, associates, childcare worker

Interventions	Policy, community environments	Intervention, trial, program, policy, strategy, guidelines Public awareness and acceptance campaign, health/breastfeeding promotion, health campaign Breastfeeding education, support, social mobilization, social marketing, mass media, social media, primary school education, "Social Support" [MeSH] Taxation, subsidies, funding, public health care, Medicare, Medibank Private, health insurance, COAG, Commonwealth-State Health Care Funding Agreement, financing, incentive, invest, resource, finance, budget, rebates, out of pocket medical expenses, "Women, Infants and Children Program", lactation consultants, breastfeeding support, scaling-up, monitoring, evaluation, "Program Evaluation" [MeSH] Restriction of advertising, WHO International Code of Marketing of Breastmilk Substitutes, WHO Code, dietary/infant feeding guidelines, food regulation, food safety, infant formula standards, commercial marketing, advertising, promotion, sponsorship, labelling, packaging, composition, health and nutrition claims, breast pumps, lactation aids, breast-milk substitutes, bottles, teats, feeding equipment, gifts, samples, supplies Dietary/infant feeding guidelines, milk banking, milk donation, milk sale, emergency and disaster planning and management Breastfeeding protection, human rights, sex discrimination, legislation, law, Family Court, child protection
	Work and employment	Returning to work, employment, work-family balance, flexible work, work-based childcare, on-site childcare, day care centre, maternity protection, maternity leave, paternity leave, "parental leave" [MeSH], PPL, breastmilk expression, breastmilk pumping, breastfeeding break, lactation break, paid lactation break, nursing break, pumping break, milk expression facility, lactation room, Affordable Health Care Act (USA), "Occupational Health Services [MeSH], "Women, Working" [MeSH], "Absenteeism" [MeSH], barriers for working mothers, workforce retention, Breastfeeding Friendly Workplace, BFW, breastfeeding friendly childcare/childcare
	Home, family	Support and networks, peer, social, mother to mother, mothers' groups, social, paternal support, male-partner, grandmother, parental, co-parenting, natural breastfeeding Shared breastmilk and shared breastfeeding, informal, milk exchange, breastmilk sharing, milk share, peer-to-peer breastmilk sharing, breastmilk cooperative, donor milk, wet nursing, cross nursing, cross feeding, safe milk sharing guidelines/guidance Baby Friendly Hospital/Health Initiative, BFHI, health system, health care services, maternity care, health facility, primary health care, "hospital practices", feeding protocols, "Ten Steps", 'first embrace', skin-to-skin, "kangaroo care", maternal and child health services,

PICOTS	Groupings	Example search terms
	Health systems and services	"Mothers/psychology" [Majr], mother-infant separation, rooming-in, co-sleeping, safe sleep guidelines Training, education, professional development, medical curriculum; opinions, knowledge, attitudes, practices; health care provider, healthcare practitioners, health professional, paediatrician, obstetrician, MCH nurse, nurse, midwife, GP, physician, 'hands off' 'laid back', primitive neonatal reflexes (PNRs), maternal instinctual behaviour Culturally sensitive, continuity of care, referral pathways support networks, group meetings, peer support programs, home visits, telephone counselling, internet, messaging (SMS), mobile apps Targeted/specialist breastfeeding support services, counselling, lactation support services, breastfeeding management, lactation consultant, lactation support specialist, prevention of mother to child transmission, MTCT, milk bank, donor milk, human milk product, breastmilk bank, mothers' milk bank, pasteurised donor milk, commercial milk bank, for profit milk bank, breast milk expression, breast pump, bottle feeding expressed milk, supplementary nursing system (SNS), expressed colostrum, breastmilk storage, frozen breastmilk, mother's own milk, MOM
	Other interventions	Emergency, humanitarian, disaster response Combined interventions Serving sizes, packaging options, product innovations, launches, segmentation, 'breast is best', advertising ban, nutritional value representation
Comparison	Study designs[i]	Reviews, systematic reviews, meta-analysis, intervention, program, trial, randomised trial, pre-post, quasi experimental, before-after.

[i] The Comparison (C) varies for each of the search strategies. Uncontrolled descriptive studies may inform the research question for some strategies or interventions.

