INFANT FEEDING SURVEY

2000

Authors: Melanie Besculides, DrPH, MPH
Karine Grigoryan, PhD, MPH
Fabienne Laraque, MD, MPH

1 Office of Family Health,
New York City Department of Health
2 Health Research Training Program,
New York City Department of Health

Office of Family Health
New York City Department of Health
2 Lafayette Street, 18th Floor, Box 34A
New York, New York 10007
(212) 442-1740
(212) 442-1789 (Fax)
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. Many studies have shown that infant morbidity and mortality are reduced by breastfeeding (1-3). It has been estimated that if infants were exclusively breastfed, 1.5 million infant deaths worldwide would be prevented each year (4).

Breastfed infants are hospitalized less often, have a lower risk of gastrointestinal illness, urinary tract infection, invasive Haemophilus influenzae infection, respiratory infections, otitis media, and neonatal sepsis compared to formula-fed infants (5-13). Mechanisms involved in the protection against disease are multiple. Breast milk supplements the newborn’s immature immune system with a variety of immune products and cells, which include immunoglobulins (mainly IgA), white blood cells (neutrophils, macrophages, and lymphocytes), cytokines, complex oligosaccharides (anti-adherence factors against microorganisms), hormones, antisecretory factors (protect against diarrhea), lactoferrin (suppresses bacterial growth), and anti-inflammatory factors (14).

Recent research highlights the importance of breastfeeding not only in protecting infants from infectious diseases, but also in decreasing the incidence of allergies and atopic disease, sudden infant death syndrome, insulin-dependent diabetes mellitus, Hodgkin’s disease and lymphoma, childhood obesity, childhood acute leukemia, and asthma (5, 15-19). Breastfeeding is also associated with increased bone mass in prepubertal children (20). The effects are most significant for infants breastfed for at least 3 months. Breastfeeding also influences the orofacial development of infants. For example, short breastfeeding duration and early bottle-feeding is positively associated with posterior crossbite (21).

Breastfeeding benefits are not limited to the infant, there are numerous health advantages for the nursing mother as well. For example, research suggests that breastfeeding reduces the risk of epithelial ovarian cancer and premenopausal breast cancer (22-24). In addition, breastfeeding increases levels of oxytocin, which results in less postpartum bleeding (25-27). Women who breastfeed also return to their pre-pregnancy weight faster than those who do not (28, 26). Furthermore, research suggests that breastfeeding is emotionally gratifying for the mother, and helps form a positive emotional union between infant and mom (29, 27). Finally, breastfeeding is beneficial to society, providing both economic and social benefits. For example, it reduces health care costs and employee absenteeism due to child illness (16). Breastfeeding is convenient, eliminating the need to carry and clean baby bottles, and is economically advantageous, with no need to purchase infant formula.

Despite the benefits of breastfeeding, there are a few situations when breastfeeding is not encouraged by the American Academy of Pediatrics (AAP), who has promoted breastfeeding as the best form of infant nutrition since 1948. Infants of women with untreated active tuberculosis, those who use illegal drugs, those infected with the human immunodeficiency virus (HIV), and infants with galactosemia should not be breastfed (16). Women who take antineoplastics, certain anticonvulsants, and ergot alkaloids, should not breastfeed (30). In addition, levels of cyclosporine, amiodarone, and lithium, should be monitored closely in
breastfeeding women who take these medications. Use of radioactive isotopes for diagnostic purposes requires temporary cessation of breastfeeding (30).

With these exceptions, all infants, including preterm and sick infants should be breastfed (16). The AAP guidelines advocate breastfeeding an infant within the first hour after birth, with exclusive (i.e., infant receives no other food or fluids, including water), on-demand breastfeeding as the optimal nutrition for the first six months of life. The only supplementation during these six months should be with iron and vitamin D in select populations. Specifically, infants who are not exposed to adequate sunlight or whose mothers are deficient in vitamin D should be supplemented with vitamin D; infants whose mothers are anemic or have low iron stores should be supplemented with iron. It is recommended that breastfeeding continue for at least 12 months, and after that, as long as it is mutually desired. Iron-enriched solid food should be gradually added to the breast milk diet from six months of age to one year.

