UNICEF UK BABY FRIENDLY INITIATIVE: Health benefits of breastfeeding

There has been significant reliable evidence produced over recent years to show that breastfeeding has important advantages for both infant and mother, even in the industrialised countries of the world.

Below is a selected list of recently-published studies describing differences in health outcome associated with method of infant feeding. The studies have all adjusted for social and economic variables. All were conducted in an industrialised setting.

We also provide a list of additional health issues with which breastfeeding has been associated by some researchers. Many of these require further investigation to clarify any protective effect of breastfeeding and are included here for the interest and information of readers.

To receive updates by e-mail from the Baby Friendly Initiative on research into breastfeeding click here. http://www.babyfriendly.org.uk/subscribe/

Artificially-fed babies are at greater risk of:
- gastro-intestinal infections
- respiratory infections
- necrotising enterocolitis
- urinary tract infections
- ear infections
- allergic disease (eczema, asthma and wheezing)
- insulin-dependent diabetes mellitus

and breastfed babies may have better:
- neurological development

Other studies of health and breastfeeding:
- cardiovascular disease in later life
- childhood cancer
- breastfeeding, bed sharing and cot death
- breastfeeding and HIV transmission
- breastfeeding and dental health

Women who breastfed are at lower risk of:
- breast cancer
- ovarian cancer
- hip fractures and bone density

Other potential protective effects of breastfeeding (more research needed) for the infant:
- multiple sclerosis
- acute appendicitis
- tonsillectomy

for the mother:
- rheumatoid arthritis

Source: http://www.babyfriendly.org.uk/
### Gastro-intestinal infections

**Howie PW et al. (1990).** Protective effect of breastfeeding against infection. *BMJ* 300: 11-16.  
[Abstract]  
674 infants were investigated for the relationship between infant feeding and infectious illness. The incidence of gastro-intestinal illness in infants who were exclusively breastfed for 13 weeks or more was 2.9% (after adjusting for confounders). Those who were partially breastfed had an incidence of 15.7% and those who were exclusively artificially fed 16.7%. Therefore bottle-fed infants were at five times the risk of developing gastro-intestinal illness. Interestingly, the study also noted that breastfeeding exclusively for 13 weeks or more was associated with significant protection beyond the period of breastfeeding itself. However, no significant reduction in the incidence of otitis media was found.

### Respiratory infections

[Abstract]  
This study followed infants from the above cohort into childhood. Subjects were studied at 7 years of age. After adjustment for significant confounding variables, the estimated probability of ever having respiratory illness was 17% [95% CI: 15.9%-18.1%] for those children exclusively breastfed for at least 15 weeks, 31% [26.8%-35.2%] for those partially breastfed and 32% [30.7%-33.7%] for those who were artificially fed. This means that the bottle-fed infants were at almost twice the risk of developing respiratory illness at any time during the first 7 years of life. This study also found solid feeding before 15 weeks was associated with an increased probability of wheeze during childhood (21.0% [19.9% to 22.1%] v 9.7% [8.6% to 10.8%]) as well as increased percentage body fat and weight in childhood. Systolic blood pressure was raised significantly in children who were exclusively bottle fed compared with children who received breast milk (mean 94.2 (93.5 to 94.9) mm Hg v 90.7 (89.9 to 91.7) mm Hg).

[Abstract]  
This study of 2602 children in Australia has found that hospital, doctor, or clinic visits and hospital admissions for respiratory illness and infection in the first year of life are significantly lower among babies who are predominantly breastfed. Stopping predominant breastfeeding before six months and stopping breastfeeding before eight months was associated with a significantly increased risk of wheezing lower respiratory illnesses. Upper respiratory tract infections were significantly more common if predominant breastfeeding was stopped before 2 months or if partial breastfeeding was stopped before 6 months.

[Abstract]  
This meta-analysis of studies from developed countries concludes that the risk of severe respiratory tract illness resulting in hospitalisation is more than tripled among infants who are not breastfed, compared with those who are exclusively breastfed for 4 months (relative risk = 0.28; 95% CI 0.14 - 0.54).

See also:  

### Necrotising Enterocolitis (NEC)

[Abstract]  
926 preterm infants were studied, 51 of whom developed NEC. Exclusively formula fed infants were 6 to 10 times more likely to develop NEC than those who received breast milk. Although NEC is rare in babies over 30 weeks gestation, it was 20 times more common if the baby had received no breast milk.
Benefits of breastfeeding

### Urinary tract infection


128 hospitalised infants with urinary tract infection were compared with 128 hospitalised control infants. All infants were less than 6 months old. The infants were matched for age, gender, social class, birth order and maternal smoking habits. Infants who were exclusively bottle fed at the time of admission to the hospital were more than five times as likely to have urinary tract infections compared to those who were breastfed.