PICOTS	Groupings	Example search terms
Outcomes	IYCF breastfeeding outcomes	Improved IYCF particularly breastfeeding outcomes including continued breastfeeding: Breast*, breastfed, breastfeeding, breastfeeding initiation, exclusive breastfeeding, EBF, partial breastfeeding, any breastfeeding, breastfeeding duration, continued breastfeeding, extended breastfeeding, breastfeeding AND toddler, breast AND nursing Colostrum, human milk, lactation, breast milk, breastmilk, expressed breastmilk, pumped milk, bottle feeding expressed milk, expressed milk feeding, neonatal AND milk, neonatal AND breast Timing of introduction of complementary feeding from 6 months, solids, solid food, home prepared baby food Prepared baby food, milk formula, sales volumes decline Worse IYCF particularly breastfeeding outcomes: Delayed initiation of breastfeeding, decreased breastfeeding rates Pre-lacteal food, bottle feeding, baby milk formula, breastmilk substitute, mixed feeding, formula supplementation, infant formula, follow-up formula, follow-on formula, toddler milk, growing up milk, early introduction of complementary foods (less than 6 months), premature weaning, premature cessation of breastfeeding MTCT due to mixed feeding Neonatal hypernatremic dehydration due to exclusive breastfeeding Malnutrition due to untimely introduction of complementary foods Prepared baby food, milk formula, powdered form, liquid form, sales volumes growth Displacement of maternal breastfeeding by use of donated/shared/sold human milk (in recipient mother/infant dyad) Donation/sharing/sale of breastmilk in by individuals not optimally feeding their own infant (in donor mother infant dyad i.e. not exclusively breastfed infant, reduced duration of breastfeeding in donor population) Acceptability, affordability, and accessibility of breastfeeding protection, promotion and support
	Evidence of effect	Effect, evidence, impact, findings, influence, results

PICOTS	Groupings	Example search terms
Settings	OECD countries[1]	OECD countries; developed countries; high income countries[2] comparable middle-income countries in Asia and the Pacific region[3]
	All physical, social, cultural, market and cyber settings, including those associated with:	Mass media, print media, electronic media, social media, employment, public place
		Retailing, pharmacy, e-commerce, trade, competition policy
		Emergencies, humanitarian, disasters, bushfire, flood, cyclone
	Policy environment	Child protection, family law
	Community environment	Public place, street, park, swimming pool, beach, restaurant, café, food venue, shop, market, shopping centre, mall, library, facility, school, university, college, sport facility, gym, health and fitness facility, offices, law court, parliament, public transport, bus, train, tram, airport, car park
	Workplace and employment environment	Employer, workplace, childcare service, industry (military, health, government, public sector, private sector, corporate)
	Home and family environment	Home, neighbourhood, local group, mothers' group, playgroup
	Health systems and services	Health system, health care services, hospital, health facility, NICU, neonatal intensive care unit, "Nurseries, Hospital" [MeSH], special care nursery, maternal health service, primary care, clinic, mothers' group, doctor's office, general practitioner's office, paediatrician's office
	Other	Combined settings
Time	Dates of publications included	1/1/2007 to 31/12/2017
		Continuous exposure
	Timing at which intervention applied	Pre-natal, ante-natal, pregnancy
		Peri-natal, at birth, delivery, post-natal, in patient, 0 to 36 months, 0-3 years, infancy, toddler, weaning

1. Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom; Australia, Canada, New Zealand, United States, Chile, Mexico, Japan, Korea, Israel, Turkey.
2. Andorra, Antigua and Barbuda, Aruba, Australia, Austria, The Bahamas, Bahrain, Barbados, Belgium, Bermuda, British Virgin Islands, Brunei, Canada, Cayman Islands, Guernsey, Jersey, Channel Islands, Chile, Curaçao, Cyprus, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, French Polynesia, Germany, Gibraltar, Greece, Greenland, Guam, Hong Kong, Hungary, Iceland, Ireland, Isle of Man, Israel, Italy, Japan, South Korea, Kuwait, Latvia, Liechtenstein, Lithuania, Luxembourg, Macao, Malta, Monaco, Netherlands, New Caledonia, New Zealand, Northern Mariana Islands, Norway, Oman, Palau, Poland, Portugal, Puerto Rico, Qatar, Saint Kitts and Nevis, Saint Martin, San Marino, Saudi Arabia, Seychelles, Singapore, Sint Maarten, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, Trinidad and Tobago, Turks and Caicos Islands, United Arab Emirates, United Kingdom, United States, Uruguay, US Virgin Islands.
3. Middle-income countries in Asia and the Pacific include Indonesia, India, Solomon Islands, Bhutan, Kiribati, Lao PDR, Sri Lanka, Marshall Islands, Micronesia, Timor-Leste, Mongolia, Tonga, Fiji, Vanuatu, Pakistan, Vietnam, Papua New Guinea, Philippines, Samoa, Thailand, China, Malaysia, Tuvalu.

