

The Cost of Not Breastfeeding: A Commentary

Janice M. Riordan, EdD, RN, FAAN

Abstract

Breastfeeding, a valuable natural resource, promotes health, helps prevent infant and childhood disease, and saves health care costs. Additional annual national health care costs, incurred for treatment of four medical conditions in infant who were not breastfed were estimated. Infant diarrhea in nonbreastfed infants costs \$291.3 million; respiratory syncytial virus, \$225 million; insulin-dependent diabetes mellitus, from \$9.6 to \$124.8 million; and otitis media, \$660 million. Thus, these four medical diagnoses alone create just over \$1 billion of extra health care costs each year. Breastfeeding may also enhance intellectual development of children according to at least one medical research study. The potential societal benefits of more intelligent children is incalculable even though it cannot be directly measured in terms of dollars. Finally, it was calculated that an additional \$2,665,715 in federal funds is needed yearly in order for WIC to provide infant formula to nonbreastfeeding mothers. For the average family, the cost of purchasing formula is twice the cost of supplemental food for the breastfeeding mother. Breastfeeding education and support should be an integral part of health care, especially under managed care which rewards the prevention of health problems and reduced use of health services. *J Hum Lact* 1997; 93-97.

Keywords: breastfeeding, costs, childhood disease, formula, health care

Joseph A. Califano, Jr., former United States Secretary of Health, Education and Welfare, notes that in the United States, only 3 cents of every health care dollar goes to preventive health care.¹ Thus, "health care" is actually sickness care—treatment of chronic and acute illness. The United States spends more on sickness care, just over a trillion dollars each year, than any other nation in the world. But times are changing. With the advent of managed care where the rewards are for preventing health problems and *not* using health services, health care corporations look for cost effective ways to keep their insured clients healthy. This article estimates the additional costs of medical treatment of four common childhood illnesses because of not breastfeeding. Further, it compares the cost of

breastfeeding or formula feeding to the United States Women, Infants and Children Supplemental Food Program (WIC) and for US consumers.

Breastfeeding, a unique process that provides ideal nutrition for infants, contributes to their healthy growth and development and reduces both the incidence and severity of infectious diseases.² Research during the past several decades documents the protective effect of breastfeeding against a variety of health problems during infancy and early childhood.³ This protective effect of breastfeeding is more striking in settings where poverty, malnutrition and poor hygiene are prevalent.

This research is not without flaws. Some studies contradict one another and contribute to the controversy about how important breastfeeding really is to public health.⁴ Common methodological flaws are inconsistent definition of "breastfeeding,"^{5,6} and small sample sizes. Randomized clinical trial design is difficult since a woman's choice to breastfeed is a deeply personal decision.

Kramer⁴ notes that estimates of breastfeeding effects are often conservative because of the dichoto-

Received for review, December 27, 1995; revised manuscript accepted for publication, July 23, 1996.

Janice M. Riordan is an Associate Professor at the School of Nursing, Wichita State University, Kansas.

J Hum Lact 13(2), 1997

© Copyright 1997 by International Lactation Consultant Association. All rights reserved.

mous classification of infants as either ever or never breastfed. A baby who receives only a few breastfeedings may be similarly classified with infants who were exclusively breastfed for many months. Moreover, the continued positive effect of human milk on the child's immunological defense, in some cases for years after weaning, is not considered.^{7,8}

Problems with conducting epidemiological research on breastfeeding are confounded in the United States which lacks a national registry or central data source for infant morbidity and mortality data. For example, the only reliable United States data on the rates of breastfeeding are from a formula company. The Center for Disease Control publishes data on selected diagnoses but much of the reported data are categorized according to age groups (usually 0–15 years) that do not separate out the first or second year of life, the years when breastfed infant morbidity can best be compared with those of formula-fed infants. The data presented here are estimates garnered from incidence rates, costs of treatment, and calculated potential savings generated by breastfeeding based on available sources. Effects are most likely greater than shown below.

Estimated Savings from Childhood Disease Prevention

Diarrheal Diseases

Diarrheal diseases are a major health problem everywhere, even in the United States. Worldwide, the strongest deleterious effect of not breastfeeding is diarrheal disease, especially in the first year. In a Brazilian study,⁹ for example, completely weaned infants had 14.2 times the risk of death from diarrhea as that of breastfeeding infants.

