



**FOURTEEN RISKS OF
FORMULA FEEDING**



Fourteen Risks of Formula Feeding

When breastfeeding is not fully practiced, infant formulas are generally used. The World Health Organisation International Code of Marketing of Breastmilk Substitutes requires that parents be informed about the health hazards of the unnecessary or improper use of infant formula. This informational brochure gives some examples from the extensive body of research documenting the importance of breastfeeding and the associated risks of formula feeding.

The World Health Organisation recommends exclusive breastfeeding for the first 6 months of life, the introduction of nutritious complementary foods at 6 months, and continued breastfeeding for 2 years and beyond.

“Formula feeding is the longest lasting uncontrolled experiment lacking informed consent in the history of medicine.”

-Dr. Frank Oski, founder of the journal *Contemporary Pediatrics*

— Increased risk of infection from contaminated formula —

Infant formulas are not sterile and are vulnerable to bacterial contamination as well as deliberate chemical adulteration. Particularly for young infants with immature immune systems, impurities in formula can have serious repercussions and even result in death.

A case report from a recent U.S.-based outbreak of *Enterobacter sakazakii* in a neonatal intensive care unit (NICU) documented the case of an infant who developed fever, increased heart rate, decreased blood circulation and seizures at 11 days. The infant subsequently died at day 20. Its symptoms were attributed to infection with *E. sakazakii*, which was traced to contaminated powdered infant formula used in the NICU.

Weir, E. (2002). Powdered infant formula & fatal infection with *Enterobacter sakazakii*. *Canadian Med Assoc J* 166: 1570.

A Belgium-based outbreak of necrotizing enterocolitis (NEC) was traced back to infant formula contaminated with *Enterobacter sakazakii*. A total of 12 infants developed NEC during the outbreak and 2 died.

Van Acker, J. et al. (2001). Outbreak of necrotizing enterocolitis associated with *Enterobacter sakazakii* in powdered infant formulas. *J Clin Microbiol* 39: 293-7.

The deliberate contamination of infant formula in China with the compound melamine (used by dairy manufacturers to artificially elevate protein levels in their products) resulted in 12,900 hospitalizations and 3 deaths. Chinese inspection officials detected melamine in the products of 22 dairy manufacturers throughout the country, 2 of which exported their products internationally.

World Health Organization (2008). Melamine-contaminated powdered infant formula, China. *Weekly Epidemiological Record* 39(83): 349-56.

Increased risk of allergy

Infants who are formula-fed not only lack the protective effects of breastmilk but also are exposed to foreign substances in the form of cow's milk proteins—potential allergens that increase their risk of developing allergies later in life. Particularly for high-risk infants with a family history of allergic conditions, formula feeding is strongly discouraged.

A study of 1,246 infants in the U.S. showed that at age 6, children who had received only formula had 3 times the odds of having recurrent wheezing compared to those who had been breastfed.

Wright, A.L. et al. (1995). Relationship of infant feeding to recurrent wheezing at age 6 yrs. *Arch Pediatr Adolesc Med* 149: 758-63.

In a study from Finland of 17-year-old adolescents, the group who had received formula had a higher incidence of eczema, food allergy and respiratory allergy.

Saarinén, U.M. and M. Kajosari. (1995). Breastfeeding as a prophylactic against atopic disease: Prospective followup study until 17 years old. *Lancet* 346: 1065-9.

Increased risk of asthma

As with allergies, being formula-fed as an infant significantly increases a child's risk of developing asthma.

A review of studies investigating the association between exclusive breastfeeding and asthma found that rates of asthma were higher among formula-fed children than among those who had been exclusively breastfed for 3 months. The authors attributed this to the protective properties of breastmilk, the avoidance of allergens in formula, or a combination of both.

Gdalevich, M. et al. (2001). Breast-feeding and the risk of bronchial asthma in childhood: A systematic review with meta-analysis of prospective studies. *J Pediatr* 139(2):261-6.

A study of 2,184 children in Toronto determined that the risk of asthma and wheezing was doubled among formula-fed infants compared to those who had been breastfed for 9 months or longer.

Dell, S. and T. To. (2001). Breastfeeding and asthma in young children. *Arch Pediatr Adolesc Med* 155: 1261-5.

Increased risk of ear infections

Infants have immature immune systems, and so the immune properties in breastmilk provide crucial protection against otitis media (ear infections); formula-fed infants therefore have a higher risk of developing ear infections.

In a U.S. study, the incidence of ear infections increased significantly with decreased duration and exclusivity of breastfeeding. Infants who were exclusively formula-fed had twice the number of ear infections as those who were exclusively breastfed.

Duncan, B. et al. (1993). Exclusive breastfeeding for at least 4 months protects against otitis media. *Pediatrics* 91:867-72.