Table 4 Summary of literature inclusion and exclusion criteria

Criteria	Exclude	Include
Date of publication	Pre–2007 After search date of 15 November 2017	2007 to 15 November 2017
Language of publication	No English abstract Full text not available in English (published) Full text unavailable by 15 November	
Participants	Non-humans Population subgroups of mothers or children with breastfeeding practices comparable with general population	Women; Women of reproductive age (15–49 years) with infants or young children (0–36 months) including premature infants, unwell/separated infants and at-risk mothers Family, fathers/partners, grandmothers, peers School children Population subgroups of mothers or children at risk of not optimally breastfeeding including; • Indigenous populations such as Aboriginal and Torres Strait Islander peoples • Less educated mothers or with low socioeconomic status • Younger mothers aged less than 25 years • Other mothers, infants and young children at risk due to recognised socioeconomic-demographic, situational risk factors, health, health system, or maternal trauma risk factors • Women donating/sharing/selling breastmilk Health professionals, healthcare workers, hospital staff, midwife, nurse, doctor, lactation consultant, peer counsellors, pharmacists, paediatricians, obstetricians Employers, co-workers, childcare workers
Interventions	Strategies, policies, laws or interventions that have not been implemented Strategies, campaigns etc. where effects on IYCF outcomes have not been formally evaluated	Formally and appropriately evaluated strategies, policies, laws or interventions Strategies etc. that have been implemented Policies or laws that create enabling environments, address structural or social determinants Indirect interventions in settings Direct interventions in settings Strategies integrating multiple strategies, policies and interventions Interventions affecting maternal breastfeeding outcomes in human milk expressing/donating/sharing/selling populations

Criteria	Exclude	Include
Outcomes	IYCF outcomes unrelated to breastfeeding or lactation No breastfeeding or lactation outcomes measured or reported Studies of human milk components or properties	IYCF outcomes related to breastfeeding Breastfeeding initiation, duration and exclusivity, any breastfeeding Breastmilk feeding (expressed milk from the mother or a donor provided by milk banks, informal milk sharing arrangements, or commercial sale and supply of human milk products) Resources and costs involved in implementing a strategy Social or gender equity outcomes

Criteria	Exclude	Include
Timing	Studies published before 1 January 2007 Medical or public health interventions targeting in utero feeding of unborn children, or children >36 months	Studies published after 1 January 2007 Interventions targeting feeding of IYCF 0–36 months Pre-and postnatal interventions targeting IYCF nutrition via nutrition of pregnant or lactating women, e.g. commercial brand marketing of food products targeting pregnant or lactating mothers such as pregnant mother formula or vitamin supplements
Country settings	Non-comparable countries, populations, or settings for IYFC feeding practices Specific to developing or low-income country populations and policy, community, work or healthcare settings	OECD countries, developed countries, high and middle-income countries but only for comparable policy, community, work or health care settings to Australia For expert panel identified studies, we want highest quality that is available for high- and middle-income countries and comparable policy, community, work or healthcare settings to Australia Geographic scope of included studies from searches updating the systematic reviews (Rollins/Sinha & Skouteris) is determined by their geographic scope, that is, high-, middle- and low-income countries but only for comparable policy, community, work or healthcare settings to Australia For industry database studies, selected high and middle countries as specified. Australia, New Zealand, US, UK, Canada, Norway, Denmark, Korea Singapore Japan, China, India, Brazil, Mexico. These are countries for which Euromonitor country studies are available, and which are considered comparable to or contrast with Australia on relevant aspects such as population, market development, policy, community, work or healthcare settings
Intervention settings 'Policy', 'Work' and 'Community'	For 'policy', 'work' and 'community' settings, the study design is not constrained	High-quality reviews, non-RCTs or observational studies where these are the highest quality evidence available Countries with comparable or contrasting features regarding IYC feeding and food markets; large or small population size; comprehensive or limited social/maternity protection systems; government or non-government regulation of BMS marketing; lack or presence of comprehensive, integrated national breastfeeding policies/strategies; large or small dairy/non-dairy industry base
'Health system/services'	Studies in health settings or services that are not systematic reviews of interventions and breastfeeding outcomes	Studies in health settings or services which are systematic reviews of RCT or similar quality studies and breastfeeding outcomes Studies in health settings or services that are not systematic reviews of RCT or similar, but which are key papers published after the date of the updated systematic review

