

# Breastfeeding and health in the Western World

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## SUMMARY

Considerable evidence suggests that infant feeding practices are associated with variations in health. This paper reviews research relating to the health of infants who receive breast milk, and of women who breastfeed, in the developed world. Obstacles to breastfeeding are examined, and current initiatives to increase breastfeeding levels are discussed.

**Keywords:** breast feeding, mothers, infants, recommendations, allergy.

## Introduction

IN the United Kingdom (UK), the Department of Health, in line with World Health Organisation recommendations,<sup>1</sup> promotes breastfeeding as the preferred method of infant feeding;<sup>2</sup> yet breastfeeding initiation rates are low, with a rapid, further fall over the first few weeks of infant life (Table 1). This pattern is repeated in much of the developed world, where most infants are breastfed for only a few weeks (often not exclusively) and a large minority receive no breast milk at all.<sup>3</sup>

The past decade has seen a large increase in the quantity and quality of research in human lactation. Significant health differences associated with infant feeding methods are suggested by this recent work.

## Method

International studies to be included were identified by a computerized search of the literature using Medline, and by a manual search of references quoted in the literature over the past decade, together with ensuing correspondence. Research from industrialized countries relating to lactation, as it concerns maternal and child health, was considered.

Much research in the field of human lactation has had serious methodological flaws, including inadequate sample size, selection bias, failure to adjust for confounding variables, and, perhaps most importantly of all, unclear definitions of feeding methods. Methodological criteria of specific relevance to lactation research are described fully by Bauchner *et al.*,<sup>4</sup> Kramer<sup>5</sup> and Auerbach *et al.*,<sup>6</sup> and were applied in order to select studies for inclusion. Methodological issues are discussed throughout this review.

## Breastfeeding and infant health

### Infectious disease

Human milk is rich in secretory IgA, produced partly in response to specific intestinal and respiratory pathogens encountered by the mother.<sup>7</sup> It also contains other immunoglobulins, lysozyme, lactoferrin, bifidus factor, macrophages, lymphocytes, neutrophil granulocytes, cytokines and complement.<sup>7</sup>

Nevertheless, the supposed protective effect of breastfeeding against infection was questioned in 1986 by Bauchner *et al.*<sup>4</sup> who reviewed the available research and concluded that most had

methodological defects. Since then, research in this area has been more rigorously designed. Evidence has accumulated to confirm that breast milk protects the infant against various forms of infection, both during and beyond the period of breastfeeding, at a level which is of importance even in affluent Western societies.

Howie *et al.*, in a large study in Dundee, found that infants, fully or partially breastfed for 13 weeks, had one-third the incidence of gastro-enteritis compared with infants who received less than 13 weeks of breastfeeding or none.<sup>8</sup> This protection was maintained beyond the period of breastfeeding and was accompanied by a reduction in the rate of hospital admission. This study also found a significant protective effect of breastfeeding against respiratory infections (defined as coryza accompanied by cough, wheeze or both).

The DARLING study, of a smaller, middle-income group in the USA, found the rate of diarrhoeal illness in the first year to be reduced by half in breastfed infants compared with formula-fed children.<sup>9</sup> This study did not show an effect of feeding method on respiratory illness (defined as any respiratory symptoms other than clear nasal discharge), possibly because the sample size was not sufficiently large to detect differences in less common, more serious disease.

The DARLING study also found otitis media to be reduced by 19%, and prolonged episodes by 80%, in breastfed compared with formula-fed infants.<sup>9</sup> This is consistent with other recent studies, which have found that episodes of acute otitis media are less frequent, occur at a later age and are less likely to be recurrent if infants are breastfed.<sup>10,11</sup> Protection is greater if breastfeeding is exclusive up to the age of six months,<sup>11</sup> and reaches a maximum when breastfeeding is prolonged beyond 10 months.<sup>10</sup> There is some evidence of a continued protective effect beyond the breastfeeding period.<sup>11</sup>

Urinary tract infection is less common in infants who are breastfed even partially,<sup>12</sup> and this protection appears to extend beyond the period of breastfeeding.<sup>13</sup> Several mechanisms may be involved here. The urine of breastfed infants contains increased concentrations of secretory IgA,<sup>14</sup> and also an oligosaccharide which decreases adhesion of *E. coli* to uroepithelial cells.<sup>15</sup> Breastfeeding also promotes intestinal colonization with lactobacilli, and the resulting low pH of the gut lumen inhibits the growth of potentially pathogenic bacteria.<sup>7</sup>

Breastfeeding significantly enhances both the cell-mediated and humoral responses to antigens, as shown in studies measuring the effect of BCG<sup>16</sup> and Hib<sup>17</sup> immunization.