A U.S. study found that the percentages of exclusively breastfed children who had been diagnosed with an ear infection were 25% at 6 months and 51% at 12 months, while the corresponding figures for exclusively formula-fed children were 54% and 76%, respectively.

Duffy, L.C. et al. (1997). Exclusive breastfeeding protects against bacterial colonization and day care exposure to otitis media. *Pediatrics* 100: E7.

Reduced cognitive development

Formula-fed children have been found to have lower levels of cognitive development compared to their breastfed counterparts.

A study of over 1,000 children in New Zealand that examined infant feeding practices and children's subsequent scores on intelligence quotient (IQ) tests, teacher ratings, standardized tests, and academic performance reviews found that decreased duration of breastfeeding was associated with lower cognitive development and educational achievement throughout childhood and young adulthood.

Horwood, L. J. & D. M. Fergusson. (1998). Breastfeeding & later cognitive & academic outcomes. *Pediatrics* 101(1):E9.

A study of preterm infants found that at ages 7.5-8, those who had received formula for the first few weeks of life scored on average 8.3 points lower on IQ tests than their breastfed counterparts.

Lucas, A. et al. (1992). Breastmilk & subsequent intelligence quotient in children born preterm. *Lancet* 339(8788):2614.

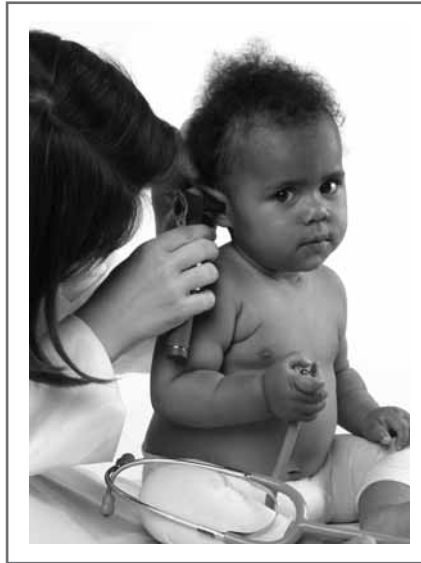
Infant feeding has long-term impacts on cognitive development, as a U.K. study concluded that increased formula feeding was associated with lower educational levels obtained by age 26 and cognitive abilities at age 53.

Richards, M. et al. (2002). Long-term effects of breast-feeding in a national cohort: educational attainment and midlife cognition function. *Publ Health Nutr* 5: 631-5.

Increased risk of diabetes

Exposure to cow's milk proteins (in cow's milk-based formulas) early in life increases a child's risk of developing both type 1 and type 2 diabetes.

A review of studies examining the association between infant feeding and the incidence of



insulin-dependent (type I) diabetes found that early cow's milk exposure is associated with a 1.5 times increase in the risk of developing diabetes.

Gerstein, H.C. (1994). Cow's milk exposure and type 1 diabetes mellitus. A critical overview of the clinical literature. *Diabetes Care* 17(1): 13-9.

In a study that examined pre- and postnatal risk factors in 46 native Canadian type 2 diabetes patients and 92 healthy controls, formula feeding was found to increase the risk of developing type 2 diabetes.

Young, T.K. et al. (2002). Type 2 diabetes mellitus in children: prenatal and early infancy risk factors among native Canadians. *Arch Pediatr Adolesc Med* 156: 651-5.

Increased risk of obesity

Children who are fed formula have a higher risk of becoming obese.

A Scottish study looked at infant feeding practices and body mass index (BMI) of 32,200 children aged 39 to 42 months. After controlling for socioeconomic status, birth weight and sex, the prevalence of obesity was significantly higher in the formula-fed children, leading to the conclusion that formula feeding is associated with an increase in the risk of childhood obesity.

Armstrong, J. et al. (2002). Breastfeeding and lowering the risk of childhood obesity. *Lancet* 359: 2003-4.

German researchers collected height and weight data for 9,375 children to determine the impact of early childhood feeding on the development of obesity. They found a 40% higher prevalence of obesity associated with formula feeding.

Von Kries, R. et al. (1999). Breast feeding and obesity: Cross sectional study. *British Med J* 319(7203):147-50.



— Increased risk of chronic gastrointestinal diseases —

Research has shown a strong association between formula feeding and the incidence of chronic gastrointestinal diseases, particularly Celiac disease and Crohn's disease.

An Italian study found that children who were formula-fed from birth or breastfed for less than 30 days had 4 times the risk of developing Celiac disease compared to those who were breastfed for more than 30 days. Decreases in breastfeeding in recent decades are likely implicated in the rise of Celiac disease.

Auricchio, S. et al. (1983). Does breast feeding protect against the development of clinical symptoms of Celiac disease in children? *J Pediatr Gastroenterol Nutr* 2(3): 428-33.

