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Breastfeeding Patterns in a Community of Native Hawaiian Mothers Participating in WIC

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Abstract

Although Hawaii has high breastfeeding initiation rates (89%), Native Hawaiian WIC* participants have much lower initiation (64%) rates. Little is known about why these disparities occur. The study's aim was to describe the breastfeeding patterns of Hawaiian/part-Hawaiian women enrolled in the WIC who had initiated breastfeeding. Retrospective descriptive data ($N = 200$) were gathered from WIC records. Descriptive and parametric statistics with univariate and multivariate analysis of breastfeeding patterns were completed. Mothers exclusively breastfeeding at initiation weaned significantly later and were significantly more likely to breastfeed for 6 months than were mothers who partially breastfed. Practice and policy implications of these findings are discussed.

Keywords

breastfeeding; Native Hawaiian; Women; Infants and Children Supplemental Nutrition Program

INCREASING breastfeeding initiation, exclusivity, and duration rates is a priority preventive health behavior and also a national public health goal.¹ The many infant health benefits of breastfeeding (eg, reduction in respiratory, gastrointestinal, and allergic conditions, childhood cancers, type I and type II diabetes later in life) are dose dependent; thus, infants exclusively breastfed for longer periods of time receive greater benefits.² Because of these increased benefits, the American Academy of Pediatrics² has recommended exclusive breastfeeding for the first 6 months and continued breastfeeding with the introduction of solid foods during the second 6 months of life.

Improving children's health both in infancy and in later life is possible by increasing the dose (exclusivity and duration) of breast milk during the first 6 months of life. Receiving appropriate and timely breastfeeding services has been shown to improve exclusivity and duration.¹

"Ensuring that breastfeeding mothers have access to comprehensive, up-to-date, and culturally tailored lactation services provided by trained physicians, nurses, lactation consultants and dietitians"^(p19) is one of the recommendations made within the *DHHS Blueprint for Action on Breastfeeding*,¹ the document setting the national agenda concerning breastfeeding. Some interpretation of who might be underserved may be projected from the maternal characteristics and breastfeeding rates collected in existing national and state databases; however, it is not a

*The Special Supplemental Nutrition Program for Women, Infants, and Children.

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complete or accurate picture especially for Asian American and Pacific Islander women. All Asian American and Pacific Islander ethnic groups have been aggregated into one ethnic category in national and most state data^{3,4} resulting in many understudied segments within this population.⁵

The breastfeeding initiation rate in Hawaii (89.6%) is higher than the national average (70%) and exceeds the 2010 *Healthy People* (2000) goals ($\geq 75\%$).^{2,6} Researchers have found that breastfeeding initiation for women of Hawaiian ancestry (64.0%) is well below state and national rates.⁷ *Healthy People 2010* sets a goal of 50% of mothers continuing to breastfeed at least 6 months; however, national rates (33%) are well below this target.² In Hawaii again this rate is higher than national rates, except for Native Hawaiian and other Pacific Islander women. Many factors may influence the decreased rates (eg, increased teen pregnancies, higher rates of drug abuse, low socioeconomic status, community norms); existing data have not been fully analyzed or do not exist. Little is known about the nature of these disparities. Before interventions can be planned to address these disparities, it is necessary to understand Native Hawaiian women's infant feeding choices. The purpose of this study was to determine the infant feeding patterns for one community of Native Hawaiian women participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

BACKGROUND

In 1990, the Nutrition Surveillance Program in the Department of Health initiated a statewide retrospective survey, the *Hawaii Infant feeding Survey*, sending it to all resident mothers who had live births between January 1 and March 31, 1989 ($N = 2013$; response rate = 51%).⁹ The resulting findings and publications have provided excellent baseline data about infant feeding during that time period.¹⁰⁻¹² At hospital discharge, 78% of all participants had breastfed at least initiation, 50% (of the 78%) were exclusively breastfeeding, and 45% (of the 78%) were still breastfeeding at 6 months.⁹ Echoing national data, introducing formula during the early postpartum period was associated with early weaning.⁹ Other risk factors associated with early weaning were residence on O'ahu, Japanese¹³ and Filipino¹¹ ethnicity, mother born in another country, full-time employment, and receiving formula from the WIC program.¹⁰ Employment and receiving formula from WIC mirror national data trends although other maternal characteristics associated with early weaning are specific to Hawaii and will be further explored during this study.