### Ear infections

Duncan B et al. (1993). Exclusive breast feeding for at least 4 months protects against otitis media. *Pediatrics* 5: 867-872. [Abstract]

1013 infants were studied during the first year of life to assess the relationship between infant feeding and acute and recurrent otitis media. 467 infants had at least one episode and 169 had recurrent otitis media. Infants exclusively breastfed for at least 4 months had 50% fewer episodes of otitis media and those partially breastfed had 40% fewer episodes.


400 infants were studied at 2, 6, 10 and 12 months of age. Breastfed babies had significantly lower incidence of acute otitis media at every stage.

See also:


### Allergic disease (eczema, asthma and wheezing)


150 children were studied up to the age of 17 years to determine the effect on atopic disease of breastfeeding. The subjects were divided into three groups: prolonged (>6 months) intermediate (1-6 months) and short or no (<1 month) breastfeeding. They were followed up at 1, 3, 5, 10 and 17 years. The prevalence of manifest atopy throughout follow-up was highest in the group who had little or no breastfeeding. Breastfeeding for longer than 1 month without other milk supplements was associated with a significant reduction in the incidence of food allergy at 3 years of age, and also respiratory allergy at 17 years of age. Six months of breastfeeding was associated with significantly less eczema during the first 3 years and less substantial atopy in adolescence.


Preterm infants were randomly allocated to receive preterm formula or banked human milk, alone or as supplements to the mother's own milk. The use of human milk was associated with a significantly-reduced incidence of allergic disease, particularly eczema at 18 months in those with a family history of atopic disease. In those without a family history there was no effect.


An Australian study followed 2187 children from birth to age 6 years and found that the introduction of milk other than breastmilk before 4 months of age was a significant risk factor for asthma (odds ratio 1.25; 95% CI 1.02-1.52) after adjustment for confounders. It was also a risk factor for wheeze three or more times since 1 year of age (1.41; 1.14-1.76), wheeze in the past year (1.31; 1.05 to 1.64), sleep disturbance due to wheeze within the past year (1.42; 1.07-1.89) and positive skin prick test reaction to at least one common aeroallergen (1.30; 1.04-1.61).

Children aged 6 years were more likely to be asthma sufferers if they had not been exclusively breastfed for at least 4 months, regardless of their mother's asthma status (odds ratio, 1.35; 95% CI 1.00-1.82).

See also:


**Insulin-dependent diabetes mellitus**


This analysis pooled results from 19 studies of the relationship between infant feeding and insulin dependent diabetes mellitus (IDDM) selected to minimise bias. It concluded that early onset IDDM patients were more likely than healthy controls to have been breastfed for less than 3 months. In separate analyses it also found the IDDM patients were more likely to have been exposed to cows' milk protein before 4 months of age. It estimated that up to 30% of type 1 diabetes cases could be prevented by removing cows' milk products from the diet of 90% of the population in the first 3 months.


This study found that newly diagnosed diabetic children had a much higher level of IgG anti-BSA (bovine serum albumin) than controls. This antibody to a cows’ milk protein, BSA, has some structural homology with the pancreatic islet b-cell surface antigen p69. The authors speculated that anti-BSA antibodies attack b-cells in genetically-predisposed children.

**Virtanen SM et al. (1991).** Infant feeding in children <7 years of age with newly diagnosed IDDM. *Diabetes Care* 14: 415-417. [Abstract]

This case-control study involving nearly 700 diabetic children found that the risk of insulin dependent diabetes was doubled in children who were exclusively breastfed for less than 2 months and doubled among those introduced to dairy products at less than 2 months of age. The risk was lowest in those exclusively breastfed for longest. In multivariate analyses, the introduction of cows’ milk products was the most important risk factor. This suggests, along with the previous study, that formula feeding in infancy plays a part in the pathogenesis of juvenile onset diabetes mellitus.