The Healthy People 2000 objective for the breastfeeding rate in the early postpartum period was 75 percent, this goal remains for the 2010 objectives (31, 32). One method to reach this goal is to institute hospital policies that promote breastfeeding. According to a joint statement by the World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) (33), facilities that provide maternity services and newborn care should: (1) have a breastfeeding-friendly policy in writing that describes care, education, and training for expectant mothers, new mothers, and infants that all staff are informed of, (2) provide skills training for staff to implement the policy, (3) educate all pregnant women about breastfeeding benefits, (4) help mothers begin breastfeeding within a half-hour of birth, (5) show new mothers proper breastfeeding techniques and teach them how to maintain lactation when separated from their infant, (6) not give newborns anything other than breast milk unless medically indicated, (7) encourage rooming-in, allowing mothers and newborns to be together 24 hours a day, (8) promote on-demand breastfeeding, (9) not give pacifiers to breastfeeding infants, and (10) refer mothers to breastfeeding support groups upon discharge.

In the late 1970s, the New York City Department of Health (NYCDOH) made a commitment to increase breastfeeding throughout New York City. At that time, teams from the NYCDOH Bureau of Maternity Services and Family Planning (BMSFP) made hospital visits to encourage hospital staff to facilitate breastfeeding (34). In 1984, The New York State DOH instituted regulation NYCRR 405.2, requiring hospitals with maternity services to designate a person trained in breastfeeding physiology and management, typically referred to as a lactation coordinator, and develop and implement written breastfeeding policies and procedures (35). This regulation was renewed in 1997 (36).

In order to monitor early infant feeding patterns in New York City, the BMSFP began administering the Infant Feeding Survey, which records feeding practices among mothers of infants delivered at New York City hospitals. The first survey was undertaken in 1979, with a follow-up study in 1980 and then subsequently every 2 years. The survey collects data on feeding practices in a sample of births in a calendar year. The Infant Feeding Survey 2000 was conducted in May and June of 2000 by the Office of Family Health (formerly the Bureau of Maternity Services and Family Planning) to determine the early feeding patterns of infants born in city hospitals over a two-month period, and to compare these patterns to the Healthy People 2000 and 2010 objectives for early postpartum breastfeeding.

METHODS

Data Collection

A representative (either the Lactation Coordinator, the Director of Nursing or the equivalent) from the 46 New York City hospitals with obstetric units was contacted to provide data for the Survey. A letter was sent in early April to all study sites announcing the 2000 Survey and introducing the Survey’s coordinator. At the end of April, the data collection tools for each month (May and June), and instructions on how to complete them were sent.

The hospital representative was instructed to record daily the total number of infants discharged from the normal newborn nursery, how they were being fed at the time of discharge (breast milk only, formula only,
or both), and whether they were private (covered by private insurance) or service patients (covered by Medicaid or no insurance).

Follow-up phone calls were made to ensure that the letters were received and instructions understood. Hospitals were contacted repeatedly to encourage them to submit data. Hospitals that sent data with errors were contacted to correct the errors. All but one hospital (98%) submitted complete data.

**Data Analysis**

All patients were grouped into *service* and *private* categories. *Private* patients were classified as having private insurance and private physicians; all other patients were categorized as *service* patients, including those covered by Medicaid and those without insurance.

Infants of patients were categorized as being “Exclusively Breastfed”, “Breast & Formula Fed”, and “Formula Fed Only”. The first two categories were further classified into an *any breastfeeding* group, which included infants who were exclusively breastfed and those who were fed a combination of breastmilk and formula.

All hospitals were classified as *public* (municipal) or *voluntary*. Infant feeding patterns were compared between categories of patients (service, private), hospitals (public, voluntary), as well as according to the presence of a lactation coordinator in the hospital.