About 16 million U.S. children have between 21 and 37 million episodes of diarrhea annually. Rotavirus diarrhea accounts for about one-fifth of these illnesses.¹⁰ These diarrhea episodes result in 2.1 and 3.7 million annual visits to health care providers and to 79,000 inpatient hospital admissions for children under 2 years old in the United States.¹¹ About 400 children die annually. Two well-controlled prospective studies conducted in the United States¹² and the United Kingdom¹³ suggest that not breastfeeding increases an infant's risk of diarrhea approximately two-fold and the protective effect of breastfeeding is greatest during the infant's first year of life.

The estimated average cost of ambulatory care for each episode of childhood diarrhea is \$289. This cost includes the following: missed work, \$144; office visits,

\$57; laboratory tests, \$23; medication, \$21; changed diet/oral rehydration solutions, \$18; travel, \$15; extra diapers, \$7; and extra child care, \$6. Avendano et al.¹⁴ estimate that the annual cost of ambulatory care visits for diarrhea in infants and toddlers (0 to 36 months) within the United States is \$0.6 to \$1 billion. The average cost of hospital treatment is about \$4,000 per hospitalization.

When calculating the cost of not breastfeeding for diarrheal disease, if we use the midpoint of Avendano's cost estimate for ambulatory care for diarrhea (\$800 million) and divide this figure by one-third to reflect the assumption that one-third of the children in Avendano's study were under 12 months) the cost estimate is \$266.6 million. If \$266.6 million is then divided by half to reflect our assumption that not breastfeeding increases the diarrhea incidence in children of this age by two-fold, \$133.3 million in sickness care costs are added.

Annually then, the cost of hospitalization for childhood diarrhea is about \$316 million (79,000 hospital admissions × \$4,000). Thus, if hospitalization costs (\$316 million) are doubled as a result of not breastfeeding, \$158 million in health care costs are added. These two figures equal \$291.3 million, which are additional national health care costs for diarrheal disease because of not breastfeeding. This estimate does not consider the costs of human suffering by families of the several hundred children who die annually in the United States from diarrheal illnesses.

Respiratory Syncytial Virus (RSV)

RSV is a common, and for small children, serious illness of the lower respiratory tract. Millions of cases are seen in medical offices each fall and winter and about 90,000 infants are admitted to hospitals for this problem.¹⁵ Breastfed babies receive specific antibodies and cell-mediated immunologic factors and are about half as likely to be hospitalized with RSV as are artificially fed babies.^{16,17} The average cost of hospitalizing an infant for RSV (\$5,000) multiplied by 90,000 infant admissions equals \$450 million spent on hospitalizations alone. Half of this amount, \$225 million, is extra cost to the United States that could be avoided by breastfeeding.

Insulin-dependent Diabetes Mellitus (IDDM)

Several studies show breastfeeding protects against childhood diabetes.^{18,19,20} A meticulous case-control study of IDDM in Colorado children¹⁹ showed that subjects with IDDM were 30% less likely to have ever been breastfed as infants than healthy controls. Authors projected that the amount of IDDM in the population attributable to not breastfeeding ranged from 2% to 26%

mous classification of infants as either ever or never breastfed. A baby who receives only a few breastfeedings may be similarly classified with infants who were exclusively breastfed for many months. Moreover, the continued positive effect of human milk on the child's immunological defense, in some cases for years after weaning, is not considered.^{7,8}

Problems with conducting epidemiological research on breastfeeding are confounded in the United States which lacks a national registry or central data source for infant morbidity and mortality data. For example, the only reliable United States data on the rates of breastfeeding are from a formula company. The Center for Disease Control publishes data on selected diagnoses but much of the reported data are categorized according to age groups (usually 0–15 years) that do not separate out the first or second year of life, the years when breastfed infant morbidity can best be compared with those of formula-fed infants. The data presented here are estimates garnered from incidence rates, costs of treatment, and calculated potential savings generated by breastfeeding based on available sources. Effects are most likely greater than shown below.

