Increasing Breastfeeding Rates in New York City, 1980–2000

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ABSTRACT *Our objective was to determine temporal patterns of breastfeeding among women delivering infants in New York City (NYC) and compare national breastfeeding trends. All hospitals in NYC with obstetric units were contacted in May and June 2000 to provide information on the method of infant feeding during the mother's admission for delivery. Feeding was categorized as "exclusive breastfeeding," "breast and formula," or "exclusive formula." The first two categories were further grouped into "any breastfeeding" in the analysis. Hospitals were classified as "public" and "private," and patients were classified by insurance type as "service" and "private." Data between public and private hospitals and service and private patients were compared. Breastfeeding trends over time were compared by using previous iterations of the same survey. Of 16,932 newborns, representing approximately 80.0% of all reported live births in the city during the study period, 5,305 (31.3%) were exclusively breastfed, 6,189 (36.6%) were fed a combination of breast milk and formula, and the remaining 5,438 (32.1%) were exclusively formula-fed. Infants born in private hospitals were 1.6 times more likely to be exclusively breastfed compared with infants discharged from public hospitals (33% vs. 21%, respectively). Similarly, private patients were more likely than service patients to exclusively breastfeed their infants (39.6% vs. 22.9%, respectively) and to use a combination of breast and formula (i.e., any breastfeeding) (73.6% vs. 62.0%, respectively). From 1980 to 2000, the proportion of exclusive breastfeeding increased from 25.0% to 31.0%, the percentage of combined feeding increased from 8.0% to 37.0%, and the percentage of any breastfeeding increased from 33.0% to 68.0%. NYC has more than doubled the rate of breastfeeding since 1980. However, there is much progress to be made, and continued efforts are vital to maintain current gains in breastfeeding, improve the rates further, and prolong the duration of breastfeeding.*

KEYWORDS *Breastfeeding, Breastfeeding initiation, Breastfeeding trends, Improving breastfeeding.*

INTRODUCTION

The importance of breastfeeding in enhancing the development of an infant's immune system and protecting the newborn against a variety of infections is well recognized. Studies have shown that infant morbidity and mortality are reduced by breastfeeding.^{1,2} Breastfed infants are hospitalized less often and have a lower risk

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of gastrointestinal illness, urinary tract infection, invasive *Haemophilus influenzae* infection, respiratory infections, otitis media, and neonatal sepsis compared with formula-fed infants.^{3–10} Other benefits for the infant include decreased incidence of allergies and atopic disease,^{11,12} sudden infant death syndrome,¹³ insulin-dependent diabetes mellitus,¹⁴ leukemia and lymphoma,^{15,16} childhood obesity,¹⁷ and asthma.¹⁸ There are also numerous health advantages for the nursing mother including reduced risk of epithelial ovarian cancer and premenopausal breast cancer,^{19–21} decreased postpartum bleeding,²² and earlier return to prepregnancy weight.²³

In 1984, The New York State Department of Health (DOH) instituted a regulation requiring hospitals with maternity services to designate a person trained in breastfeeding physiology and management, typically referred to as a lactation coordinator, and to develop and implement written breastfeeding-friendly policies and procedures.²⁴ This regulation was renewed in 1997.²⁵ Before instituting these policies, the New York City (NYC) Department of Health and Mental Hygiene (DOHMH) began monitoring feeding practices among infants delivered in NYC hospitals via the Infant Feeding Survey. The first survey was undertaken in 1979, with a follow-up study in 1980, then subsequently every 2 years. This article examines feeding practices among infants born in 46 NYC hospitals in 2000 and assesses the effects of insurance type and hospital type on breastfeeding initiation. In addition, it describes breastfeeding trends in the city over the past two decades and compares these with national trends.

METHODS

All hospitals with obstetric units are contacted on a biannual basis to provide information on the method of infant feeding after newborn delivery to the Office of Family Health, NYC DOHMH. In 2000, the 46 hospitals in NYC with obstetric units were contacted by mail to provide data during May and June 2000 on infants admitted to the normal newborn nursery after delivery. Infants admitted to the neonatal intensive care unit were not included. Follow-up telephone calls were made to the lactation coordinator or nurse in charge to encourage timely and accurate data collection.

A representative (the lactation coordinator, the director of nursing, or equivalent) was asked to keep a tally of newborns who stayed in the normal newborn nursery and record their mother's chosen method of infant feeding and patient status. No information was available on the mother's length of stay in the hospital; however, it should range from 24 to 72 hours, because we sampled only the normal newborn nursery. The tally of newborns was summed by the hospital over the study period. Data collection tools and methods used in this survey were the same as those in previous iterations of the survey. The methods were kept simple because the data are collected by hospital staff.

