Early Exclusive Breastfeeding and Maternal Attitudes Towards Infant Feeding in a Population of New Mothers in San Francisco, California

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Abstract

Background: Positive parental attitudes towards infant feeding are an important component in child nutritional health. Previous studies have found that participants in the Special Supplemental Women, Infants, and Children (WIC) Program have lower breastfeeding rates and attitudes that do not contribute towards healthy infant feeding in spite of breastfeeding and nutrition education programs targeting WIC participants. The objective of this study was to assess the frequency of exclusive breastfeeding in the early postpartum period and maternal attitudes towards breastfeeding in a population of mothers at two San Francisco hospitals and in relation to WIC participation status.

Methods: We interviewed women who had recently delivered a healthy newborn using a structured interview.

Results: A high percentage (79.8%) of our sample was exclusively breastfeeding at 1–4 days postpartum. We did not find any significant differences in rates of formula or mixed feeding by WIC participant status. Independent risk factors for mixed or formula feeding at 1–3 days postpartum included Asian/Pacific Islander ethnicity (odds ratio [OR] 2.90, 95% confidence interval [CI] 1.17–7.19). Being a college graduate was associated with a decreased risk of formula/mixed feeding (OR 0.28, 95% CI 0.10–0.79). We also found that thinking breastfeeding was physically painful and uncomfortable was independently associated with not breastfeeding (OR 1.41, 95% CI 1.06–1.89).

Conclusions: Future studies should be conducted with Asian-Americans and Pacific Islanders to better understand the lower rates of exclusive breastfeeding in this population and should address negative attitudes towards breastfeeding such as the idea that breastfeeding is painful or uncomfortable.

Background

Low breastfeeding rates in United States

THE DEPARTMENT OF HEALTH and Human Service's Healthy People's objectives for breastfeeding for 2010 are to have 50% of all mothers breastfeeding at 6 months of age and 25% at 1 year and 60% of mothers exclusively breastfeeding at 3 months and 25% at 6 months.¹ The target goal for breastfeeding initiation is 75%. Infant and child feeding is an important area of public health effort in the United States as breastfeeding is associated with reduced risk for chronic diseases and early-life diseases such as otitis media, respiratory tract infections, atopic dermatitis, and obesity. The American Academy of Pediatrics recommends exclusive breastfeeding during the first 6 months of life.²

Exclusive breastfeeding rates are low in the United States, with 30.5% of mothers exclusively breastfeeding their infants to 3 months of age and 11.3% to 6 months based on data from the 2004 National Immunization Survey.³ Rates are lower in certain population groups such as African-Americans (19.8% exclusively breastfeeding at 3 months), among mothers with a lower education level (22.9% at 3 months), and in mothers who had an income-to poverty ratio <100% (23.9% at 3 months).³ Studies with participants in the Special Supplemental Nutrition Program for Women, Infant and Children (WIC) have found that the rate of initiation of breastfeeding was 54.3% among WIC participants and 76.1% among non-WIC participants in 2003.⁴ In 2004, breastfeeding initiation in the United States was 73.8%, any breastfeeding was 41.5% at 6 months, and 20.9% at 12 months.³ In general, those with

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lower incomes and participants in the WIC program have a lower breastfeeding rate, with those with a household income to poverty ratio <100% having 28.9% breastfeeding at 6 months and 12.9% at 12 months.⁴ Among WIC participants, in 2003 the rate of breastfeeding at 6 months was 42.7% and at 12 months was 21.0% according to a survey by Ryan and Zhou.⁵