Estimated Savings from Childhood Disease Prevention

Diarrheal Diseases

Diarrheal diseases are a major health problem everywhere, even in the United States. Worldwide, the strongest deleterious effect of not breastfeeding is diarrheal disease, especially in the first year. In a Brazilian study,⁹ for example, completely weaned infants had 14.2 times the risk of death from diarrhea as that of breastfeeding infants.

About 16 million U.S. children have between 21 and 37 million episodes of diarrhea annually. Rotavirus diarrhea accounts for about one-fifth of these illnesses.¹⁰ These diarrhea episodes result in 2.1 and 3.7 million annual visits to health care providers and to 79,000 inpatient hospital admissions for children under 2 years old in the United States.¹¹ About 400 children die annually. Two well-controlled prospective studies conducted in the United States¹² and the United Kingdom¹³ suggest that not breastfeeding increases an infant's risk of diarrhea approximately two-fold and the protective effect of breastfeeding is greatest during the infant's first year of life.

The estimated average cost of ambulatory care for each episode of childhood diarrhea is \$289. This cost includes the following: missed work, \$144; office visits,

\$57; laboratory tests, \$23; medication, \$21; changed diet/oral rehydration solutions, \$18; travel, \$15; extra diapers, \$7; and extra child care, \$6. Avendano et al.¹⁴ estimate that the annual cost of ambulatory care visits for diarrhea in infants and toddlers (0 to 36 months) within the United States is \$0.6 to \$1 billion. The average cost of hospital treatment is about \$4,000 per hospitalization.

When calculating the cost of not breastfeeding for diarrheal disease, if we use the midpoint of Avendano's cost estimate for ambulatory care for diarrhea (\$800 million) and divide this figure by one-third to reflect the assumption that one-third of the children in Avendano's study were under 12 months) the cost estimate is \$266.6 million. If \$266.6 million is then divided by half to reflect our assumption that not breastfeeding increases the diarrhea incidence in children of this age by two-fold, \$133.3 million in sickness care costs are added.

Annually then, the cost of hospitalization for childhood diarrhea is about \$316 million (79,000 hospital admissions × \$4,000). Thus, if hospitalization costs (\$316 million) are doubled as a result of not breastfeeding, \$158 million in health care costs are added. These two figures equal \$291.3 million, which are additional national health care costs for diarrheal disease because of not breastfeeding. This estimate does not consider the costs of human suffering by families of the several hundred children who die annually in the United States from diarrheal illnesses.

Respiratory Syncytial Virus (RSV)

RSV is a common, and for small children, serious illness of the lower respiratory tract. Millions of cases are seen in medical offices each fall and winter and about 90,000 infants are admitted to hospitals for this problem.¹⁵ Breastfed babies receive specific antibodies and cell-mediated immunologic factors and are about half as likely to be hospitalized with RSV as are artificially fed babies.^{16,17} The average cost of hospitalizing an infant for RSV (\$5,000) multiplied by 90,000 infant admissions equals \$450 million spent on hospitalizations alone. Half of this amount, \$225 million, is extra cost to the United States that could be avoided by breastfeeding.

Insulin-dependent Diabetes Mellitus (IDDM)

Several studies show breastfeeding protects against childhood diabetes.^{18,19,20} A meticulous case-control study of IDDM in Colorado children¹⁹ showed that subjects with IDDM were 30% less likely to have ever been breastfed as infants than healthy controls. Authors projected that the amount of IDDM in the population attributable to not breastfeeding ranged from 2% to 26%

varying according to the breastfeeding prevalence reported in other studies.

Approximately 120,000 U.S. children have IDDM and the average cost of treatment is about \$4,000 per child per year.²¹ Multiplying the 26% increase by \$4,000 and then by 120,000 results in added costs of \$124.8 million for children not breastfed. When the 2% increase is used, added cost is \$9.6 million for children not breastfed.

Otitis Media

Breastfed infants in the United States are at lower risk for first-year acute otitis media than are formula-fed infants.²² Infants breastfed 2 months or less have an incidence of acute otitis media that is 3.3 times greater than that of infants breastfed for 6 months. About 8 million children visit their health care provider each year for otitis media.