Criteria	Exclude	Include
Other	Protocols only No evaluation of IYCF or breastfeeding outcomes	Strategies, policies, programs or interventions without funding or resourcing, including dietary guidelines, emergencies or child protection or family law guidance, hospital system or maternal and infant/child healthcare protocols

Table 4.1 Summary table of included study characteristics[i] part one of three

Author	Year	Categorisation of intervention/ strategy/ exposure/ technique	Level of evidence for Quantitative Study design	Country	Setting (Category)	Study population	"Review of reviews" included reviews (no. of reviews sample size)	Review included studies sample size	Outcomes: Feeding behaviours *For reviews of reviews provide overall conclusions from synthesis		Outcomes: Feeding knowledge, attitudes or beliefs *For reviews of reviews provide overall conclusions from synthesis	
									Categorisation of Feeding Behaviours	Direction of effect on Feeding Behaviours	Categorisation of Feeding knowledge, attitudes or beliefs	Direction of effect on Feeding knowledge, attitudes or beliefs
Abe et al.	2016	Health and welfare systems/ practices	Platinum	N.A.	Healthcare	Health servcies		N.A.	N.A.	N.A.	N.A.	N.A.
Balogun et al.	2016	Education, support and training	Platinum	USA, Australia,	Healthcare, Home and	Caregivers: healthy mothers and healthy babies		23	BF Initiation	Positive	N.A.	N.A.
Balogun et al.	2017	Education, support and training	Platinum	Sweden, Australia,	Healthcare, Education	Health workers		6	N.A.	N.A.	Knowledge, attitudes,	Positive
Beake et al.	2017	Health and welfare systems/practices	Platinum	Various-USA,	Healthcare	Caregivers: healthy mothers and healthy babies with caesarean birth		7	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Becker et al.	2016	Health and welfare systems/practices	Platinum	USA, UK, Canada,	Healthcare, Home and	Caregivers: healthy mothers and healthy babies ; Caregivers: at risk groups: NICU		22	HMI	Ambiguous	Shame being seen using a breast	Harmful
Britton et al.	2007	Health and welfare systems/practices;	Platinum	Canada, USA, UK,	Healthcare, Home and	Caregivers: healthy mothers and healthy babies ; Caregivers: at risk groups:all		34	Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Positive	N.A.	N.A.
Buckle and Taylor	2017	Health and welfare systems/practices	Platinum	USA, Netherlan	Healthcare	Caregivers: at risk groups- admitted to NICU		27	HMI	Positive	N.A.	N.A.
Chikhungu et al.	2016	Health and welfare systems/practices	Platinum	African countries,	Healthcare	Caregivers: at risk groups: HIV infection		18	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Chung et al.	2008	Health and welfare systems/practices;	Platinum	Australia, Canada,	Healthcare, Home and	Caregivers: healthy mothers and healthy babies ; Caregivers: at risk groups:all		36	BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Positive	N.A.	N.A.
Collins et al.	2016	Health and welfare systems/practices	Platinum	Australia, UK, USA,	Healthcare	Caregivers: at risk groups- admitted to NICU		7	Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Conde-Agudelo and Díaz-	2016	Health and welfare systems/practices	Platinum	N.A.	Healthcare	Caregivers: at risk groups: low birthweight infant		21	BF Initiation ; Any BF to 2y+	Positive	N.A.	N.A.
Crowe et al.	2016	Health and welfare systems/practices	Platinum	N.A.	Healthcare	Caregivers: at risk groups: premature infant		0	Other-readiness to suck feeds	N.A.	N.A.	N.A.
De Jesus et al.	2016	Education, support and training	Platinum	Brazil, various	Healthcare, Education	Health workers		17	N.A.	N.A.	Knowledge, attitudes	Positive
Dennis and Kingston	2008	Education, support and training	Platinum	Canada, USA,	Home and family	Caregivers: healthy mothers and healthy babies		3	Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Dyson et al.	2010	Multiple	Platinum	Various	Environment , Healthcare,	Public policy makers; Public; Employers; Childcare services; Health workers; Peer		210	BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Positive	N.A.	N.A.
European Commission.	2008	Multiple	Platinum	Various	Environment , Healthcare,	Public policy makers; Public; Employers; Childcare services; Health workers; Peer		N.A.	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Fallon et al.	2016	Health and welfare systems/ practices	Platinum	Australia, Canada,	Healthcare	Caregivers: at risk groups - mothers with postpartum anxiety		33	BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Harmful	Confidence, Self-efficiacy, Attitude	Harmful
Flint et al.	2016	Health and welfare systems/ practices	Platinum	Australia, UK	Healthcare	Caregivers: at risk groups- admitted to NICU		5	Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Foster et al.	2016	Health and welfare systems/ practices	Platinum	USA, Australia,	Healthcare	Caregivers: at risk groups- admitted to NICU		12	Other- transition from tube to full oral feeding	Positive	N.A.	N.A.