The WIC program

The WIC program is a national program, which was designed to provide educational services and nutritional supplementation to nutritionally at-risk women, infants, and children. As part of a national breastfeeding promotion program to encourage breastfeeding among WIC participants, WIC participants receive breastfeeding materials, breast pumps, and eligibility to participate in the program longer than non-breastfeeding mothers. Additionally, breastfeeding mothers receive an enhanced food package (U.S. Department of Agriculture Food and Nutrition Services). In spite of the extra effort to encourage breastfeeding as part of the WIC program, studies have found that WIC participants have lower breastfeeding rates than non-WIC participants. In a study of breastfeeding rates from 1978 to 2003, Ryan and Zhou⁵ found that WIC participants lagged behind non-WIC mothers by an average of 23.6 ± 4.4 percentage points. In deciding whether to breastfeed, previous studies have found that WIC participants are influenced by a number of factors, including family member's and partner's attitudes towards breastfeeding.⁶ Other studies have found that attitudes towards breastfeeding can be negative in spite of mothers' knowledge of the health benefits of breastfeeding.⁷

WIC participants also receive educational materials on infant and child feeding, which vary by WIC clinic location and by state. In California, WIC prenatal educational materials include materials on the benefits of breastfeeding, what to expect in the first week of breastfeeding, and additional materials for early infant feeding including getting enough calcium, getting enough iron, and reading food labels for the smart shopper.⁸ The goals of the San Francisco WIC program are (1) to increase the rate of exclusively breastfed infants and (2) to promote healthy eating and physical activity through a "Healthy Eating and Active Living Campaign." In spite of all this additional education, some studies suggest that WIC participants do not have health-promoting behaviors and attitudes in comparison with non-WIC participants. A study with low-income families in North Carolina found that participants in the WIC program had a lower frequency of reading labels in comparison with non-WIC participants (35.4% vs. 45.1%).⁹ Another study, based on national survey data, found that WIC preschool children continue to have inadequate intake of fruits and vegetables in spite of the additional nutritional education interventions focused on the importance of fruit and vegetable intake.¹⁰ There is some evidence that nutritional interventions should focus on changing attitudes in addition to providing mothers with enhanced nutritional knowledge. One study with WIC mothers in Maryland found that the best way to improve consumption of nutritional intake is through increased maternal self-efficacy and attitudes towards nutrition but not necessarily nutrition knowledge.¹¹

Because of the high rate of participation of low income women in the WIC program in San Francisco (96.6% of those

eligible served [approximately 16,000 women and children in 2005])¹² and the direct role of WIC in trying to increase breastfeeding rates and improve child health through nutritional interventions, this study was designed to evaluate the frequency of breastfeeding in the early postpartum period in WIC participants and non-participants and the relationship between participation in WIC and attitudes towards breastfeeding. This study sought to evaluate the relationship between nutritional attitudes, including intention to breastfeed and attitudes towards breastfeeding, during the early postpartum period (1–3 days post-delivery while still in the hospital) and participation in the WIC program as breastfeeding in the early postpartum period has been shown to predictive of future breastfeeding patterns.

Subjects and Methods

Participants and procedures

From 2003 to 2005, a convenience sample of women who had recently delivered a healthy newborn infant (defined as an infant who was not in the intensive care nursery or did not have any contraindications for breastfeeding) were recruited at two hospitals in San Francisco, CA. Nurses, doctors, or other hospital workers asked mothers if they were interested in participating in the study, and those that were interested were given more details about the study and consented if they decided to participate. Women were administered a previously validated questionnaire, described in more detail in Wojcicki et al.,¹³ through either a face-to-face interview or by individually self-completing the questionnaire. Breastfeeding attitudes were assessed in the following areas: the relationship between the child's health and breastfeeding, the costs of formula versus breastfeeding and how this might impact breastfeeding, possible difficulties and embarrassment associated with breastfeeding, physical pain and discomfort associated with breastfeeding, difficulties with breastfeeding if someone else cares for the child, partner's and friend/family's attitudes towards breastfeeding and how this might impact a decision to breastfeed or not, and whether self-defined cultural attitudes impacted any decision about breastfeeding.