Brower and Brower (Breastfeeding Facts for Ohio, 1995) estimated that if the percentage of Ohio WIC mothers exclusively breastfeeding for 4 months was increased to 50%, annual health care costs for otitis media would decrease by \$1 million. This is just for one state. The total health care cost for childhood acute otitis media across the United States is estimated at \$1 billion.²³ If we estimate conservatively that not breastfeeding raises the incidence of acute otitis media by about two-thirds, about \$660 million could be saved by breastfeeding.

If infants are not breastfed for a year or more, added costs to the health care system for these four illnesses total just over \$1 billion a year (Table 1). Further costs would presumably result if the adverse effects of not breastfeeding on other health problems were also calculated. Moreover, the health benefits discussed here

are not limited to the child. Breastfeeding's protective effects also extend to the mother with decreased incidence of premenopausal breast cancer²⁴ and uterine cancer.²⁵

Estimating cost benefits of breastfeeding in terms of higher IQs and enhanced cognition is problematic. Studies of this type have been criticized because of the difficulty of separating out the effects of parenting on the child's later intellectual and cognitive performance. Lucas and colleagues²⁶ were able to control for maternal confounders by adjusting for differences between breastfed and formula-fed groups in mother's education and social class. There was a dose-response relationship between the proportion of mother's milk in the diet and the child's subsequent IQ. When tested at age 7 to 8 years, children who, as preterm infants, had received human milk subsequently scored significantly higher (8.3 points) than children who had received only artificial infant milk. Children whose mothers chose to provide milk but failed to do so had the same IQ scores as those whose mothers elected not to provide breast milk.

Costs of Formula Versus Human Milk

Not breastfeeding costs the WIC program, and subsequently U.S. taxpayers, enormous amounts of money. WIC is the largest purchaser of artificial infant milk—purchasing 40% of all formula sold in the United States. The cost of free artificial infant milk given to WIC mothers in 1991 was \$404 million (after artificial infant milk company rebates to WIC). Mothers on WIC who feed their babies commercial milk also receive supplemental foods costing a total of \$130 million in 1991.

Data from WIC General Accounting Office were used to compare the costs of supplements for breastfeeding and formula-feeding mothers.²⁷ WIC participants who exclusively breastfed and received the basic food supplement package saved WIC slightly more than \$2.5 million in formula costs each year. Even if the food package given breastfeeding mothers contains additional food, savings to WIC are still almost \$1 million because the mother receives no supplemental formula. As the proportion of formula in the package rises, savings fall (Table 2).

Families also spend more money by not breastfeeding. The cost of formula is about twice that of extra food for the lactating mother. When costs were calculated based on 62 days of exclusive breast or formula feeding for healthy full-term neonates in Hawaii, the cost for formula feeding was \$119.14 compared to \$49.16 for a breastfeeding mother on a "thrifty" diet plan.²⁸ In other

Table 1. Additional health care costs due to nonbreastfeeding for four medical conditions.

Diagnosis	Estimated effect of breastfeeding	Cost per episode (\$)	Costs of not breastfeeding (\$)
GI/Diarrhea	1/2*	Ambulatory=289 Hospital=4,000	291,300,000
Otitis Media	1/4-1/3	70-5,000	660,000,000
RSV	1/2 (hospitalization rate only)	5,000	225,000,000
IDDM	2% less likely to develop	4,000/yr.	9,600,000
	28% less likely to develop	4,000/yr.	124,800,000
Total costs	(low estimate)		1,185,900,000
	(high estimate)		1,301,100,000

*Compared with the rates of occurrence for artificially fed infants.

Table 2. Additional costs for WIC participants who did not breastfeed (assuming full funding participation, 1992).

Supplements	Additional Costs (\$)
Using basic breastfeeding food packages*	
No supplemental formula	2,665,714
10-% formula	2,436,354
Using enhanced breastfeeding food packages**	
No supplemental formula	977,025
10-% formula package	747,665
25-% formula package	407,875

*Cost \$36.34 per package. **Cost \$47.78 per package.
Data taken from United States General Accounting Office. Breastfeeding: WICs efforts to promote breastfeeding have increased. 1993 GAO/HRD-94-13; pp. 75-88.

words, two newborns can be breastfed for one formula-fed baby.