An investigation of the risk factors for Crohn's disease and ulcerative colitis found that shorter durations of breastfeeding and increased formula feeding were associated with an increased risk for developing both diseases.

Singhal, A. et al. (1993). Breast-feeding and maternal smoking in the aetiology of Crohn's disease and ulcerative colitis in childhood. *Ann Epidemiol* 3(4): 387-92.

— Increased risk of cardiovascular disease —

Infants who are formula-fed have a greater risk of developing high cholesterol levels and high blood pressure, which increase the risk of cardiovascular disease.

An analysis of 216 children (aged 13-16 years) who had been born premature found that blood pressures were higher among children who had been given formula than among those who had received breastmilk.

Singhal, A. et al. (2001). Early nutrition in preterm infants and later blood pressure: two cohorts after randomized trials. *Lancet* 357: 413-9.

A study that examined the infant feeding histories and current cholesterol levels of adults aged 48-53 years found that those who were formula-fed had higher cholesterol levels than their breastfed counterparts, suggesting that the risks of formula feeding extend well into adulthood.

Ravelli, A.C. (2000). Infant feeding & adult glucose tolerance, lipid profile, blood pressure & obesity. *Arch Dis Child* 82(3): 248-52.

Increased risk of childhood cancers

Formula-fed infants have a greater risk of developing childhood cancers, particularly leukaemia and lymphomas.

The UK Childhood Cancer Study analyzed 3,500 childhood cancer cases and the children's history of infant feeding. The results showed a small increase for leukaemia and for all childhood cancers combined among infants who had not been breastfed.

UK Childhood Cancer Investigators. (2001). Breastfeeding and childhood cancer. *Br J Cancer* 85: 1685-94

Increased risk of acute respiratory disease

Infants who are formula-fed do not receive the immune properties of breastmilk and therefore have a greatly increased risk of developing acute respiratory diseases such as pneumonia.

Brazilian children who were exclusively formula-fed were 16.7 times more likely to be diagnosed with pneumonia than children who had been exclusively breastfed.

Cesar, J.A. et al. (1999). Impact of breastfeeding on admission for pneumonia during post-neonatal period in Brazil: Nested case-controlled study. *British Med J* 318: 1316-20.

Increased risk of gastrointestinal infections

Given that infants have immature immune systems, the immune properties of breastmilk are crucial for protecting against common infections that cause diarrhoea. Infants who are formula-fed are therefore at a significantly greater risk for developing gastrointestinal infections.

A comparison of infants who received primarily breastmilk during the first 12 months of life and infants who were exclusively formula-fed or breastfed for 3 months or less found that diarrhoeal disease was twice as high among the infants who received no or little breastmilk

Dewey, K.G. et al. (1995). Differences in morbidity between breast-fed & formula-fed infants. *J Pediatr* 126: 696-702.

Increased risk of hospitalization due to infectious disease

Breastfeeding is critical for protecting vulnerable infants against diarrhoea, pneumonia and other infections. Its role is so significant that formula-fed infants are not only more likely to develop these conditions but also are at greater risk of contracting infections so severe that they require hospitalization.

A study in the U.K. measured hospitalizations due to diarrhoea and pneumonia in the first 8 months of life among 15,890 breastfed and formula-fed infants. The frequency of hospitalizations increased as the amount of breastfeeding decreased, so much so that the researchers estimated that exclusive breastfeeding could prevent 53% of hospitalizations due to diarrhoea and 27% due to pneumonia, and even partial breastfeeding could prevent 31% of diarrhoea and 25% of pneumonia hospitalizations.

Quigley, M. A. et al. (2007). Breastfeeding & hospitalization for diarrheal & respiratory infection in the UK Millenium Cohort Study. *Pediatrics* 120(2): 452-3.



Increased risk of mortality

As seen throughout this brochure, formula-fed children both lack the protective properties of breastmilk and are also exposed to increased sources of infection in what is often impure formula. Particularly in resource-poor settings, formula-fed children are not only at greater risk for developing and being hospitalized for these infections, but are ultimately more likely to die.

A study of Brazilian children found that compared to exclusively breastfed children, the risk of death from diarrhoeal diseases was increased 4.2 times for partially breastfed children and 14.2 times for children who received only formula.

Victoria, C.G. et al. (1989). Infant feeding & deaths due to diarrhea: A case-controlled study. *Amer J Epidemiol* 129:103241.

Infants in Bangladesh who were partially breastfed or not breastfed had a 2.4 times greater risk of dying from an acute respiratory infection compared to their breastfed counterparts.

Arifeen, S. et al. (2001). Exclusive breastfeeding reduces acute respiratory infection and diarrhea deaths among infants in Dhaka slums. *Pediatrics* 108: e67.

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