Trained research assistants, bilingual in English and Spanish and English and Chinese, recruited, consented, and administered the questionnaires. Our research assistants did not work consistently on the study during this time period (2003–2005) but were only able to work at certain times (e.g., summer vacation) as all were concurrently enrolled as students during the time period that they administered the questionnaire as part of the study. We decided to conduct our interviews at 1–4 days postpartum because we wanted to assess the frequency of breastfeeding initiation, early exclusive breastfeeding, and attitudes towards breastfeeding and child feeding early in the postpartum period. As there are no previously reported data on attitudes towards breastfeeding in women in San Francisco, no sample size calculation was done for this study. The final enrollment number was based on the number of women who were recruited and interviewed during the study period. However, the final study sample was a good representation of women in San Francisco in terms of socioeconomic and education level. More details about the study procedures can be found in Wojcicki et al.¹³ All procedures and methods were approved by the Committee on Human Research at the University of California, San Francisco.

Statistical methods

Questions on attitudes towards breastfeeding and child feeding were assessed using a 5-point Likert scale with the choices being 5 = very important/relevant and 1 = not important/not relevant. Mean values for attitudes towards breastfeeding were compared between mothers who were exclusively breastfeeding and those who were mixed or formula feeding using Student's *t* test. The relationship to exclusive breastfeeding among maternal education (some college education or less in comparison with being a college graduate or higher), ethnicity (Latino vs. no Latino background) and racial background, family income (household annual income was categorized as \$0–25,000, \$25,000–50,000, >\$50,000), and having more children was also evaluated. Statistical significance was set at $P < 0.05$. Multivariate logistic regression models were evaluated to determine independent predictors for exclusive breastfeeding. All multivariate regression models were adjusted for maternal age, racial/ethnic background, having multiple children, participation in the WIC program, and maternal education. In multivariate regression models, attitudes towards breastfeeding were evaluated continuously. All statistical tests were conducted using Stata version 9.0 (StataCorp LP, College Station, TX).

Results

Participant demographics

We interviewed 363 women (200 [55%] at one hospital and 163 [45%] at the other). Approximately an additional 10% either declined to participate or did not complete the survey. As reported in Wojcicki et al.,¹³ the mean maternal age was 29.8 ± 6.7 years; 31% of the women interviewed were white, and 35% were Latina, with the remainder being African-American, Asian, and other. Sixty-nine percent were married. Mean number of previous children was 0.74 ± 0.99 . Of the sample, 43.1% were a college graduate or higher, whereas 39.5% of the sample had a high school education or less. Mothers in this sample had 51% WIC participation (based on self-report), and 14.4% participated in the Food Stamps program (also based on self-report). We had very few WIC-eligible women who were not participating in WIC: only 18 out of 125 or 13% of those with $\leq 185\%$ or below the poverty line. For these reasons, we did not have a good WIC-eligible control population.

Household annual income was greater than \$50,000 in 43.0% of the sample, whereas 40.1% reported a household income less than \$25,000. Of those for whom we were able to ascertain reported income ($n = 253$), 49% were deemed to be eligible for WIC at 185% below the federal poverty level. The mean total birth weight of the sample was $3,341.5 \pm 493.4$ g; 70% had a vaginal delivery. Of the sample, 19.9% was using formula or mixed feeding, with 78.1% exclusively breastfeeding; 92.3% had initiated breastfeeding.

Breastfeeding attitudes

Our participants placed a high value on breastfeeding attitudes associated with improving child health. On the Likert scale (with 5 being the most important and 1 the least important), breastfeeding was valued for improving a child's health, in helping prevent a child from getting diseases, and to help prevent a child from gaining too much weight (all with mean values ≥ 4) (Table 1). Breastfeeding's importance in improving a child's health had a mean of 4.89 ± 0.39 among all the participants, to help prevent a child from getting diseases had a mean of 4.88 ± 0.47 , and to help prevent a child from gaining too much weight was 4.19 ± 1.18 . We looked at differences in attitudes towards breastfeeding based on whether the mother was exclusively breastfeeding or mixed/formula feeding at 1–4 days postpartum and found that specific attitudes were more associated with mixed/formula feeding, including finding breastfeeding embarrassing and difficult in public ($P < 0.01$), difficult if someone else feeds the child ($P = 0.02$), physically painful and uncomfortable ($P < 0.01$), and having friends, family, or a partner who does not approve of breastfeeding ($P < 0.01$) (Table 1). In multivariate logistic regression analysis, the only attitude that was associated with formula or mixed feeding was if breastfeeding was physically painful and uncomfortable (odds ratio [OR] 1.41, 95% confidence interval [CI] 1.06–1.89) (Table 2).