Data were entered and analyzed using Epi-Info software. Statistical significance was measured by $\chi^2$ tests to determine whether a difference between groups represented a real difference in breastfeeding patterns.

**RESULTS**

Of the 45 hospitals included in the final analysis, 34 were voluntary and 11 were public. Only one hospital did not employ a lactation coordinator at the time of the Survey. There were 16,932 infants in the sample representing approximately 80.0% of all reported live births in the city during the study period. Of the infants sampled, 5,305 (31.3%) were being exclusively breastfed, 6,189 (36.6%) were fed by a combination of breast milk and formula, and the remaining 5,438 (32.1%) were receiving formula only. Therefore, 67.9% of infants received some breast milk (i.e., *any breastfeeding*, see Table 1).

The majority of infants (13,900; 82.1%) were born in voluntary hospitals, while only 3,032 (17.9%) were born in public institutions (Table 1). An approximately equal number of individuals were classified as private, 8,542 (50.4%) and service, 8,390 (49.6%) patients (Table 1). However, this differed by hospital type: in voluntary hospitals 61.3% of patients were private patients, whereas in public hospitals less than one percent were private (20 patients) (Table 2). Only 463 (2.7%) infants were born in the hospital without a lactation coordinator (Table 1).

**Type of Hospital**

Infant feeding patterns varied between public and voluntary hospitals. Only 21.1% of infants born in public hospitals received exclusive breastfeeding as compared to 33.6% of infants born in voluntary hospitals (Table 1). An infant discharged from a voluntary hospital was 1.6 times more likely to be exclusively breastfed than an infant discharged from public hospital (RR=1.59, 95% CI 1.48, 1.71, $p < 0.001$).

The difference between type of hospital was less pronounced when infants receiving any breastmilk were examined. In public hospitals, 64.9% of infants received “any breastfeeding” and in voluntary hospitals 68.5% received “any breastfeeding” (Table 1).

**Type of Medical Insurance**

A disparity between feeding categories according to type of medical insurance was also present. The percentage 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.
classified as a service patient (RR=1.73, 95% CI 1.65, 1.82, p < 0.001).

This discrepancy between feeding categories according to type of insurance remained statistically significant when the data were stratified by type of hospital. In voluntary hospitals, 39.6% of private patients breastfed exclusively compared to 24.0% of service patients (RR=1.65, 95% CI 1.56, 1.74, p < 0.001) (Table 2). Note that 73.6% of private infants discharged from voluntary hospitals received any breastfeeding, which is close to the Healthy People 2000 objective (Table 2).

Of the 20 private patients discharged from public hospitals, 60.0% were exclusively breastfeeding their infant, compared to 20.9% of service patients (RR=2.87, 95% CI 2.00, 4.14, p < 0.001) (Table 2). The differences in breastfeeding between private and service patients remained significant in both voluntary and public hospitals when grouping infants receiving any breastfeeding (Table 2).

**Presence of a Lactation Coordinator**

As mentioned previously, only one hospital did not have a designated lactation coordinator on staff during the data collection period. The rate of exclusive breastfeeding in the hospital without a lactation coordinator was 22.4%, compared to 31.6% for hospitals with a lactation coordinator (Table 1). However, the rate of any breastfeeding was similar in hospitals with a lactation coordinator and in the hospital without one (67.8% and 71.3%, respectively) (Table 1).