### Atopic eczema and asthma

Why is it plausible that breastfeeding might give long-term protection against allergic sensitization? The fully breastfed infant has less exposure to dietary allergens which might directly induce an immune response or prime a less specific reaction in the immature immune system, particularly where there is a

**Table 1.** Prevalence of breastfeeding (%) by country in the UK, 1990.

	England and Wales	Scotland	N. Ireland
Birth	64	50	36
6 weeks	39	30	17

Source: Office of Population and Census Surveys (1990).

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genetic predisposition. Secretory IgA and other immunoglobulins in breast milk give local protection to the immature gut mucosa, while various growth factors in breast milk enhance mucosal maturation, thereby reducing absorption of food antigens.<sup>7</sup> In addition, the breastfed infant receives IgE suppressor factors in colostrum.<sup>18</sup>

Breastfeeding was first reported to protect against infantile eczema in 1936.<sup>19</sup> There was much subsequent research on the influence of breastfeeding on atopic disease, reviewed by Kramer in 1988.<sup>5</sup> He assessed the validity of the foregoing studies according to 12 methodological criteria and found that, as most were flawed, little could then be concluded about the prophylactic effect of breastfeeding. This stimulated a more rigorous approach in subsequent research. There is now increasing evidence that prolonged and exclusive breastfeeding is associated with a lower incidence of various atopic manifestations.

The longest modern follow-up study<sup>20</sup> of infant feeding and its effect on atopy (atopic eczema, respiratory allergy and allergic food intolerance) observed a group of children up to the age of 17 years. All the children commenced solid foods at the age of three and a half months. Prolonged breastfeeding (defined as breast milk being the only source of milk for six months or longer) was found to be the most protective, but even one month of exclusive breastfeeding conferred protection against allergic food intolerance and respiratory allergy. The effect was significant, regardless of heredity, and by the age of 17 years the differences due to varying infant feeding methods were found to be more pronounced than the differences due to heredity.

In a group of children with a high genetic risk of atopy, who were followed up until 12 months of age, very strict avoidance of allergens (dairy products, eggs, wheat, unhydrolysed soya, oranges, fish and nuts), by both infants and lactating mothers in the first nine months, substantially reduced the frequency of asthma, eczema and allergic food intolerance.<sup>21</sup>

A study of preterm infants fed with breast milk, formula or a combination found that exposure from birth to cow's milk increased the risk of atopic disease, particularly eczema, at 18 months, but only in those with a family history.<sup>22</sup>

Other studies have not discovered a protective effect of breastfeeding, but have methodological defects.<sup>5</sup> A clear definition of breastfeeding is essential for assessment of this problem: even one artificial feed may trigger allergy in very young infants.<sup>23</sup>

### *Insulin dependent diabetes mellitus*

Part of the bovine serum albumin (BSA) molecule of cow's milk crossreacts with a surface protein of human pancreatic beta-cells, p69. Diabetic children have elevated serum concentrations of anti-BSA antibodies.<sup>24</sup> It is therefore postulated that early exposure to cow's milk may initiate an immune response which ultimately damages pancreatic beta-cells and causes IDDM.

Virtanen et al found IDDM in Finnish children under seven years of age to be associated with the introduction of cow's milk products before the age of four months. Exclusive breastfeeding to three or four months, and continued breastfeeding to seven months, were protective.<sup>25</sup>

A 10-year, 3000-family study is planned to investigate whether insulin dependent diabetes mellitus in children may be prevented by the exclusion of cow's milk in the first nine months of life.<sup>26</sup>

### *Neurodevelopmental significance of feeding method*

In the last trimester of pregnancy, and just after delivery, the developing central nervous system requires supplies of certain long-chain polyunsaturated fatty acids (LCPUFAs), including docosahexaenoic acid (DHA), which the fetus and newborn are

incapable of synthesizing.<sup>27</sup> Breast milk is a good source of these temporarily essential LCPUFAs;<sup>27, 28</sup> until recently all artificial milks failed to supply adequate quantities.