See also:


**Other studies of interest (requiring further substantiation) on health benefits for the infant:**


Neurological development


A meta-analysis of observed differences from 20 studies in cognitive development between breast-fed and formula-fed children, which found - after adjustment for appropriate key cofactors - that breastfeeding was associated with significantly higher scores for cognitive development and that the developmental benefits of breastfeeding increased with duration of feeding. After adjustment for covariates, the increment in cognitive function was 3.16 (95% CI: 2.35, 3.98) points. Significantly higher levels of cognitive function were seen in breastfed than in formula-fed children at 6-23 months of age and these differences were stable across successive ages. Low-birth-weight infants showed larger differences (5.18 points; 95% CI: 3.59, 6.77) than did normal-birth-weight infants (2.66 points; 95% CI: 2.15, 3.17).


300 children who had been born preterm were studied at the age of 7-8 years. After controlling for social class, maternal education, birth weight, gestational age, birth rank, infant sex and maternal age it was discovered that those children who had been fed breast milk in the early weeks of life had an 8.3 point advantage in intelligence quotient (I.Q.) over those who had received artificial milk. This advantage was associated with being fed mother's milk by tube rather than with the process of breastfeeding. There was a dose-response relation between the proportion of breast milk in the diet and subsequent I.Q. Children whose mothers chose to provide breast milk but failed to do so had the same I.Q. as those whose mothers elected to feed artificially.


This study measured cognitive development in children at the age of 2 years. It adjusted for ethnic group, smoking, alcohol consumption, maternal intelligence quotient and attitude. Using the Bayley scale, it showed that those breastfed for four months or less had a 3.7 point advantage over those artificially fed. Those fed for over four months were at a 9.1 point advantage. As with the above study, this study shows a dose response relationship between the duration of breastfeeding and the subsequent I.Q.


Aiming to reduce the role of environmental influence, this study examined infants before 1 year of age. Motor skills and early language development were evaluated at 8 months of age in 1656 healthy, singleton, term infants, with a birth weight of at least 2500g. The proportion of infants who mastered the specific milestones increased consistently with increasing duration of breastfeeding. The relative risk for the highest versus the lowest breastfeeding category was 1.3 (95% CI: 1.0-1.6) for crawling, 1.2 (95% CI: 1.1-1.3) for pincer grip and 1.5 (95% CI: 1.3-1.8) for polysyllable babbling. Little change was found after adjustment for confounding.


Babies who are breastfed for longest grow up to have significantly increased intelligence as adults according to this study among two samples of Danish adults born between 1959 and 1961.

See also:


Breast cancer


A review of 47 breast cancer studies that included information on breastfeeding patterns found that the longer women breastfeed, the more they are protected against breast cancer. The relative risk of breast cancer decreased by 4·3% (95% CI 2·9-5·8; p<0·0001) for every 12 months of breastfeeding. The relative risk remained after controlling for developed versus developing country location, women's age, menopausal status, ethnic origin, parity, her age when her first child was born, or any of nine other personal characteristics examined.

The study group estimate that the cumulative incidence of breast cancer in developed countries would be reduced by more than half (from 6·3 to 2·7 per 100 women by age 70) if women had the average number of births and lifetime duration of breastfeeding that had been prevalent in developing countries until recently. Breastfeeding could account for almost two-thirds of this estimated reduction in breast cancer incidence.


This study of women living in 11 UK health districts matched 755 cases with 675 controls. It showed that the risk of developing breast cancer before the age of 36 was negatively correlated with both the duration of breastfeeding and number of babies breastfed. Adjustment was made for use of oral contraceptives, nulliparity, age at first birth, family history and age at menarche. Cases and controls were similar in respect of marital status, age at leaving school and alcohol consumption.


This multi-centre trial in the USA included more than 14000 pre- and post-menopausal women. It concluded that breast cancer risk was 22% lower among pre-menopausal women who had ever breastfed than among those who had not. Total duration of lactation was also associated with a reduction in the risk of breast cancer among the pre-menopausal women. The authors of the study estimated that if all women with children breastfed for a total of 4-12 months, breast cancer among pre-menopausal women could be reduced by 11%. In addition, they suggested that if women with children breastfed for a lifetime total of 24 months or longer, the incidence of this form of breast cancer might be reduced by almost 25%.

See also:

Ovarian cancer


This multinational study showed a 20-25% decrease in the risk of ovarian cancer among women who lactated for at least 2 months per pregnancy, compared to those who had not. Little or no further decrease in risk was seen with increasing duration of lactation.

See also:
Hip fractures and bone density


In this study of 311 cases of hip fracture in women over the age of 65 years, it was found that parous women who had not breastfed had twice the risk of hip fracture as nulliparous women and those who had breastfed (after controlling for confounders).