### Table 1

**Method of Infant Feeding at Time of Hospital Discharge**

<table>
<thead>
<tr>
<th></th>
<th>Exclusively Breastfed Number (%)</th>
<th>Breast &amp; Formula Fed Number (%)</th>
<th>Formula Fed Only Number (%)</th>
<th>Any Breastfeeding Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong> (n = 16932: 100%)</td>
<td>5305 (31.3)</td>
<td>6189 (36.6)</td>
<td>5438 (32.1)</td>
<td>11494 (67.9)</td>
</tr>
<tr>
<td><strong>Hospital Type</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Voluntary (n=13900: 82.1%)</td>
<td>4664 (33.6)</td>
<td>4862 (34.9)</td>
<td>4374 (31.5)</td>
<td>9526 (68.5)</td>
</tr>
<tr>
<td>Public (n=3032: 17.9%)</td>
<td>641 (21.1)</td>
<td>1327 (43.8)</td>
<td>1064 (35.1)</td>
<td>1968 (64.9)</td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>1.59 (1.48, 1.71)</td>
<td>0.80 (0.76, 0.84)</td>
<td>0.90 (0.85, 0.95)</td>
<td>1.06 (1.03, 1.09)</td>
</tr>
<tr>
<td><strong>Patient Type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (n=8542: 50.4%)</td>
<td>3387 (39.6)</td>
<td>2904 (34.0)</td>
<td>2251 (26.4)</td>
<td>6291 (73.6)</td>
</tr>
<tr>
<td>Service (n=8390: 49.6%)</td>
<td>1918 (22.9)</td>
<td>3285 (39.1)</td>
<td>3187 (38.0)</td>
<td>5203 (62.0)</td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>1.73 (1.65, 1.82)</td>
<td>0.88 (0.84, 0.91)</td>
<td>0.69 (0.66, 0.73)</td>
<td>1.19 (1.16, 1.21)</td>
</tr>
<tr>
<td><strong>Lactation Coordinator</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Present (n=16469: 97.3%)</td>
<td>5202 (31.6)</td>
<td>5962 (36.2)</td>
<td>5305 (32.2)</td>
<td>11164 (67.8)</td>
</tr>
<tr>
<td>Not present (n=463: 2.7%)</td>
<td>103 (22.4)</td>
<td>227 (48.9)</td>
<td>133 (28.7)</td>
<td>330 (71.3)</td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>1.42 (1.20, 1.69)</td>
<td>0.74 (0.67, 0.81)</td>
<td>1.12 (0.97, 1.30)</td>
<td>0.95 (0.90, 1.01)</td>
</tr>
</tbody>
</table>

*Any Breastfeeding = Exclusively Breastfed and Breast & Formula Fed
Breastfeeding Trends

From 1980 to 1998, the percentage of exclusive breastfeeding increased from 25.0% to 31.0%. In 2000, the rate of exclusive breastfeeding remained at 31.0% (Table 3). From 1980 to 2000 the percentage of combined feeding increased from 8.0% to 37.0%, a large proportion of that increase, 30.0% to 37.0%, occurred between 1998 and 2000. From 1980 to 2000 the percentage of any breastfeeding increased from 33.0% to 68.0% (Table 3, Graph 1), while the proportion of infants fed only formula decreased from 67.0% to 32.0%. Between 1998 and 2000, a sharp increase in the rates of any breastfeeding among public hospital patients is evident (Graph 2). Increasing rates of any breastfeeding are also seen in voluntary hospitals, as well as among service and private patients (Graphs 2-3), however, private patients began to increase breastfeeding earlier than service patients (Graph 3).

<table>
<thead>
<tr>
<th>Year</th>
<th>Infants Surveyed</th>
<th>Exclusively Breastfed Number (%)</th>
<th>Any Breastfeeding* Number (%)</th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>7232</td>
<td>1827 (25)</td>
<td>545 (8)</td>
<td>4860 (67)</td>
</tr>
<tr>
<td>1982</td>
<td>15121</td>
<td>4158 (27)</td>
<td>1228 (8)</td>
<td>9735 (64)</td>
</tr>
<tr>
<td>1984</td>
<td>15945</td>
<td>4877 (31)</td>
<td>1667 (10)</td>
<td>9401 (59)</td>
</tr>
<tr>
<td>1986</td>
<td>17216</td>
<td>5773 (34)</td>
<td>1580 (9)</td>
<td>9863 (57)</td>
</tr>
<tr>
<td>1988</td>
<td>18213</td>
<td>6124 (34)</td>
<td>2212 (12)</td>
<td>9877 (54)</td>
</tr>
<tr>
<td>1990</td>
<td>19419</td>
<td>6030 (31)</td>
<td>2824 (15)</td>
<td>10565 (54)</td>
</tr>
<tr>
<td>1992</td>
<td>18953</td>
<td>5635 (30)</td>
<td>3296 (17)</td>
<td>10022 (53)</td>
</tr>
<tr>
<td>1994</td>
<td>17737</td>
<td>5898 (33)</td>
<td>3332 (19)</td>
<td>8507 (48)</td>
</tr>
<tr>
<td>1996</td>
<td>16383</td>
<td>5530 (34)</td>
<td>4001 (24)</td>
<td>6852 (42)</td>
</tr>
<tr>
<td>1998</td>
<td>16508</td>
<td>5178 (31)</td>
<td>4850 (30)</td>
<td>6480 (39)</td>
</tr>
<tr>
<td>2000</td>
<td>16932</td>
<td>5305 (31)</td>
<td>6189 (37)</td>
<td>5438 (32)</td>
</tr>
</tbody>
</table>