Preterm infants are particularly at risk from a deficiency in LCPUFAs, as brain growth is greatest in the last trimester of pregnancy. Cognitive function has been found to be impaired in the long term in premature infants fed exclusively on formula, compared with those whose diet included breast milk.<sup>29</sup> This variation (amounting to a difference of 8.3 IQ points at the age of seven-and-a-half to eight years) was found in children who had been tube-fed, with a dose-response relationship, regardless of the mother's intention to breastfeed. This suggests a relationship between feeding method and developmental outcome beyond that attributable to genetic potential and parenting skills.

Rapid brain growth continues throughout the early months of life. Cerebral DHA concentrations are higher in term infants who are breastfed,<sup>27,28</sup> and incorporation of DHA into the cerebral cortex increases with duration of breastfeeding for at least the first 40 weeks.<sup>30</sup> Neuroretinal development has been shown to be impaired in term infants who have been fed standard formula, compared with those fed breast milk or LCPUFA-enriched formula, with no evidence of catch-up at 30 weeks.<sup>27</sup> On the basis of these findings, Makrides et al suggest that breastfeeding should be continued for at least four months and possibly for a year.<sup>27</sup>

In 1992, the British Nutrition Foundation recommended that manufacturers of infant formula should ensure that their products contain appropriate amounts of the relevant LCPUFAs,<sup>31</sup> but this recommendation is still not universally followed.

Studies of the effect of infant feeding methods on intelligence in later childhood are methodologically difficult, particularly with regard to the removal of confounding factors. However, in a study examining broader neurological function, Lanting et al found impairment at nine years in children who had received no breastmilk.<sup>32</sup>

### *Sudden infant death syndrome*

Infant feeding methods might be expected to influence the rate of sudden infant death syndrome (SIDS) through such associations as infection, allergy, neurological maturation or patterns of care. The aetiology of SIDS remains unclear however. Much research on the relationship between infant feeding and SIDS has been marred by methodological problems, particularly insufficient sample size and inadequate definition of breastfeeding.<sup>33</sup>

A multi-centre trial in New Zealand found a significant reduction in the risk of SIDS when exclusive breastfeeding was continued during the first six months.<sup>34</sup> Infants not breastfed were nearly twice as likely to die of SIDS as those exclusively breastfed. On the strength of the findings of this unusually large and well-designed trial, recommendation to breastfeed has been included in the medical advice designed to reduce SIDS in New Zealand. However, New Zealand has high rates of both breastfeeding and SIDS<sup>34</sup> compared with the UK, and in the absence of confirmatory evidence there has been a reluctance to affirm the association between artificial feeding and SIDS in this country.<sup>33,35</sup>

In the most recent UK study, the risk of SIDS in fully artificially fed infants was also found to be nearly twice that found in exclusively breastfed infants;<sup>36</sup> however, the study group was relatively small and therefore the results do not attain statistical significance.<sup>37</sup>

### *Neonatal necrotizing enterocolitis*

This is the most common serious gastro-intestinal disease seen in neonatal intensive care units, and is associated with low birth weight and prematurity, gut ischaemia and possibly infection.

Mortality rates are high (26% in one large series);<sup>38</sup> however, breast milk is strongly protective, even where breastfeeding is not exclusive. After 30 weeks gestation, breast milk almost completely protects against necrotizing enterocolitis.<sup>38</sup>

Lucas and Cole found necrotizing enterocolitis to be six to 10 times more common in exclusively artificially fed infants. They calculate from this that exclusive formula feeding could account for 500 extra cases in Britain per year, of whom about 100 would die.<sup>38</sup>

### Breastfeeding and maternal health

Prolonged breastfeeding improves post-partum weight loss for up to twelve months, with the main weight loss occurring at three to six months after delivery.<sup>39</sup>

In the first six post-partum months, the lactational amenorrhoea method of contraception, if taught and used properly, offers a protection against pregnancy as effective as barrier methods.<sup>40</sup>

Epidemiological studies have found that women who breast-feed have a reduced rate of post-menopausal osteoporotic hip fracture compared with parous women who do not breastfeed.<sup>41-43</sup> This reduction is in proportion to the duration of lactation.<sup>43</sup>