Method of infant feeding was categorized by the lactation coordinator/head nurse as "exclusive breastfeeding," "breast and formula," or "exclusive formula." These classifications were made at the time of hospital discharge; therefore, if a woman made one attempt to breastfeed after delivery, was unsuccessful, and began exclusively formula feeding, she was categorized as exclusively formula feeding her infant.

During analysis, exclusive breastfeeding and breast plus formula were grouped into "any breastfeeding." Patients were classified by the lactation coordinator/head nurse by insurance type as "private" if they had private insurance and private physicians and

“service” if they did not. Hospitals were classified by DOHMH staff as “public” (municipal) or “private” (voluntary). Infant feeding patterns were compared between categories of patients (service and private) and hospitals (public and private). Data were entered and analyzed by using Epi-Info™ software (<http://www.cdc.gov/epiinfo/>). The Epi-Info package calculated relative risks. Statistical significance was measured by χ^2 analysis.

RESULTS

All but one of the hospitals (97.8%) submitted complete data. Of these 45 hospitals, 34 were private and 11 were public. There were 16,932 newborns in the sample. On the basis of the number of births reported to the DOHMH's Office of Vital Statistics, the sample represented approximately 80.0% of all live births in the city during the study period. The remaining infants were admitted to the neonatal intensive care unit, not born in a hospital, or perhaps not surveyed by hospital staff in error. Of the infants sampled, 31.3% were exclusively breastfed, 36.6% were fed a combination of breast milk and formula, and the remaining 32.1% were exclusively formula-fed (Table 1). Therefore, 67.9% of infants received some breast milk.

Most infants (82.1%) were born in private hospitals; 17.9% were born in public institutions. An approximately equal number of mothers were classified as private (50.4%) and service (49.6%) patients. However, this differed by hospital type: In private hospitals, 61.3% of patients were private patients, whereas in public hospitals, less than 1% were private.

Infant feeding patterns varied between public and private hospitals. Twenty-one percent of infants born in public hospitals received exclusive breastfeeding compared with 33.6% of infants born in private hospitals (Table 1). An infant born in a private hospital was 1.6 times more likely to be exclusively breastfed than an infant born in a public hospital (RR=1.59, 95% CI=1.48–1.71, $P<.001$). The percentage of infants born in public and private hospitals who received any breastfeeding was similar (64.9% and 68.5%, respectively) (Table 1).

A disparity between feeding categories according to the type of medical insurance was also present. The percentages of service and private patients who exclusively breastfed their infants were 22.9% and 39.6%, respectively (Table 1). An infant born to a mother with private insurance was 1.7 times more likely to be exclusively breastfed than an infant born to a mother without such insurance (RR=1.73, 95% CI=1.65–1.82, $P<.001$). This difference remained statistically significant when data were stratified by type of hospital. In private hospitals, 39.6% of private patients breastfed exclusively compared with 24.0% of service patients (RR=1.65, 95% CI=1.56–1.74, $P<.001$) (Table 2).

Of the 20 private patients who delivered at public hospitals, 12 (60.0%) were exclusively breastfeeding their infant, compared with 20.9% of service patients (RR=2.87, 95% CI=2.00–4.14, $P<.001$) (Table 2). The differences in breastfeeding patterns between private and service patients remained significant in both private and public hospitals when combining infants receiving exclusive breast milk and those receiving both breast milk and formula (Table 2).

From 1980 to 1998, the proportion of exclusive breastfeeding increased by 24%, from 25.0% to 31.0%. In 2000, the rate of exclusive breastfeeding remained stable at 31.0% (Table 3). From 1980 to 2000, the percentage of combined feeding increased by 363%, from 8.0% to 37.0%. A large proportion of that increase, 30.0%–37.0%, occurred between 1998 and 2000. From 1980 to 2000, the percentage