[i] BF Initiation = Breastfeeding initiation (within 1 hour of birth); Excl BF to 6mo =Exclusive breastfeeding (to 6 mo); Any BF to 2y+ = Breastfeeding duration (any BF to 2y+ where duration <6mo is not exclusive); Cont.BF >6–36mo = Continued breastfeeding (any breastfeeding past >6–36 months along with adequate and timely complementary foods);

Early Intro CFD = Early introduction of complementary foods & drinks; HMI = Human milk intake, or supplied for child (donated/received) e.g. in NICU or received from milk sharing; Other Liquids = Provision of liquids other than BM; $ or Vol BMS = Value or volume of BMS sales; Other = Others — specify

Table 4.2 Summary table of included study characteristics part two of three

Author	Year	Categorisation of intervention/ strategy/ exposure/ technique	Level of evidence for Quantitative Study design	Country	Setting (Category)	Study population	"Review of reviews" included reviews (no. of reviews sample size)	Review included studies sample size	Outcomes: Feeding behaviours *For reviews of reviews provide overall conclusions from synthesis		Outcomes: Feeding knowledge, attitudes or beliefs *For reviews of reviews provide overall conclusions from synthesis	
									Categorisation of Feeding Behaviours	Direction of effect on Feeding Behaviours	Categorisation of Feeding knowledge, attitudes or beliefs	Direction of effect on Feeding knowledge, attitudes or beliefs
Ganchimeg et al.	2016	Health and welfare systems/ practices	Platinum	N.A.	Healthcare	Health servcies		N.A.	N.A.	N.A.	N.A.	N.A.
Gavine et al.	2017	Education, support and training	Platinum	Brazil, Sweden,	Healthcare	Health workers		3	N.A.	N.A.	Knowledge, attitudes,	Ambiguous
Gilmore and McAuliffe	2013	Health and welfare systems/ practices	Platinum	Various - Banglades	Healthcare	Caregivers: healthy mothers and healthy babies		19	Excl BF to 6mo	Positive	N.A.	N.A.
Glaser et al.	2016	Education, support and training	Platinum	Brazil, Canada,	Education sector	School students		6	N.A.	N.A.	Knowledge, attitudes	Positive
Greene et al.	2016	Health and welfare systems/ practices	Platinum	USA, UK, France,	Healthcare	Caregivers: at risk groups- admitted to NICU		19	Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Haastrup et al.	2014	Health and welfare systems/ practices; Education, support	Platinum	Various: Australia,	Healthcare, Home and	Caregivers: healthy mothers and healthy babies		41	Any BF to 2y+ ; Other-milk volume expressed; time to milk ejection	Ambiguous	N.A.	N.A.
Hannula et al.	2008	Health and welfare systems/ practices	Platinum	Various: Australia,	Healthcare	Caregivers: healthy mothers and healthy babies		36	BF Initiation ; Any BF to 2y+	Positive	Confidence,	Positive
Haroon et al.	2013	Health and welfare systems/ practices; Education, support	Platinum	Various	Healthcare, Home and	Caregivers: healthy mothers and healthy babies		110 (76 in HIC)	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Hector	2010	Health and welfare systems/ practices, Education, support	Platinum	Developed	Healthcare	Caregivers: healthy mothers and healthy babies	11 (reviews of intervention		BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo; Early Intro CFD; HMI; Other	Positive, Ambiguous	BF self-efficiacy; BF intention	Positive