In most studies, breastfeeding has been found to produce a small reduction in the risk of epithelial ovarian cancer. This is independent of the effect of pregnancy.<sup>44</sup> Breastfeeding has also been found by some researchers to have a protective effect against pre-menopausal breast cancer,<sup>45,46</sup> although other studies have failed to show an association.<sup>47,48</sup> Methodology appears to account at least partly for these contradictions: inadequate or unrepresentative samples, failure to distinguish between types of breast cancer and unclear definition of the duration, exclusivity and pattern of breastfeeding have all confused the picture. Consequently, there is a growing awareness that questions on lactation have not been adequately detailed in the research to date.<sup>45,49,50</sup>

### The optimum duration of lactation

Breast milk provides the healthy infant with fully adequate nutrition and fluid intake for the first four to six months of life.<sup>1,7</sup> Other foods and fluids interfere with the stimulus to breast milk production provided by suckling.<sup>7</sup>

Evidence that is currently available suggests that maximum health gains for both babies<sup>8-10,20,25,30,34</sup> and mothers<sup>39,40,43-45</sup> are obtained when breastfeeding is prolonged for several months at least, and when it is exclusive for the initial months.<sup>11, 20, 23, 25, 34</sup>

On the basis of current knowledge in lactation management, nutrition and disease prevention, the World Health Organisation recommends exclusive breastfeeding for about six months, and thereafter continued breastfeeding, with complementary feeding, to two years of age.<sup>1</sup>

### Contra-indications to breastfeeding

True contra-indications to breastfeeding are uncommon. In the mother, hepatitis C infection, major substance abuse or a recent diagnosis of breast cancer are absolute contra-indications.<sup>51</sup> HIV seropositivity is a contra-indication to breastfeeding in the UK<sup>52</sup> as in other developed countries; in the Third World, the balance of risk lies in favour of breastfeeding.<sup>51</sup> Therapeutic use of drugs or radioactive materials may be a relative or temporary contra-indication.<sup>51,53</sup> The infant with hereditary galactosaemia cannot tolerate breast milk, but other inborn errors of metabolism may allow carefully monitored breastfeeding.<sup>51</sup>

### Obstacles to breastfeeding

Almost all mothers, if adequately informed and supported, could

provide breast milk for their babies. That being so, why do so many women choose to breastfeed only briefly or not at all?

Prolonged, exclusive breastfeeding of infants by their own mothers is not the cultural norm in Western society; the widespread practice of artificial feeding, wet-nursing and early weaning goes back many centuries.<sup>54</sup> Today, artificial feeding is presented attractively by commercial interests, and even (in the UK) provided free to disadvantaged families. Exclusive breastfeeding, particularly beyond the early weeks, has come to be perceived as unusual and potentially problematical.

Having chosen to breastfeed, parents may have difficulty in obtaining ideal advice and support within the health service.<sup>52-59</sup> In the past, the training of health professionals has often been inadequate or flawed,<sup>52,60</sup> lacking, until recently, a sound research base.<sup>4-6</sup>

Women's working patterns are often cited as a reason for low breastfeeding rates, although this idea needs careful assessment. The intention to return to paid work does not seem to be a major influence on feeding choice in the UK<sup>52</sup> or the USA,<sup>51</sup> maternal educational level and social class are the determinants. However, a return to part-time work is associated with a longer continuance of breastfeeding compared with a return to full-time work.<sup>61</sup> Howie *et al* suggest that the present knowledge of the health gains associated with prolonged, exclusive breastfeeding supports the provision of longer post-natal maternity leave and a change in workplace practices.<sup>8</sup>

Successful lactation requires acceptance of the biological, maternal role.<sup>51</sup> In the developed world there is an emphasis on the independence and economic role of women, and the breasts are commonly portrayed in a sexual rather than in a maternal, nutritive context. Conflicts subsequently arise for the breastfeeding mother, and health professionals may prefer to give neutral advice on infant feeding because of the perceived risk of provoking guilt feelings in women who do not attempt, or who fail to continue to breastfeed.<sup>51</sup> However, educating and supporting families in health-related behaviour (of any kind) is accepted good practice.<sup>62-63</sup>

### Current initiatives for the support of breastfeeding

As information accumulates on the health benefits associated with breastfeeding, the financial costs associated with low breastfeeding rates are beginning to be recognized and quantified. Dewey *et al* suggest that, in the USA, \$1 billion per year is spent on the diagnosis and treatment of otitis media alone, and that large savings could therefore result from breastfeeding promotion.<sup>9</sup> In the UK, the Department of Health estimates that the saving on infant gastroenteritis admissions alone would be £35 million per annum if all babies were breastfed.<sup>2</sup> As a result, initiatives from the Department of Health in the last decade have sought to raise public awareness of breastfeeding, to develop local guidelines for practice and to improve the training of health workers.<sup>60</sup>

As part of the World Health Organisation's global effort to increase breastfeeding, the Baby Friendly Hospital Initiative UK was launched in 1994. Hospitals which seek to attain Baby Friendly status must demonstrate that their practices conform to the UNICEF/WHO 'Ten steps to successful breastfeeding'.<sup>64</sup> The programme is now being developed as the UK Baby Friendly Initiative, to include recognition of effective breastfeeding support in the community setting.