We also found some important differences in attitudes towards breastfeeding based on WIC participation status. We found that WIC participants were more likely to value the fact that breastfeeding is cheaper than formula (3.68 ± 1.61 vs. 2.58 ± 1.57 , $P < 0.01$) and value the importance of self-defined cultural factors in deciding whether or not to breastfeed (3.84 ± 1.58 vs. 2.36 ± 1.49 , $P < 0.01$). We found some statistically significant differences in attitudes based on WIC status

TABLE 1. MOTHERS' ATTITUDES AND BELIEFS CONCERNING BREASTFEEDING IN RELATION TO EARLY SUPPLEMENTATION WITH FORMULA

Attitude or belief	Mean $\pm$ SD		P value
	Formula or mixed feeding (n = 72)	Exclusive breastfeeding (n = 252)	
Good for child's health	4.80 ± 0.63	4.91 ± 0.30	0.06
Keep child from gaining weight	4.20 ± 1.23	4.17 ± 1.18	0.86
Cheaper than formula	3.11 ± 1.69	3.43 ± 1.68	0.18
Embarrassing and difficult in public	2.16 ± 1.38	1.59 ± 1.04	<0.01
Difficult if someone else feeds the child	2.33 ± 1.47	1.88 ± 1.22	0.02
Physically painful and uncomfortable	2.43 ± 1.49	1.69 ± 1.06	<0.01
Friends and family do not approve	1.53 ± 1.16	1.15 ± 0.56	<0.01
Husband/partner do not want me to breastfeed	1.80 ± 1.52	1.27 ± 0.80	<0.01
Culture (self-defined) recommends breastfeeding	2.98 ± 1.81	3.18 ± 1.68	0.41

TABLE 2. MULTIVARIATE LOGISTIC REGRESSION MODEL FOR EXCLUSIVE BREASTFEEDING IN RELATION TO ATTITUDES TOWARDS BREASTFEEDING

Attitude ^a	OR (95% CI)
Embarrassing or difficult in public	1.12 (0.83–1.52)
Difficult if someone else feeds the child	1.00 (0.77–1.32)
Physically painful and uncomfortable	1.41 (1.06–1.89)
If friends and family do not approve of breastfeeding impacts attitudes	1.11 (0.69–1.78)
If husband/partner does not approve of breastfeeding impacts attitudes	1.24 (0.90–1.71)

The model was also adjusted for maternal age, race/ethnicity, having multiple children, participation in the WIC program, and maternal education.

^aAll attitudes are evaluated continuously in regression model.

but with little practical importance as the difference in actual values (on the Likert scale) were small. WIC participants were more likely to think that breastfeeding can be embarrassing or difficult to do in public (1.87 ± 1.27 vs. 1.55 ± 0.99 , $P = 0.02$), is difficult to maintain because someone else cares for the child (2.22 ± 1.42 vs. 1.70 ± 1.09 , $P < 0.01$), and is physically painful and uncomfortable (1.99 ± 1.31 vs. 1.66 ± 1.04 , $P = 0.02$). WIC participants were also slightly less likely than non-WIC participants to stop or not initiate breastfeeding if their

husband/partner did not support breastfeeding (1.23 ± 0.69 vs. 1.48 ± 1.20 , $P = 0.03$) (data not shown).