*Any Breastfeeding = Exclusively Breastfed and Breast & Formula Fed
**Graph 1. Method of Infant Feeding at Time of Discharge from Hospital, New York City, 1980—2000**

- Any Breastfeeding* = Exclusively Breastfed and Breast & Formula Fed

**Graph 2. Method of Infant Feeding at Time of Discharge by Hospital Type, New York City, 1980—2000**

- Public Hospitals—Any Breastfeeding*
- Public Hospitals—Formula Only
- Voluntary Hospitals—Any Breastfeeding*
- Voluntary Hospitals—Formula Only

* Any Breastfeeding = Exclusively Breastfed and Breast & Formula Fed

**Graph 3. Method of Infant Feeding at Time of Discharge by Patient Type, New York City, 1980—2000**

- Service Patients—Any Breastfeeding*
- Service Patients—Formula Only
- Private Patients—Any Breastfeeding*
- Private Patients—Formula Only

* Any Breastfeeding = Exclusively Breastfed and Breast & Formula Fed
DISCUSSION AND RECOMMENDATIONS

In New York City, the proportion of infants receiving at least some breast milk upon discharge from the hospital has continued to increase over the past decade; exclusive breastfeeding increased for the majority of the decade, and bottle feeding steadily decreased. These advances may be the result of increased awareness that breastfeeding is the healthiest option for infants and changing societal views regarding breastfeeding and its acceptance. Despite these great strides, the present rate of any breastfeeding (67.9%) falls short of the Healthy People 2000 and 2010 objectives of 75.0%.

The analysis revealed that private patients, with an overall breastfeeding rate of 73.6% (any breastfeeding), were closer to reaching the objective than service patients (62.0%). The disparity in breastfeeding rates among service and private patients is not likely to be the result of hospital type, as the rates of exclusive and any breastfeeding among private patients discharged from public hospitals and those discharged from voluntary hospitals were significantly higher than the rates of exclusive and of any breastfeeding among service patients discharged from public and voluntary hospitals.

It is important to note that the difference in the rates of any breastfeeding between public and voluntary hospitals has decreased from previous years and that the rates of any breastfeeding have steadily increased in all categories of patients during the last years. However, service patients appear to be about 10 years behind private patients in the trend of increased breastfeeding.

Several factors could explain the difference in breastfeeding rates between service and private patients, with service patients possibly having: a) less knowledge about breastfeeding benefits due to poorer quality of prenatal care, b) lack of support for breastfeeding from providers and family members, c) early return to work or school, and d) availability of free infant formula. Insurance status is also likely to systematically vary with factors such as income, education, age, and race/ethnicity, which are known to influence breastfeeding rates. Sociodemographic variables such as these were not examined in the present study.

Although differences in breastfeeding rates between public and voluntary hospitals may partially be explained by insurance status of patients in those hospitals, it does not completely account for the discrepancy. Anecdotal evidence suggests that lack of consistent advice from health care providers, poor health care worker skills, and noise and embarrassment in non-private rooms negatively influence the initiation and continuation of breastfeeding. It is possible that private patients in public hospitals receive different rooms and different care than service patients in the same hospitals. It is also possible that service patients in voluntary hospitals receive different rooms and care than private patients in the same hospitals. These issues need to be examined and addressed.