Since 2000, Hawaii breastfeeding data have been included in the Centers for Disease Control and Prevention's Pregnancy Risk Assessment Monitoring Survey. According to the 2002 Pregnancy Risk Assessment Monitoring Survey data for Hawaii ($N = 6251$), the highest prevalence rates were found in Caucasian women (91.0%), Asian women (92.1%), and, unlike other Hawaiian breastfeeding surveys, Filipino women (91.8%).⁶ Socioeconomic differences within the state sample were not a significant factor in the duration of breastfeeding. This finding is incongruent with the findings of other researchers who have reported decreased breastfeeding rates in national and state samples among lower socioeconomic status populations.^{14,15}

Breastfeeding promotion activities by the statewide WIC program have been successful in increasing breastfeeding initiation rates. WIC participants ($N = 535$) surveyed in 1997 at 35 sites throughout the state reported 82% initiation rates.⁷ However, duration rates fell far short of national goals and early introduction of mixed feedings was common (37.5% mixed feeding and 22.1% formula feeding at 0-5 weeks postpartum). Only 12.4% of the participants were exclusively breastfeeding and 13.3% were mixed feeding after 20 weeks. This sample had 172 (32.3%) participants of Hawaiian ancestry. Predictors of early mixed feedings in the WIC

sample were employment, age younger than 20 years, Hawaiian/part-Hawaiian or Filipino ethnicity, birth in Hawaii, and residence in O'ahu.⁷

The overall high breastfeeding initiation and 6-month breastfeeding rates in Hawaii obfuscate the disparities found in the Native Hawaiian population. Improving breastfeeding rates has the potential to improve the infant health in this high-risk population, which has the highest infant mortality rate (12.1%) in the state (4.6%).¹⁶ To date no studies have focused on the infant feeding disparities reported in the Native Hawaiian population. This study was a first step in developing a better understanding of breastfeeding issues in the Native Hawaiian community and will provide information for additional research and program planning. The aims of this study were to identify

1. the characteristics of Native Hawaiian women who choose to breastfeed and who were enrolled in the WIC Program at Waianae Coast Comprehensive Health Center (WCCHC) and
2. the breastfeeding patterns of Native Hawaiian women enrolled in the WIC Program at WCCHC.

METHODS

The research reported in this article was conducted as part of a larger ethnographic study exploring the disparities found in breastfeeding patterns on the Waianae Coast of O'ahu. For this portion of the study, a retrospective design with 6 data points spanning months 1-6 of the immediate postpartum period for each participant was undertaken. Approval was obtained from the Institutional Review Board at the University of Hawaii at Manoa and at WCCHC and the Hawaii WIC Program prior to data collection.

Setting

Waianae is a rural multiethnic community with a population of about 42250.¹⁶ The Waianae coast area has the fourth largest population of Native Hawaiian/part-Hawaiians (23,543) in the state (total Native Hawaiian/part-Hawaiian = 239,655).¹⁶ This community also has the fourth lowest per capita income (\$13,672) in the state (\$21,888), with 44.1% at or below 200% poverty level.¹⁷ Waianae qualifies as a medically underserved area.¹⁶

The result of generations of poverty and dependence on welfare has infused this community with behaviors related to the "Culture of Poverty." This is seen in high crime and incarceration rates, the high percentage of welfare recipients, poor educational achievement levels, the impact of drugs and alcohol, and poor health outcomes. Many disparities in health and health-promotion behaviors exist within this community, including the lowest rates of breastfeeding in the state.

Since its beginning 35 years ago as a 1-physician office practice, the WCCHC has undergone tremendous growth and change but has maintained its focus to address the multiple and complex health, social, and economic needs of the community. The WCCHC is the main source of primary and preventive healthcare services for this rural area. Native Hawaiian/part-Hawaiians are 51% of the WCCHC client base. Sixty-four percent of WCCHC patients are 100% below the federal poverty level and 17% are uninsured. The WCCHC WIC provides nutritional support including breastfeeding guidance and breast pumps to mothers who are at or below 200% of the poverty level. This WIC office serves 70% of the postpartum women receiving care at the WCCHC, a much higher proportion of mothers than the state average of 46% (WIC Section Chief, personal communication, January 20, 2005).

Participants

The sample selection criteria were postpartum women participating in WIC who (1) self-identified as being of Hawaiian/part-Hawaiian ethnicity, (2) received healthcare at WCCHC, (3) reported initiating breastfeeding, and (4) lived on the Waianae coast. The WIC office at WCCHC served 745 postpartum women between December 1, 2003, and January 1, 2005. Data were abstracted on all women meeting the sample selection criteria during this 3-year period. The sample consisted of 200 women or 26.85% of the Native Hawaiian women receiving WIC services.