Introduction of infant formulas or mixed feeding

We also looked at socioeconomic, sociodemographic, and delivery-specific variables in relation to formula or mixed feeding and found that not being a homeowner was associated with formula or mixed feeding ($P = 0.03$) as was reduced annual household income ($P < 0.01$), racial/ethnic background ($P < 0.01$), not being married ($P < 0.01$), and having a high school/college education or less ($P = 0.01$) (Table 3). Ninety-one percent of whites were exclusively breastfeeding in comparison with 78.8% of Latinas, 74.0% of Asians, and 65.0% of African-Americans. We found a slightly higher frequency of breastfeeding at one hospital (83.3%) versus the other hospital where recruitment was conducted (75.0%) ($P = 0.053$); however, this was not longer significant after adjusting for maternal age and race/ethnicity. In multivariate logistic regression models, independent risk factors for early introduction of formula or mixed feeding included being of Asian/Pacific Islander ethnicity/background (OR 2.90, 95% CI 1.17–7.19), and being a college graduate or higher was protective (OR 0.28, 95% CI 0.10–0.79) (Table 4). WIC participation status, maternal older age, marital status, type of delivery, and maternal employment status were not associated with risk for early infant supplementation.

TABLE 3. RISK FACTORS FOR EARLY INTRODUCTION OF FORMULA OR MIXED FEEDING

Variable	Formula or mixed feeding (n = 72)*	Exclusive breastfeeding (n = 252)*	P value
Socioeconomics			
Full or part-time employment	52.9% (37/70)	51.6% (144/279)	0.85
Participation in the WIC program	41.7% (30/72)	52.7% (148/281)	0.096
Participation in the Food Stamps program	19.4% (14/72)	12.7% (35/276)	0.14
Homeowner	18.1% (13/72)	30.6% (86/281)	0.03
Annual household income			
<\$25,000	45.8% (27/59)	37.3% (90/241)	<0.01
\$25,000–\$50,000	28.8% (17/59)	14.5% (35/241)	
>\$50,000	25.4% (15/59)	48.1% (116/241)	
Sociodemographics			
Maternal age (years)	28.4 ± 6.9	30.3 ± 6.5	0.03
Racial background			
White	14.5% (10/69)	35.3% (97/275)	<0.01
African-American/black	20.3% (14/69)	9.5% (26/275)	
Latino/Hispanic	36.2% (25/69)	33.8% (93/275)	
Asian and Pacific Islander	27.5% (19/69)	9.5% (26/275)	
Other	1.5% (1/69)	1.8% (5/275)	
Marital status			
Married	66.7% (46/69)	83.8% (232/277)	<0.01
Single	33.3% (23/69)	16.3% (45/277)	
Number of other children	0.70 ± 0.94	$0.89 \pm 1/12$	0.17
Education			
High school or less	52.2% (36/69)	35.6% (99/278)	0.01
College graduate or higher	47.8% (33/69)	64.4% (179/278)	
Delivery specifics			
Type of delivery			
Cesarean section	36.1% (26/72)	28.2% (79/280)	0.19
Vaginal delivery	63.9% (46/72)	71.8% (201/280)	

*Data are percentage (n/total) or mean $\pm$ SD values.

TABLE 4. INDEPENDENT RISK FACTORS FOR EARLY INTRODUCTION OF FORMULA OR MIXED FEEDING

Variable	OR, 95% CI	P value
Participation in WIC program	1.29 (0.60–2.80)	0.52
Maternal age		
<30 years	1.00	
≥30 years	0.64 (0.31–1.32)	0.22
Marital status		
Single, divorced	1.00	
Married	0.62 (0.31–1.27)	0.19
Race/ethnicity		
White	1.00	
Asian/Pacific Islander	2.90 (1.17–7.19)	0.02
Black/African-American	2.26 (0.67–7.62)	0.19
Latino/Hispanic	1.25 (0.43–3.64)	0.68
Delivery type		
Cesarean section	1.00	
Vaginal	0.65 (0.33–1.27)	0.21
Employment status		
Not employed	1.00	
Employed	1.53 (0.80–2.93)	0.20
Education level		
High school or less	1.00	
Some college	0.69 (0.30–1.59)	0.38
College graduate and higher	0.28 (0.10–0.79)	0.02