TABLE 1. Method of infant feeding after delivery, New York City, 2000

	Total (N = 16,932)	Hospital type			Patient type		
		Private [n = 13,900 (82.1%)]	Public [n = 3,032 (17.9%)]*	RR (95% CI)	Private [n = 8,542 (50.4%)]	Service [n = 8,390 (49.6%)]*	RR (95% CI)
Exclusive breastfeeding	5,305 (31.3%)	4,664 (33.6%)	641 (21.1%)	1.59 (1.48–1.71)	3,387 (39.6%)	1,918 (22.9%)	1.73 (1.65–1.82)
Exclusive formula	5,438 (32.1%)	4,374 (31.5%)	1,064 (35.1%)	0.9 (0.85–0.95)	2,251 (26.4%)	3,187 (38.0%)	0.69 (0.66–0.73)
Breast and formula	6,189 (36.6%)	4,862 (34.9%)	1,327 (43.8%)	0.80 (0.76–0.84)	2,904 (34.0%)	3,285 (39.1%)	0.88 (0.84–0.91)
Any breastfeeding	11,494 (67.9%)	9,526 (68.5%)	1,968 (64.9%)	1.06 (1.03–1.09)	6,291 (73.6%)	5,203 (62.0%)	1.19 (1.16–1.21)

Any breastfeeding: exclusive breastfeeding plus breast and formula.

*The analysis compares public with private hospitals or patients in each category of breastfeeding. Public hospitals or service patients are the referent group for these comparisons.

TABLE 2. Breastfeeding by patient type within hospital type, New York City, 2000

	Exclusive breastfeeding	Any breastfeeding
Private hospitals		
Private patients (n = 8,522, 61.3%)	3,375 (39.6%)	6,272 (73.6%)
Service patients (n = 5,378, 38.7%)*	1,289 (24.0%)	3,254 (60.5%)
RR (95% CI)	1.65 (1.56–1.74)	1.22 (1.19–1.25)
Public hospitals		
Private patients (n = 20, 0.66%)	12 (60.0%)	19 (95.0%)
Service patients (n = 3,012, 99.4%)*	629 (20.9%)	1,949 (64.7%)
RR (95% CI)	2.87 (2.00–4.14)	1.47 (1.32–1.63)

Any breastfeeding: exclusive breastfeeding plus breast and formula.

*The analysis compares service to private patients within hospital type for each category of breastfeeding. Service patients are the referent group for these comparisons.

TABLE 3. Method of infant feeding after delivery, New York City, 1980–2000

Year	Infants surveyed	Exclusive breastfeeding (%)	Breast and formula (%)	Exclusive formula (%)	Any breastfeeding (%)
1980	7,232	25	8	67	33
1982	15,121	27	8	64	36
1984	15,945	31	10	59	41
1986	17,216	34	9	57	43
1988	18,213	34	12	54	46
1990	19,419	31	15	54	46
1992	18,953	30	17	53	47
1994	17,737	33	19	48	52
1996	16,383	34	24	42	58
1998	16,508	31	30	39	61
2000	16,932	31	37	32	68

Any breastfeeding: exclusive breastfeeding plus breast and formula.

Percentages in this table are rounded to the nearest 100. Chi-square test for trends for any breastfeeding; $P < .001$.

of any breastfeeding increased by 106%, from 33.0% to 68.0% (Table 3), whereas the proportion of infants fed exclusively formula decreased by 52%, from 67.0% to 32.0%. Between 1998 and 2000, increases in rates of any breastfeeding among patients giving birth at public and private hospitals and among service and private patients were evident (Figure). Over the past two decades, however, women giving birth at private hospitals and women classified as private patients have had consistently higher rates of breastfeeding than women giving birth at public hospitals and women without private insurance (Figure).

DISCUSSION AND RECOMMENDATIONS

In NYC, the proportion of newborns receiving at least some breast milk at the time of hospital discharge after delivery has more than doubled over the past two decades, to 67.9%, whereas exclusive formula feeding has steadily decreased. NYC breastfeeding initiation rates remain lower than the national rates, however.

FIGURE. Percentage of any breastfeeding by insurance and hospital type, New York City, 1980–2000.

Nationally, breastfeeding initiation rates now surpass the Healthy People 2010 objectives, having increased from 59.7% to 76% from 1995 to 2002.^{26,27} The latest national rates are higher than the combined breastfeeding rates for NYC, a difference which can, at least partially, be explained by different population characteristics. In the Feeding Infants and Toddlers Study,²⁷ 79% of the population were white, and only 10% lived in a low-income household. Although we do not know the racial profile of the NYC survey population, only 29% of NYC births in 2000 were white, and close to half of the survey mothers were categorized as “service” patients—those who do not have private medical providers and are generally considered low income. The recently implemented NYC Pregnancy Risk Assessment Monitoring System will provide more detailed information on infant feeding practices by mother’s characteristics.