Discussion

Health costs to federal and state governments because of not breastfeeding appear to run into billions of dollars. The estimates may be conservative as they usually include neither parent "lost work" time nor other costs that occur when children are ill. Although the costs presented here are estimates only, the evidence is sufficiently compelling to warrant further investigation.

A similar study in the United Kingdom supports the validity of these findings. The estimated additional hospitalization costs for infant diarrheal disease from breastfeeding noted here are similar to those Broadfoot²⁹ recently found in the United Kingdom. Using Howie's carefully controlled prospective study results¹³ of the protective effect of human milk in the United Kingdom, Broadfoot calculated hospitalization costs for "bottle baby" diarrheal disease as about £41.5 million (about US \$62 million). The number of United States births is about 4.4 times the United Kingdom; therefore, \$62 million times 4.4 is \$273 million, which is comparable to the U.S. costs from diarrheal disease calculated in this study.

Tuttle and Dewey³⁰ found potential cost savings associated with breastfeeding over a 7½-year period could range from \$3 to \$5 million in Hmong families enrolled in Medi-Cal, AFDC, Food Stamps, and WIC programs in Sacramento County, California. Most of the cost savings were associated with the potential for a lower birth rate among breastfeeding Hmong women. An additional savings of \$0.6 to \$1.3 million could be included if costs for maternal prenatal and postnatal care were taken into account.

Given that breastfeeding is disease prevention in its purest form, it behooves health care providers, administrators, and policy-makers under pressure to reduce medical costs to promote and support breastfeeding. If breastfeeding is to be accepted as a lifestyle choice for more women, our culture must support it. Sadly, the United States lacks public policy that supports and promotes breastfeeding. For example, it is not uncommon policy in some public hospitals for infants to be removed from their mothers at birth or even to keep them in the nursery for 24 hours after the mother is discharged.

Every mother has a right to decide how her infant will be fed. When asked, most breastfeeding women say they chose to breastfeed because of the health benefits for their babies. Yet, despite overwhelming evidence that breastfed babies are healthier, only 49% of new mothers are exclusively breastfeeding at 1 month after their baby's birth (Ross Laboratories Mothers' Survey, 1995, Dayton, Ohio.) How many mothers do not breastfeed because they are not fully aware of the long-lasting health benefits of breastfeeding to their babies? Many health care providers hesitate to inform parents about the hazards of not breastfeeding because they do not want the parents, especially the bottle-feeding mother, to feel guilty. However, withholding information about breastfeeding deprives parents of their right to informed consent and may cause more anger than guilt in those who find out there are critical differences.

The evidence is clear that human milk feeding lowers health care costs and reduces human suffering. Federal and state governments, private medical insurance companies, and managed health care corporations would all experience significant cost savings by making breastfeeding education and support an integral part of the health care they provide. Since managed care appears to be the shape of health care in the years to come, the potential for an extensive cost savings from breastfeeding is real. Managed health care, where the bottom line is corporate profit, could do for breastfeeding what public policy has failed to do.

References

1. Califano JA. Radical Surgery. New York: Random House, 1994:Chapter 1.
2. Cunningham AS, Jelliffe DB, Jelliffe EF. Breastfeeding and health in the 1980's: A global epidemiologic review. *J of Pediatr* 1991; 118:659-66.
3. Kovar MG, et al. Review of the epidemiologic evidence for an association between infant feeding and infant health. *Pediatrics* 1984; 74(suppl):615-38.
4. Kramer M. Infant feeding, infection, and public health. *Pediatrics* 1988; 81(1):164-66.