Discussion

Exclusive breastfeeding

A high percentage of our participants (79.1%) were exclusively breastfeeding at 1–4 days postpartum. This is higher than the 75% suggested by Healthy People 2010 and the 56% found in a recent large study of WIC Infant Feeding Practices¹⁴ and much higher than the 16% found in a study with low-income urban women.¹⁵ However, these rates might be explained by the high percentage of Latina women, a group that has been found to have high rates of exclusive breastfeeding in California,¹⁶ as well as the high percentage of educated¹⁷ and higher-income women in this sample, groups that also have a greater high rates of early breastfeeding.^{16,17} San Francisco County is also known to have a higher rate of breastfeeding initiation (85%) than the United States as a whole.¹⁸ Additionally, one of the hospitals that served as a site of recruitment (San Francisco General Hospital) is a certified “baby-friendly hospital” with an exclusive breastfeeding rate of 88.9% and a breastfeeding initiation rate of 95.4%.¹⁹ However, we found a higher rate of exclusive breastfeeding (83.3% vs. 75.0%) at the non-baby-friendly hospital, which likely reflects differences in sociodemographics of the pregnant women at the two hospitals, including a higher percentage of educated and higher-income women at the non-baby-friendly hospital.

We found that the Asian/Pacific Islander women in our sample had an increased risk of early infant supplementation with formula or mixed feeding in comparison with Caucasian women. The California Department of Health has found that for all of California, exclusive breastfeeding initiation while in the hospital is 44.5% for Asians and 40.6% for Pacific Islanders, although San Francisco County has higher rates at 60.4% for Asians and 56.4% for Pacific Islanders but still lower than the 85% of breastfeeding initiation reported for San Francisco as a

whole.²⁰ It is not clear what are the reasons for the higher rate of cessation of breastfeeding or never breastfeeding in Asians and Pacific Islanders, as these groups have been minimally studied. Similar to our results, a study by Heck et al.¹⁶ in 2006 of the California Maternal and Infant Health Assessment for 1999–2001 found that Asians and Pacific Islanders had a greater risk of never breastfeeding in comparison with foreign-born Latinas. The risk in Asian-Americans and Pacific Islanders was also higher than that for whites and U.S.-born Latinas.¹⁶ Another study by Taveras et al.²¹ in 2003 of Kaiser Permanente patients in Northern California also found a great risk of breastfeeding cessation at 2 weeks for Asians and Pacific Islanders. The Asians and Pacific Islanders in our study did have any socioeconomic or sociodemographic risk factors, including reduced educational level, lower income, additional children, or single/divorced marital status, in comparison to white or Latina women that could have put them at increased risk for earlier cessation of breastfeeding or never breastfeeding. We also did not find any significant differences in attitudes towards breastfeeding among the Asians/Pacific Islanders and other racial/ethnic groups.

We did find that mothers with more education were also more likely to initiate exclusive breastfeeding, which corresponds with the data from the 2003 and 2004 National Immunization Surveys that found that women with less than a college degree were less likely to breastfeed than college graduates. Additionally, the likelihood of not breastfeeding increases with less education: those who had less than a high school education or were a high school graduate were less likely to breastfeed in comparison with those with some college or those who were college graduates.²² Another study using data from a statewide postpartum survey in California found that education was associated with intention to breastfeed even after controlling for income, although a model that included maternal education and income fit the data on intention to breastfeed better than maternal education alone.²³

Attitudes towards breastfeeding

Our study participants highly valued the health benefits of breastfeeding. We found that those participants who were mixed or formula feeding were more likely to have negative attitudes towards breastfeeding, including thinking that breastfeeding was embarrassing and difficult in public, difficult if someone else feeds/cares for the child, and physically painful and uncomfortable and were likely to be influenced by the negative attitudes of family/friends or partner/husband. However, in multivariate regression models, we found that the only attitude towards breastfeeding that was independently predictive for formula/mixed feeding was that if breastfeeding was painful or uncomfortable. Other studies that have evaluated the relationship between attitudes towards breastfeeding and breastfeeding intention have found that partner or friend/family support is important²⁴ as is confidence or prior experience²⁵ and fear of pain^{15,26} in deciding not to breastfeed. It is our recommendation that future hospital-based efforts to improve breastfeeding rates in San Francisco, including education efforts of lactation consultants, should address these physical concerns associated with early cessation of breastfeeding, including the perceived pain and discomfort associated with breastfeeding.