Among 308 women who breastfed fully for 6 months, bone mineral density decreased during this time, but had increased by 18 months to a level higher than baseline.

See also:


Other studies of interest (requiring further substantiation) on health benefits for the mother:


Risk factors for cardiovascular disease


Data were collected in 1991 on 33768 children aged 6 to 14 years in the Czech Republic. Children who had ever been breastfed were less likely to be obese or overweight than those who had never been breastfed. After controlling for parental education, parental obesity, maternal smoking, high birth weight, watching television, number of siblings and physical activity, the adjusted odds ratio for breastfeeding were 0.80 for being overweight (95% CI, 0.71 to 0.90) and 0.80 for being obese (95% CI, 0.66 to 0.96).


In a study of 9357 German five and six year old children, those who had never been breastfed were more likely to be overweight or obese than those who had been breastfed. A dose response effect was identified - 4.5% of children who had never been breastfed were obese compared with 2.3% of children breastfed for 3-5 months, 1.7% of children breastfed for 6-12 months and 0.8% of children breastfed for more than 12 months. After adjusting for potential confounding factors, breastfeeding remained a significant protective factor against the development of obesity (odds ratio 0.75, 95% CI 0.57 to 0.98) and being overweight (0.79, 0.68 to 0.93). The study authors note that obese children have a high risk of becoming obese adults and suggest that increased breastfeeding duration may eventually result in a reduction in the prevalence of cardiovascular diseases and other diseases related to obesity.


Of 625 subjects aged 48-53 years born around the time of a severe period of famine in Amsterdam (1944-45), those were bottle fed at hospital discharge had greater risk factors for cardiovascular disease than those who were exclusively breast fed. They had a higher mean 120 minute plasma glucose concentration after a standard oral glucose tolerance test, a higher plasma low density lipoprotein (LDL) cholesterol concentration, a lower high density lipoprotein (HDL) cholesterol concentration, and a higher LDL/HDL ratio. Systolic blood pressure and body mass index were not affected by the method of infant feeding.
A study of 32200 Scottish children aged 39-42 months found that the prevalence of obesity was significantly lower among those who had been breastfed, after adjusting for socioeconomic status, birthweight and gender (odds ratio 0.70, 95% CI 0.61-0.80).

See also:

**Childhood cancers**

Information regarding breastfeeding was obtained through telephone interviews with mothers of 1744 children with acute lymphoblastic leukaemia (ALL) and 1879 matched control subjects, aged 1-14 years, and of 456 children with acute myeloid leukaemia (AML) and 539 matched control subjects, aged 1-17 years. Ever having breastfed was found to be associated with a 21% reduction in risk of childhood acute leukaemia (odds ratio [OR] for all types combined = 0.79; 95% confidence interval [CI] = 0.70-0.91). The inverse associations were stronger with longer duration of breastfeeding. The authors acknowledge the need for further investigation.

Total duration of breastfeeding and of exclusive breastfeeding was studied and compared in 99 childhood cancer cases and 90 controls. The difference between the average duration of breastfeeding in cases and controls was significant for all cancers (p<0.05) and for lymphoma (p<0.01). When average duration of exclusive breastfeeding was compared, the difference was highly significant for all cancers (p<0.001) and for lymphoma (p<0.001). Cases and controls were not different with respect to their age, sex, birth year, birth order, age and educational status of mothers, smoking of fathers and socioeconomic status but a positive family history of cancer was present in 4 cases compared with only 1 control.

See also:

**Breastfeeding, bed-sharing and cot death (SIDS)**

Research has found associations between breastfeeding and reduced risk of Sudden Infant Death Syndrome (SIDS or cot death) as well as between bed-sharing and successful breastfeeding. Babies sharing a bed with their mother are at greater risk of cot death if a parent smokes, but there is no increased risk for non-smokers.

A three year, case-control study of 325 babies who died and 1300 control infants concluded that there is no association between infants sharing the parental bed and an increased risk of sudden infant death syndrome among parents who do not smoke or infants older than 14 weeks. There was an increased risk for infants who shared the bed for the whole sleep or were taken to and found in the parental bed (9.78, 95% CI: 4.02 - 23.83), but which was not significant for infants of parents who did not smoke or for older infants (>14 weeks). This risk also became non-significant after adjustment for recent maternal alcohol consumption (>2 units), use of duvets (>4 togs), parental...
Benefits of breastfeeding


The New Zealand Cot Death Study reviewed data on 356 infant deaths classified as SIDS and 1529 control infants over 3 years. Cases stopped breastfeeding sooner than controls: by 13 weeks, 67% controls were breastfed versus 49% cases. A reduced risk for SIDS in breastfed infants persisted during the first 6 months after controlling for confounding demographic, maternal and infant factors. Infants exclusively breastfed at discharge from hospital (OR = 0.52, 95% CI: 0.35-0.71) and during the last 2 days (OR = 0.65, 95% CI: 0.46-0.91) had a significantly lower risk of SIDS than infants not breastfed.