The presence of a lactation coordinator significantly increased the rate of exclusive breastfeeding but had little effect on the rate of any breastfeeding. This result must be interpreted with caution, as only one hospital did not have a designated lactation coordinator. However, this finding suggests that simply having a person to educate new mothers about breastfeeding increased exclusive breastfeeding rates, regardless of the content or quality of the education (which was not measured).

This study examined infant feeding practices at time of hospital discharge. Research suggests that breastfeeding rates decline substantially in the early postpartum period (2, 6, 12, 37, 38), and very few infants meet the AAP standard of exclusive breastfeeding for six months (5). Therefore, efforts need to be undertaken to increase the proportion of women who initiate breastfeeding, to assess the length they breastfeed, and the reasons they stop.

The first two weeks of life are critical to establish breastfeeding. To improve the likelihood that women initiate and continue breastfeeding, support for breastfeeding should therefore begin before pregnancy and continue after newborn discharge. Breastfeeding guidance, including counseling and assistance with
breastfeeding soon after delivery, is positively associated with initiation of breastfeeding (39, 31). The availability of trained individuals, such as lactation coordinators, nurses, obstetricians and pediatricians, to provide guidance both during prenatal care visits and in the hospital at time of delivery should be an integral component of any intervention that seeks to improve rates of breastfeeding. Complete support for breastfeeding must be clearly expressed by obstetric and pediatric physicians and nurses who should be trained to provide breastfeeding education.

Research suggests that providing commercial formula promotional materials and formula samples during prenatal care (40) and providing formula supplementation in the hospital (38) are associated with decreased duration of breastfeeding. Therefore, these practices should be strictly avoided. New mothers should be given phone numbers and/or website addresses they can call or log on to for breastfeeding help and support before they are discharged from the hospital. Providing a postpartum home visit by a nurse or health educator to support breastfeeding mothers, answer their questions, and address their concerns should also be considered to increase duration of breastfeeding.

Familial, social, cultural, and economic factors contribute to a mother’s decision to initiate and continue breastfeeding (6, 38, 37). To improve rates of breastfeeding initiation and maintenance, these factors must be considered by those providing breastfeeding education. For example, the roles that family and society play in the acceptance and support of breastfeeding and their impact on a woman’s decision to initiate and continue breastfeeding, including perceived acceptance of breastfeeding in the work environment, must be addressed with each new mother. Anecdotal evidence suggests that teenagers, for example, are concerned about the impact of breastfeeding on the shape and size of their breasts, their weight, and perception of friends and family, and these factors decrease their willingness to breastfeed. Identifying barriers to breastfeeding among different populations is vital to the intervention development process.

Research suggests that duration of breastfeeding is associated with length of maternity leave, specifically, shorter maternity leave was found to be associated with shorter duration of breastfeeding in a study in Brazil (41). Employers should therefore be encouraged to increase the length of paid maternity leave to combat this problem. They should also provide areas for women to extract and store breast milk once they return to work, as research in Spain found that providing such amenities was associated with longer duration of breastfeeding (42).

Potential decreases in absenteeism due to child illness should be stressed to employers as an incentive to developing breastfeeding-friendly work policies. Stores, especially those that market infant products such as toys and clothing, should also designate space for women to breastfeed or pump breast milk. Women should not be expected to complete these activities in a bathroom.

The media can also play an important role in advocating breastfeeding. They should use their power and presence to explain the benefits of breastfeeding and portray breastfeeding in positive terms, as typical, normal, and acceptable.

CONCLUSION

New York City has made great strides in improving the rates of breastfeeding over the years. Healthcare providers and public health professionals have undoubtedly played an important role in educating women and society about the benefits of breastfeeding. Their continued effort and collaboration is vital to maintain current gains in breastfeeding, to improve the rates further, and to ultimately reduce infant morbidity and mortality in New York City.
REFERENCES


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