Our study found one important difference in attitudes towards breastfeeding based on WIC participation status. Specifically, we found that participating in WIC was associated with citing the importance of self-defined cultural values in determining to breastfeed. The importance of self-defined cultural values in determining to breastfeed among WIC participants may be associated with the high percentage of Latina women who were also WIC participants and the previously described association between being a foreign-born Latina and high rates of breastfeeding.²⁷ Latina women in San Francisco County have a high rate of initiating exclusive breastfeeding at 77.4%,²⁰ and previous studies have found that Latina women who have been in the United States for fewer years or who are less acculturated to the United States culture are more likely to initiate and maintain breastfeeding.²⁷ These studies have indicated that breastfeeding is likely valued as a practice in these cultures, although the specifics of these cultural values need to be better delineated. We did not ask participants to define cultural values or provide other details of cultural background that could contribute to higher breastfeeding rates.

Other studies with WIC participants have found many more differences between WIC participants and non-WIC participants in attitudes towards breastfeeding. In particular, other studies have found the following differences: WIC participants were more likely to think that no one else can feed the child if the mother breastfeeds¹⁴ or that once a child is fed formula by family members or hospital staff, formula feeds should continue.²⁸ WIC mothers also believed that bottlefeeding was more expensive than breastfeeding.¹⁴ Our study, however, indicates that WIC participants, in general, do not have attitudes that differ significantly from better-educated women with higher income levels, attesting potentially to the positive role of the WIC program in San Francisco in addressing some of the factors that lead to differences in nutritional attitudes among WIC and non-WIC participants.

The limitations of our study included using a convenience sample of pregnant women. Although our sample was representative of San Francisco women in the areas of education level and socioeconomic, it did not reflect the ethnic or racial percentages in San Francisco. Additionally, our study did not include questions on ethnic-specific cultural factors that may result in different rates of early exclusive breastfeeding. We only included a general question on self-defined cultural factors that may influence breastfeeding. Additionally, we did not collect information on acculturation, including length of time in the United States or place of birth, which would have provided us with the ability to evaluate acculturation in relation to differences in attitudes. Given the importance that WIC participants attributed to self-defined cultural factors, future studies should investigate the role of these factors, including acculturation, that could account for the increased risk of early supplementation among women of Asian and Pacific Island ethnicity.

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No competing financial interests exist.