### The role of the primary health care team

A substantial minority of pregnant women (up to 23% of primigravidae<sup>57</sup>) have not made a firm decision on an infant feeding method<sup>52,57-59</sup> and may therefore be particularly accessible to advice and support,<sup>57</sup> even in adverse social circumstances.<sup>65</sup>

More women intend to breastfeed than are finally discharged from hospital actually doing so;<sup>52,57,58</sup> subsequently, there is a rapid attrition of breastfeeding numbers.<sup>52,57-59,66</sup> The most commonly given reasons for early cessation of breastfeeding are perceived insufficient milk supply and sore nipples;<sup>57,59,66</sup> these and other problems could be relatively easily overcome if informed advice and practical support were available.<sup>52,56-59,66</sup>

General practitioners have an important role to play, not only in managing individual mothers and babies,<sup>55</sup> but also in using purchasing powers to obtain adequate midwife and health visitor training and time for the support of breastfeeding.<sup>2</sup> Referral of mothers to local lay support groups is of recognized value.<sup>64</sup>

To date, little research has been published on issues relating to breastfeeding promotion and management in the primary care setting in the UK. In view of the reported associated health benefits, this represents an important gap in our knowledge.

## Conclusion

There is now substantial evidence to suggest that prolonged breastfeeding benefits the health of mothers and children in developed countries, while artificial feeding and early weaning may compromise their well-being and result in considerable financial costs for health services.

Effective application of present knowledge, using health care systems which are already in place, could improve breastfeeding rates and thereby the health of women and children.


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## GPs and Medical Officers for VSO's Health Programmes

Sheer professionalism makes VSO's health programmes in 56 developing countries a match for any medical service in the world. But where much needed **GPs and Medical Officers** are concerned the attraction runs deeper still. Working as a VSO volunteer demands personal initiative and decisiveness. Whether you're dealing with patients, helping to train colleagues or develop new programmes - it's very much down to you.

VSO's benefits are equally outstanding. As well as a modest living allowance and return air fares, the package includes:

- maintenance of NHS pension
- training to adapt specialist skills
- refresher course on completion of service
- your chosen professional journal sent to you regularly - free
- no requirement for previous overseas experience

Current opportunities include:

**Zambia.** Working within a busy referral hospital catering for 160,000 people. Duties include supervising medical work on wards with responsibility for many of them, including paediatrics, general medicine, surgery, obstetrics and the special baby care unit.

**Zambia.** Key duties include clinical curative work, preventative, surgical and teaching medical assistants both at the hospital and from Health Centres in the surrounding district. The hospital caters for 65,000 people and there are 5 rural health centres.

**South Africa.** Working in a busy under-staffed hospital, the volunteer will need to cover all areas of hospital medicine. Willingness to undertake minor surgery and deal with emergency conditions, essential. Night work and weekends will be necessary.

**Malawi,** Lilongwe School of Health Sciences. Training student Clinical Officers through both theory and practical sessions including setting



**Overseas, underpaid... and  
the best job in the world.**

exams and developing the curriculum. Experience is especially needed in obstetrics, gynaecology, paediatrics or general practice. Some clinical responsibility may be required.

As well as suitable qualifications and experience, you should have the personal qualities of resilience, cultural sensitivity and a sense of humour. You should also be without dependants, able to spend at least two years overseas (one year in some cases) working for a modest living allowance, and have unrestricted right of re-entry into the UK.

For more details and an application form, send a brief summary of your qualifications/work experience - quoting ref. BJGP - to: **Atha Murphy, VSO Enquiries Unit, 317 Putney Bridge Road, London SW15 2PN. Or call: 0181 780 1331.**



VSO enables men and women to work alongside people in poorer countries in order to share skills, build capabilities and promote international understanding and action, in the pursuit of a more equitable world.

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