Advances in breastfeeding practices in NYC may be due to the state regulation requiring hospitals to have a written breastfeeding-friendly policy that includes rooming-in of infants with mothers and a lactation coordinator on staff.^{24,25} They may also be the result of increased awareness that breastfeeding is the healthiest option for infants and changing societal views regarding breastfeeding. Moreover, the possibility of overreporting of breastfeeding by lactation coordinators, who are supposed to increase rates, cannot be ruled out, although NYC trends are in a similar direction as national trends. Regardless, the present rate of any breastfeeding (67.9%) falls short of the Healthy People 2000 and 2010 objectives of 75.0%.^{28,29}

Also of note was the finding that an increase in breastfeeding rates has not occurred equally among all groups of women. Private patients, with an overall breastfeeding rate of 73.6% (exclusive breast milk plus combined feeding), are much closer to reaching the Healthy People 2010 objective than service patients

(62.0%), regardless of hospital type. Several factors could explain this difference in rates. Service patients may be less likely to breastfeed because of (a) less knowledge about breastfeeding benefits owing to poorer quality of prenatal care, (b) lack of support for breastfeeding from providers and family members, (c) need for early return to work or school, and (d) ready availability of free infant formula.

One study limitation is the absence of information on the race/ethnicity of the infants' mother. However, race/ethnicity is often analyzed in research studies as a factor associated with socioeconomic status, for which we have a proxy in our study, the patient insurance coverage type (private vs. public or service). Another limitation of this study is that it examined infant feeding practices only at the time of hospital discharge. Research indicates that breastfeeding rates decline substantially in the postpartum period and that very few infants meet the American Academy of Pediatrics recommendation of exclusive breastfeeding for 6 months.^{1,3,9,30-32} Therefore, it is likely that the already low rate of exclusive breastfeeding at discharge becomes extremely low a few months later. To improve the likelihood that women will initiate and continue breastfeeding, strong positive counseling on breastfeeding from trained health care providers before and after delivery, support and encouragement from hospitals, the community, and the mothers' family, elimination of the distribution of free commercial formula samples, and a more positive societal view of breastfeeding are needed.^{3,25,30,31,33,34}

In NYC, the proportion of women choosing to breastfeed has increased substantially over the past two decades. Health policy, health care providers, and public health professionals have undoubtedly played an important role in educating women and society about the benefits of breastfeeding. Yet, there is much progress to be made toward higher rates of exclusive breastfeeding and longer breastfeeding duration. Continued efforts are vital to maintain current gains in breastfeeding, to improve the rates further, to prolong the duration of breastfeeding, and to ultimately reduce infant morbidity and mortality further in NYC.

REFERENCES

1. Kasla RR, Bavdekar SB, Joshi SY, Hathi GS. Exclusive breastfeeding: protective efficacy. *Indian J Pediatr*. 1995;62:449-453.
2. Orlando S. The immunologic significance of breast milk. *J Obstet Gynecol Neonatal Nurs*. 1995;24:678-683.
3. Howie PW, Forsyth JS, Ogston SA, Clark A, Florey CD. Protective effect of breastfeeding against infection. *BMJ*. 1990;300:11-16.
4. Pisacane A, Graziano L, Mazzarella G, Scarpellino B, Zona G. Breast-feeding and urinary tract infection. *J Pediatr*. 1992;120:87-89.
5. Silfverdal SA, Bodin L, Huggosson S, et al. Protective effect of breastfeeding on invasive *Haemophilus influenzae* infection: a case-control study in Swedish preschool children. *Int J Epidemiol*. 1997;26:443-450.
6. Nafstad P, Jaakkola JJ, Hagen JA, Botten G, Kongerud J. Breastfeeding, maternal smoking and lower respiratory tract infections. *Eur Respir J*. 1996;9:2623-2629.
7. Wang YS, Shi YW. The effect of exclusive breastfeeding on development and incidence of infection in infants. *J Hum Lact*. 1996;12:27-30.
8. Wright AL, Bauer M, Maylor A, Sutcliffe E, Clark L. Increasing breastfeeding rates to reduce infant illness at the community level. *Pediatrics*. 1998;101:837-844.
9. Bass SM, Groer MW. Relationship of breastfeeding and formula-feeding practices with infant health outcomes in an urban poor population. *J Perinat Neonatal Nurs*. 1997;11:1-9.