References

1. U.S. Department of Health and Human Services. <http://www.healthypeople2010.com> (accessed March 30, 2008).
2. Ip S, Chung M, Raman G, et al. *Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries*. U.S. Department of Health and Human Services, Rockville, MD, 2007.
3. Centers for Disease Control and Prevention. Breastfeeding trends and updated national health objectives for exclusive breast-feeding: United States, birth years 2000–2004. *MMWR* 2007;56:760–763.
4. Singh GK, Kogan MD, Dee DL. Nativity/immigrant status, race/ethnicity, and socioeconomic determinants of breastfeeding initiation and duration in the United States, 2003. *Pediatrics* 2007;119(Suppl 1):S38–S46.
5. Ryan AS, Zhou W. Lower breastfeeding rates persist among the Special Supplemental Nutrition Program for Women, Infants, and Children participants, 1978–2003. *Pediatrics* 2006;117:1136–1146.
6. Bentley ME, Caulfield LE, Gross SM, et al. Sources of influence on intention to breastfeed among African-American women at entry to WIC. *J Hum Lact* 1999;15:27–34.
7. Zimmerman DR, Guttman N. “Breast is best”: Knowledge among low-income mothers is not enough. *J Hum Lact* 2001;17:14–19.
8. California Department of Health. The Women, Infants and Children Program. <http://www.cdph.ca.gov/programs/wicworks/Pages> (accessed January 15, 2009).
9. McArthur L, Chamberlain V, Howard AB. Behaviors, attitudes, and knowledge of low-income consumers regarding nutrition labels. *J Health Care Poor Underserved* 2001;12:415–428.
10. Ponza M, Devaney B, Ziegler P, et al. Nutrient intakes and food choices of infants and toddlers participating in WIC. *J Am Diet Assoc* 2004;104(1 Suppl 1):s71–s79.
11. Havas S, Treiman K, Langenberg P, et al. Factors associated with fruit and vegetable consumption among women participating in WIC. *J Am Diet Assoc* 1998;98:1141–1148.
12. California Food Policy Advocates. San Francisco County Nutrition Profile. San Francisco, CA. <http://www.cfpa.net/countyprofile/San Francisco.pdf> (accessed January 14, 2009).
13. Wojcicki JM, Gugig R, Kathiravan S, et al. Maternal knowledge of infant feeding guidelines and label reading behaviours in a population of new mothers in San Francisco, CA. *Matern Child Nutr* 2009;5:223–233.
14. McCann MF, Baydar N, Williams RL. Breast-feeding attitudes and reported problems in a national sample of WIC participants. *J Hum Lact* 2007;23:314–324.
15. Nobel L, Hand I, Haynes D, et al. Factors influencing initiation of breast-feeding among urban women. *Am J Perinatol* 2003;20:477–483.
16. Heck KE, Braveman P, Cubbin C, et al. Socioeconomic status and breast-feeding initiation among California mothers. *Public Health Rep* 2006;121:51–59.
17. Lee HJ, Rubio MR, Elo IT, et al. Factors associated with intention to breastfeed among low-income, inner-city pregnant women. *Matern Child Health J* 2005;9:253–261.
18. http://www.mch.dhs.ca.gov/programs/bfp/breastfeeding_tables.htm (accessed June 10, 2008).
19. California WIC Association and the UC Davis Human Lactation Center. Depends on Where You Are Born: California Hospitals Must Close the Gap in Exclusive Breastfeeding Rates. September 2008. http://www.calwic.org/docs/pk!/2008/SanFrancisco_2008.pdf (accessed January 14, 2009).

20. California Department of Public Health, Center for Family Health, Genetic Disease Screening Data, Newborn Screening Data 2006. <http://ww2.cdph.ca.gov/data/statistics/Pages/BreastfeedingStatistics.aspx> (accessed December 27, 2008).
21. Taveras EM, Capra AM, Braveman PA, et al. Clinical support and psychological risk factors association with breastfeeding discontinuation. *Pediatrics* 2003;112:108–115.
22. Forste R, Hoffmann JP. Are US mothers meeting the Healthy People 2010 breastfeeding targets for initiation, duration, and exclusivity? The 2003 and 2004 National Immunization Surveys. *J Hum Lact* 2008;24:278–288.
23. Braveman P, Cubbin C, Marchi K, et al. Measuring socioeconomic status/position in studies of racial/ethnic disparities: Maternal and infant health. *Public Health Rep* 2001;116:449–463.
24. Persad MD, Mensinger JL. Maternal breastfeeding attitudes: Association with breastfeeding intent and socio-demographics among urban primiparas. *J Community Health* 2008;33:53–60.
25. Kloeblen-Tarver AS, Thompson NJ, Miner KR. Intent to breast-feed: The impact of attitudes, norms, parity and experience. *Am J Health Behav* 2002;26:182–187.
26. Hurley KM, Black MM, Papas MA, et al. Variation in breastfeeding behaviours, perceptions, and experiences by race/ethnicity among a low-income statewide sample of Special Supplemental Nutrition Program for Women, Infants and Children (WIC) participants in the United States. *Matern Child Nutr* 2008;4:95–105.
27. Sussner KM, Lindsay AC, Peterson KE. The influence of acculturation on breast-feeding initiation and duration in low-income women in the US. *J Biosoc Sci* 2008;40:673–696.
28. Heinig MJ, Follet JR, Ishii KD, et al. Barriers to compliance with infant-feeding recommendations among low-income women. *J Hum Lact* 2006;22:27–38.

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