5. Labbok M, Krasovec K. Toward consistency in breastfeeding definitions. *Stud Fam Plan* 1990; 21:226-30.
6. Auerbach KG, Renfrew MJ, Minchin M. Infant feeding comparisons: A hazard to infant health? *J Hum Lact* 1991; 7:63-71.
7. Sassen M, Brand R, Grote JJ. Breast-feeding and acute otitis media. *Am J Otolaryng* 1994; 15(5):351-57.
8. Saarinen UM, Kajosaari M. Breastfeeding as prophylaxis against atopic disease: Prospective follow-up study until 17 years old. *Lancet* 1995; 346(8982):1065-69.
9. Fuchs SC, Victoria CG, Martines J. Case-control study of risk of dehydrating diarrhoea in infant in the vulnerable period after full weaning. *Brit Med J* 1996; 313:391-93.
10. Glass RI, Lew JF, Gangaros E, LaBaron CW, Mei-Shang H. Estimates of morbidity and mortality rates for diarrheal diseases in American children. *J Pediatr* 1991; 118:S27-33.
11. Graves EJ. National Hospital Discharge Survey: Annual Summary, 1993. National Center for Health Statistics, Vital Health Statistics 1995; 13, pp. 121.
12. Dewey KG, Heinig MJ, Nommsen-Rivers LA. Differences in morbidity between breast-fed and formula-fed infants. *J Pediatr* 1995; 126:696-702.
13. Howie P. Protective effect of breastfeeding against infection. *Brit Med J* 1990; 300:11-16.
14. Avendano P, Matson DO, Long J, Whitney S, Matson CC, Pickering LK. Costs associated with office visits for diarrhea in infants and toddlers. *Pediatr Infect Dis J* 1993; 12:897-902.
15. MMRW update: Respiratory syncytial virus activity—United States 1993; 42(50):971-73.
16. Pullan CR, Toms GL, Martin AJ, Gardner PS, Webb JKG, Appleton DR. Breastfeeding and respiratory syncytial virus infection. *BMJ* 1980; 281(6247):1034-36.
17. Okamoto Y, Ogra PL. Antiviral factors in human milk: Implications in respiratory syncytial virus infection. *Acta Paediatr Scand* 1989; 351(Suppl):137-43.
18. Borch-Johnson K, Mandrup-Poulsen T, Zachau-Christansen B. Relation between breast-feeding and incidence of insulin-dependent diabetes mellitus. *Lancet* 1984; 2:1083-86.
19. Glatthaar C, Whittall DE, Welborn TA. Diabetes in Western Australian children: Descriptive epidemiology. *Med J Aust* 1988; 148:117-23.
20. Mayer EJ, Hamman RF, Gay EC, Lezotte DC, Savitz DA, Klingensmith GJ. Reduced risk of IDDM among breastfed children. *Diabetes* 1988; 37:1625-32.
21. *Diabetes in America*, 2nd Edition: National Institute of Diabetes, Digestive, and Kidney Disease. National Institutes of Health Publication 95-1468, 1995:37-45.
22. Saarinen UM. Prolonged breastfeeding as prophylaxis for recurrent otitis media. *Acad Paediatr Scand* 1982; 71:567-71.
23. Facione N. Otitis media: An overview of acute and chronic disease. *Nurs Pract* 1990; 15:11-16.
24. Hirose K, et al. A large-scale, hospital-based case-control study of risk factors of breast cancer according to menopausal status. *Jpn J Cancer Res* 1995; 86:146-54.
25. Brock KE, Berry G, Brinton LA, Kerr C, MacLennan R, Mock PA, et al. Sexual, reproductive and contraceptive risk factors for carcinoma-*in-situ* of the uterine cervix in Sydney. *Med J Aus* 1989; 150:125-30.
26. Lucas A, Morley R, Lister G, Lesson-Payne C. Breast milk and subsequent intelligence quotient in children born preterm. *Lancet* 1992; 339:261-64.
27. United States General Accounting Office. Breastfeeding: WIC efforts to promote breastfeeding have increased. 1993 GAO/HRD-94-13; pp. 75-88.
28. Jarosz LA. Breast-feeding versus formula: Cost comparison. *Hawaii Med J* 1993; 52(1):14-16, 18.
29. Broadfoot M. Economic consequences of breastfeeding less than three months. *New Generation Digest* 1995; 12:5.
30. Tuttle CR, Dewey KG. Potential cost savings for Medi-Cal, AFDC, Food Stamps, and WIC programs associated with increasing breastfeeding among low-income Hmong women in California. *J Am Diet Assoc* 1996; 96:885-90.