10. Ashraf RN, Jalil F, Zaman S, et al. Breastfeeding and protection against neonatal sepsis in a high-risk population. *Arch Dis Child*. 1991;66:488–490.
11. Kalliomaki M, Ouwehand A, Arvilommi H, Kero P, Isolauri E. Transforming growth factor- β in breast milk: a potential regulator of atopic disease at an early age. *J Allergy Clin Immunol*. 1999;125:1–7.
12. Halken S, Host A, Hansen LG, Osterballe O. Effect of an allergy prevention programme on incidence of atopic symptoms in infancy: a prospective study of 159 “high risk” infants. *Allergy*. 1992;47:545–553.
13. Ford RP, Taylor BJ, Mitchell EA, et al. Breastfeeding and the risk of sudden infant death syndrome. *Int J Epidemiol*. 1993;22:885–890.
14. Mayer EJ, Hamman RF, Gay EC, Lezotte DC, Savitz DA, Klingsmith GJ. Reduced risk of IDDM among breast-fed children. The Colorado IDDM Registry. *Diabetes*. 1988;37:1625–1632.
15. Davis MK, Savitz DA, Graubard BI. Infant feeding and childhood cancer. *Lancet*. 1988;2:365–368.
16. Shu XO, Linet MS, Steinbuch M, et al. Breast-feeding and risk of childhood acute leukemia. *J Natl Cancer Inst*. 1999;91:1765–1772.
17. Hediger ML, Overpack MD, Kuczmarski RJ, Ruan WJ. Association between infant breastfeeding and overweight in young children. *JAMA*. 2001;285:2453–2460.
18. Oddy WH. Breastfeeding and asthma in children: findings from a West Australian study. *Breastfeed Rev*. 2000;8:5–11.
19. Gwinn ML, Lee NC, Rhodes PH, Layde PM, Rubin GL. Pregnancy, breastfeeding, and oral contraceptives and the risk of epithelial ovarian cancer. *J Clin Epidemiol*. 1990;43:559–568.
20. Rosenblatt KA, Thomas DB. Prolonged lactation and endometrial cancer. *Int J Epidemiol*. 1995;24:499–503.
21. Newcomb PA, Storer BE, Longnecker MP, et al. Lactation and a reduced risk of premenopausal breast cancer. *N Engl J Med*. 1994;330:81–87.
22. Chua S, Arulkumaran S, Lim I, Selamat N, Ratnam SS. Influence of breastfeeding and nipple stimulation on postpartum uterine activity. *Br J Obstet Gynaecol*. 1994;10:804–805.
23. Dewey KG, Heinig MJ, Nommsen LA. Maternal weight-loss patterns during prolonged lactation. *Am J Clin Nutr*. 1993;58:162–166.
24. New York State Code in Support of Breastfeeding (1984). Chapter V, subchapter A, article 2, part 405 Hospitals Minimum Standards, section 405.8.
25. New York State Department of Health. Section 405.21—Maternity and newborn services. Available at: <http://www.health.state.ny.us/nysdoh/phforum/nycrr10.htm>. Accessed April 13, 2005.
26. Ahluwalia IB, Morrow B, Hsia J, Grummer-Strawn LM. Who is breastfeeding? Recent trends from the pregnancy risk assessment and monitoring system. *J Pediatr*. 2003;142:486–491.
27. Briefel RR, Reidy K, Karwe V, Devaney B. Feeding Infants and Toddlers Study: improvements needed in meeting infant feeding recommendations. *J AM Diet Assoc*. 2004;104:S31–S37.
28. Public Health Service. Healthy People 2000: national health promotion and disease prevention objectives: full report, with commentary. Washington, DC: U.S. Department of Health and Human Services, Public Health Service; 1991. DHHS publication, No. 91-50212.
29. National Center for Chronic Disease Prevention and Health Promotion. Healthy People 2010 objectives for the nation. Available at: <http://www.cdc.gov/breastfeeding/policy-hp2010.htm>. Accessed April 13, 2005.
30. Bruce NG, Khan Z, Olsen ND. Hospital and other influences on the uptake and maintenance of breastfeeding: the development of infant feeding policy in a district. *Public Health*. 1991;105:357–368.
31. Samuels SE, Margen S, Schoen EJ. Incidence and duration of breastfeeding in a health maintenance organization population. *Am J Clin Nutr*. 1985;42:504–510.

32. American Academy of Pediatrics Work Group on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 1997;100:1035–1039.
33. Ahluwalia IB, Tessaro I, Grummer-Strawn LM, MacGowan C, Benton-Davis S. Georgia's breastfeeding promotion program for low-income women. *Pediatrics*. 2000;105:E85.
34. Howard C, Howard F, Lawrence R, Andresen E, DeBlieck E, Weitzman M. Office prenatal formula advertising and its effect on breast-feeding patterns. *Obstet Gynecol*. 2000;5:296–303.