Howe-Heyman et al	2016	Health and welfare systems/ practices	Platinum	Various - USA,	Healthcare	Caregivers: healthy mothers and healthy babies; Caregivers: at risk groups- low		25	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Jaafar et al.	2016a	Health and welfare systems/ practices	Platinum	Russia	Healthcare	Caregivers -healthy mothers and healthy babies,		1	Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Jaafar et al.	2016b	Health and welfare systems/ practices	Platinum	Argentina, Switzerlan	Healthcare, Home and	Caregivers -healthy mothers and healthy babies,		2	Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Jones et al.	2015	Education, support and training, Family and other	Platinum	USA	Healthcare, Home and	Caregivers: at risk groups (multi-ethnic, socio-economically disadvantaged)		7	Excl BF to 6mo; Any BF to 2y+ ; Early Intro CFD	Positive	N.A.	N.A.
Kaunonen et al.	2012	Health and welfare systems/practices, Education,	Platinum	Various	Healthcare, Community,	Healthworkers, Peer Counsellors, Caregivers -healthy mothers and healthy		34	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Positive	Attitude	Positive
Lopes et al.	2016	Health and welfare systems/practices, Education,	Platinum	N.A.	Healthcare	Health servcies		N.A.	N.A.	N.A.	N.A.	N.A.
Lumbiganon, et al.	2016	Education, support and training	Platinum	USA, UK, Canada,	Healthcare	Caregivers: healthy mothers and healthy babies		24	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Mahon et al.	2016	Health and welfare systems/ practices	Platinum	UK	Healthcare	Caregivers: at risk groups- admitted to NICU		845	Value of HMI in NICU	Positive	N.A.	N.A.
McFadden et al.	2017	Health and welfare systems/ practices, Education, support	Platinum	Various	Healthcare, Community,	Caregivers -healthy mothers and healthy babies		73 (of which 52 HIC, 15 UMIC, 4	Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Moore et al.	2016	Health and welfare systems/ practices	Platinum	USA, Germany,	Healthcare	Caregivers -healthy mothers and healthy babies; Caregivers: at risk groups -		38	Excl BF to 6mo; Any BF to 2y+ ; Effective BF by infant (Infant BF Assessment Tool -IBFAT)	Positive	Mother's breastfeeding	Positive
Moran et al.	2015	Other- incentives	Platinum	USA, UK	Healthcare	Caregivers -healthy mothers and healthy babies		16	Excl BF to 6mo; Any BF to 2y+	Ambiguous	Attitudes	Amibiguous
Munn et al.	2016	Health and welfare systems/ practices	Platinum	USA	Healthcare	Caregivers -healthy mothers and healthy babies; Caregivers: at risk groups -		18	BF Initiation; Excl BF to 6mo	Positive	Health provider knowledge and	Positive
Pate	2009	Health and welfare systems/ practices, Education, support	Platinum	USA, Canada,	Home and family	Caregivers: healthy mothers and healthy babies; Caregivers: at risk groups- low		21	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Positive		
Patnode et al.	2016	Health and welfare systems/ practices	Platinum	Various	Healthcare	Caregivers: healthy mothers and healthy babies		52	Excl BF to 6mo; Any BF to 2y+	Positive	Harms (Anxiety, decreased	Cannot be identified
Perez-Escamilla et al.	2016	Health and welfare systems/ practices	Platinum	Belarus, Brazil,	Healthcare	Caregivers: healthy mothers and healthy babies;		58	BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Positive	N.A.	N.A.