A total of 200 parents of infants who died of SIDS between 1989 and 1992 were compared with 200 control parents who delivered healthy infants. There was an increased risk of SIDS associated with passive smoking (OR = 3.50 [95% CI, 1.81 to 6.75]). Breast-feeding was protective for SIDS among nonsmokers (OR = 0.37) but not smokers (OR = 1.38), after adjusting for potential confounders.


An anthropological investigation in the north-east of England found that 65% of parents practiced co-sleeping with their infants, finding it a convenient care strategy. Breastfeeding was significantly associated with co-sleeping.


The effect of mother-infant bed-sharing on nocturnal breastfeeding behaviour was studied in 20 routinely bedsharing and 15 routinely solitary sleeping mother-infant pairs when the infants were 3 to 4 months old. All pairs were healthy and exclusively breastfeeding at night. The most important finding was that routinely bed-sharing infants breastfed approximately three times longer during the night than infants who routinely slept separately: this reflected a two-fold increase in the number of breastfeeding episodes and 39% longer episodes. The authors suggest that, by increasing breastfeeding, bedsharing might be protective against SIDS, at least in some contexts.


UNICEF UK Baby Friendly Initiative’s Sample policy on bed sharing.
HIV-1 transmission

The HIV virus can be transmitted through breastfeeding. Unfortunately, most research has failed to define exclusive breastfeeding properly, with many studies comparing risk of infection between formula fed babies and babies receiving any breast milk. The first study to compare properly-defined exclusive breastfeeding with mixed feeding and artificial feeding found no significant difference in HIV infection between breastfed and artificially-fed babies.


Babies born to 549 HIV-1-infected South African women were assessed at 3 months of age. After adjustment for potential confounders, exclusive breastfeeding carried a significantly lower risk of HIV-1 transmission than mixed feeding (hazard ratio 0.52 [95% CI 0.28-0.98]) and a similar risk to no breastfeeding (0.85 [0.51-1.42]). The authors call for further research but point out that exclusively breastfed babies had a (non-significant) lower probability of infection than those never breastfed and suggest that this may be due to virus acquired during delivery being neutralised by immune factors in breast milk. They propose that mixed feeding carries the highest risk due to the beneficial immune factors in breast milk being counteracted by damage to the infant’s gut and disruption of immune barriers caused by contaminants in mixed feeds.


Babies of HIV-infected mothers who were breastfed exclusively for three months or more were found to be at no greater risk of HIV infection during the first six months than those never breastfed. 551 HIV-infected mothers and their babies were included in the study. Exclusive breastfeeding, defined as a time dependent variable, carried a significantly lower risk of HIV infection than mixed feeding (hazard ratio 0.56, 95% CI 0.32-0.98, p=0.04) and a similar risk to no breastfeeding (HR 1.19, 95% CI 0.63-2.22, p=0.59). The authors suggest that other foods and fluids introduced to the gut of mixed-fed babies damage the bowel and facilitate the entry into the body tissues of the HIV present in these mothers’ breast milk. This is supported by the finding that, if mothers continued to breastfeed along with other foods once the period of exclusive breastfeeding had ended, new HIV infections began to occur. The investigators call for further research.

See also:
Information on single bottle pasteurisers
**Dental health**


Data on 9698 children aged between 3 and 17 years were analysed retrospectively to assess the association between breastfeeding and dental malocclusion. After controlling for confounding factors, increased duration of breastfeeding was associated with a decline in the prevalence of malocclusion.


An investigation of 600 skulls preserved from ancient cultures in US museums found that nearly all had perfect occlusions (correct alignment of teeth, allowing a proper bite). As the skulls were from people living before the advent of artificial feeding, they would all have been breastfed. The author notes that good occlusion and well formed dental arches were much less common among his own dental patients and among a sample of modern skulls studied.

See also:


**Reviews of the benefits of breastfeeding**