Table 4.3 Summary table of included study characteristics part three of three

Author	Year	Categorisation of intervention/ strategy/ exposure/ technique	Level of evidence for Quantitative Study design	Country	Setting (Category)	Study population	"Review of reviews" included reviews (no. of reviews sample size)	Review included studies sample size	Outcomes: Feeding behaviours *For reviews of reviews provide overall conclusions from synthesis		Outcomes: Feeding knowledge, attitudes or beliefs *For reviews of reviews provide overall conclusions from synthesis	
									Categorisation of Feeding Behaviours	Direction of effect on Feeding Behaviours	Categorisation of Feeding knowledge, attitudes or beliefs	Direction of effect on Feeding knowledge, attitudes or beliefs
Renfrew et al.	2009	Health and welfare systems/ practices	Platinum	Various	Healthcare	Caregivers: at risk groups- admitted to NICU	5	96	HMI	Positive		
Renfrew et al.	2012	Education, support and training	Platinum	Various - Australia,	Healthcare, Home and	Caregivers: healthy mothers and health babies; Caregivers: at risk groups- low		52	Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Rollins	2016	Multiple	Platinum	Various	Public Environment	Caregivers: healthy mothers and health babies; Caregivers: at risk groups- all		1 911	BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Positive	N.A.	N.A.
Salam et al.	2014	Health and welfare systems/ practices	Platinum	Various	Healthcare	Health workers; Caregivers: healthy mothers and health babies; Caregivers:		45	BF Initiation	Positive	N.A.	N.A.
Sandall et al.	2016	Health and welfare systems/ practices	Platinum	Australia, Canada,	Healthcare	Caregivers- healthy mothers and babies and at risk groups		15	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Schmeid et al.	2014	Health and welfare systems/ practices; Education, support	Platinum	NZ, Australia,	Healthcare	Health workers		7	N.A.	N.A.	Other- health care staff perceptions	Ambiguous
Semenic et al.	2012	Health and welfare systems/ practices	Platinum	USA, Australia,	Healthcare	Health care services, health workers		45	N.A.	N.A.	N.A.	N.A.
Sinha et al.	2017	Multiple	Platinum	Various	Healthcare, Home and	Caregivers -healthy mothers and healthy babies. Caregivers- healthy mothers and		61	BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Positive	N.A.	N.A.
Sinha et al.	2015	Multiple	Platinum	Various	Healthcare, Community,	Caregivers -healthy mothers and healthy babies. Public, Health workers,		195	BF Initiation; Excl BF to 6mo; Any BF to 2y+ ; Cont.BF >6-36mo	Positive	N.A.	N.A.
Skouteris et al.	2014	Education, support and training, Family and other	Platinum	Various: Australia,	Healthcare, Home and	Caregivers -healthy mothers and healthy babies. Caregivers: at risk groups-		17	Excl BF to 6mo	Ambiguous	N.A.	N.A.
Skouteris et al.	2017	Education, support and training, Family and other	Platinum	Various: Australia,	Healthcare, Home and	Caregivers -healthy mothers and healthy babies. Various studies:		12	Excl BF to 6mo	Ambiguous	N.A.	N.A.
Smith and Becker	2016	Health and welfare systems/ practices	Platinum	Honduras, USA,	Healthcare, Home and	Caregivers -healthy mothers and healthy babies.		11	Excl BF to 6mo; Any BF to 2y+	Ambiguous	maternal confidence	Ambiguous
Smith, Hurt et al.	2017	Health and welfare systems/ practices	Platinum	Ghana, Tanzania,	Healthcare	Caregivers -healthy mothers and healthy babies.		22	BF Initiation	Positive	N.A.	N.A.
Spiby et al	2009	Education, support and training,	Platinum	UK, USA, Canada,	Healthcare, Home and	Health workers		9	Any BF to 2y+	Ambiguous	N.A.	N.A.
Stevens et al.	2014	Health and welfare systems/ practices	Platinum	Various: Italy, USA,	Healthcare	Caregivers: at risk groups- 1. Medical/health vulnerabilities: other-		7	BF Initiation; Excl BF to 6mo	Positive	N.A.	N.A.
Sutton et al.	2016	Multiple: Health and welfare systems/ practices,	Platinum	Sweden, USA, Iran,	Healthcare, home and	Health workers; Caregivers: healthy mothers and healthy babies; Caregivers:	36	927	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Swerts et al.	2016	Health and welfare systems/ practices	Platinum	UK, USA, Australia	Healthcare, home and	Health workers		12	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Cannot be identified	Attitude of midwives	Ambiguous effect
Watson and McGuire	2016	Health and welfare systems/ practices	Platinum	Canada, USA,	Healthcare	Caregivers: at risk groups- admitted to NICU		9	HMI	Ambiguous	N.A.	N.A.
Williams et al.	2017	Health and welfare systems/ practices	Platinum	USA, Spain, UK,	Healthcare	Caregivers: at risk groups- admitted to NICU		10	HMI	Ambiguous	N.A.	N.A.
WHO	2017	Health and welfare systems/ practices	Platinum	HIC: Australia,	Healthcare	Caregivers: healthy mothers and healthy babies	22	346	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Positive effect	N.A.	N.A.
Wong et al.	2015	Health and welfare systems/ practices	Platinum	Australai, USA,	Healthcare	Caregivers -healthy mothers and healthy babies. Caregivers: at risk groups		19	Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Wood et al.	2016	Health and welfare systems/ practices, Education, support	Platinum	Singapore, Denmark,	Healthcare	Caregivers -healthy mothers and healthy babies. Caregivers: at risk groups		6	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Ambiguous	N.A.	N.A.
Wouk et al.	2017	Health and welfare systems/ practices	Platinum	USA, Autralia,	Healthcare	Caregivers -healthy mothers and healthy babies.		38	BF Initiation; Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.
Yonemoto et al.	2017	Health and welfare systems/ practices	Platinum	USA, UK, Canada,	Healthcare	Caregivers -healthy mothers and healthy babies.		12	Excl BF to 6mo; Any BF to 2y+	Positive	N.A.	N.A.

List of abbreviations

ABA	Australian Breastfeeding Association
ABM	Academy of Breastfeeding Medicine
ACM	Australian College of Midwives
ADF	Australian Defence Force
AHMAC	Australian Health Ministers' Advisory Council
ANBS	Australian National Breastfeeding Strategy
ANBS-E	Enduring Australian National Breastfeeding Strategy
aOR	adjusted odds ratio
ART	triple ARVs
ARV	antiretroviral
ATSI	Aboriginal and Torres Strait Islander
BF	baby friendly
BFCC	Baby Friendly Childcare
BFCI	Baby Friendly Community Initiatives
BFH	Baby Friendly Hospital
BFI	Baby Friendly Initiatives
BFHI	Baby Friendly Health Initiative
BFW	Baby Friendly Workplace
BFWA	Baby Friendly Workplace Accreditation
CDC	US Centers for Disease Control and Prevention
CMV	cytomegalovirus
DHM	donor human milk
DHMBS	donor human milk-banking services
DM	donor milk
EBF	exclusive breastfeeding
EHM	exclusive human milk
EU	European Union
FSANZ	Food Standards of Australia and New Zealand
GSIYCF	Global Strategy for Infant and Young Child Feeding
HIC	high-income countries
HM	human milk

HMB	human milk bank
HTA	Health Technology Assessment
IBFAN	International Baby Food Action Network
IBCLC	International Board Certified Lactation Consultant
IFE	infant feeding in emergencies
ILO	International Labour Organization
IYC	infants and young children
IYCF	infant and young child feeding
IYCF-E	infant and young child feeding in emergencies
LMIC	low- and middle-income countries
LSAC	Longitudinal Study of Australian Children
MOM	mother's own milk
NAS	neonatal abstinence syndrome
NEC	necrotising enterocolitis
Neo-BFHI	BFHI for neonatal wards
NGO	non-government organisation
NHMRC	National health and Medical Research Council
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NICU	neonatal intensive care unit
NQR	not suitable for quality review
OECD	Organisation for Economic Co-operation and Development
OMM	own mother's milk
OR	odds ratio
PC	peer counsellor
PANORG	Physical Activity Nutrition Obesity Research Group
PDHM	pasteurised donor human milk
PICOTS	Participant Intervention Comparators Outcomes Time Settings
PMTCT	prevention of mother-to-child transmission
PPL	paid parental leave
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
QALY	quality-adjusted-life-year
RCT	randomised controlled trials
SDG	sustainable development goals

SES	socioeconomic status
SIDS	sudden infant death syndrome
SM	social marketing
SSC	skin-to-skin contact
UNICEF	United Nations Children's Fund
VLBW	very low birthweight
WBT*i*	World Breastfeeding Trends Initiative
WHA	World Health Assembly
WHO	World Health Organization
WHO International Code	WHO International Code of Marketing Breastmilk Substitutes
WIC	Special Supplemental Nutrition Program for Women, Infants and Children
WPR	Western Pacific Region

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