Data collection

WCCHC WIC participant data are maintained using a computerized record system. All WIC staff received in-service training on using this computerized record, interviewing mothers, and breastfeeding support. During a postpartum woman's initial or reevaluation visit, usually occurring during the first 4-6 weeks postpartum, WIC eligibility, demographics, and infant feeding information are collected; WIC participants make monthly, bimonthly, or trimonthly visits to their WIC office to pick up checks redeemable for food and formula (if not exclusively breastfeeding). Infant feeding data and other mandated information are collected at each visit. To identify the characteristics of the sample, demographic data (ie, maternal age, parity, education, marital status, and use of WIC prenatally) were extracted from these records. All identifying information was deleted during the data extraction by the one researcher who was agency approved to access the records. This researcher did not participate in the data analysis, assuring participant anonymity.

The WIC staff member interviewing the participant during monthly visits entered the following information into the computerized record system: (1) weeks of exclusive breastfeeding (EBF), (2) weeks of partial breastfeeding (PBF), and/or (3) weeks of complete weaning. Breastfeeding patterns were determined for these 3 variables.¹⁸ No distinction was made between the method of delivering (breast or pumped in a bottle) the breast milk.

The state WIC office has compiled data on the breastfeeding initiation and duration rates for each WIC office; however, it has not been able to determine breastfeeding exclusivity because of how these data were recorded. Consistent with national WIC data, a participant was considered to be a breastfeeding mother if she reported breastfeeding one or more times within a day (per the WIC).¹⁴ These data could not provide the depth needed to understand the quantity of breast milk an infant receives or breastfeeding patterns within a population. However, the WIC staff at WCCHC had collected data concerning the exclusivity and duration of breastfeeding in greater detail than required by national and state WIC offices. Using this more extensive dataset, it was possible to determine breastfeeding patterns.

Six months was chosen as the end point for data collection for 2 reasons. First, to be consistent with the national standard recommended by the American Academy of Pediatrics.² Second, after the first 6 months, participating women were able to obtain 3 months of WIC checks during one visit, decreasing the accuracy of maternal recall beyond an acceptable level.¹⁹

Data analysis

Data were analyzed using descriptive and parametric statistics, including univariate and multivariate analysis of breastfeeding patterns with SPSS 14.0.²⁰ The time to cessation of breastfeeding was examined with a Cox regression time-to-event ("survival") analysis.²⁰ Two separate models were examined. In the first, the outcome measure was the time from birth to cessation of exclusive breastfeeding (the EBF model). In the second, the outcome was the time from birth to cessation of all (exclusive and partial) breastfeeding (combined EBF and PBF model). Models included the predictor variables maternal age (younger than 21, 21-29, or 30

and older), education level (less than high school, high school, or some college), marital status (married or not married), number of children (1, 2-4, or 5 or more), and WIC participation (yes or no). In addition, the second model included the predictor variable breastfeeding status at initiation (exclusive or partial).

In the first model (the EBF model), an “event” was considered to have occurred when a mother was no longer breastfeeding exclusively. Censored values existed for mothers who were still breastfeeding exclusively after 6 months (value greater than 6, but actual value unknown). The second model (combined EBF and PBF model) differed from the first in that an event occurred only when the mother had stopped breastfeeding completely. Censored values existed for mothers who were still breastfeeding (partially or exclusively) after 6 months. In the modeling procedure, hazard ratios were estimated for each predictor variable, indicating the influence of the predictors on cessation of breastfeeding.

RESULTS

Demographic characteristics

The majority of women were aged between 21 and 29 years ($M = 26.71$; $SD = 5.60$), with at least a high school education, and had more than 1 child ($M = 2.54$; $SD = 1.46$) (Table 1). Although the majority of participants in the 20-year-old or younger age category were primiparous, 36 of the 60 primiparous women were aged between 20 and 29 years and 4 (6.7%) were 30 or older. The education levels of the primiparous mothers did not differ significantly from those of multiparous women. Eighty-six percent ($n = 52$) of primiparous women were unmarried (40.9% of the total number of unmarried women). The parity within the sample varied from 1 to 7 and did not differ significantly ($t = -1.38$; $P = 0.17$) between women who initiated EBF or PBE.

Breastfeeding patterns

Over the 6-month study period, most women combined EBF and PBE, with nearly half (48%) weaning before 6 months. Table 2 displays the monthly EBF, PBF, and weaning patterns. Results for each of the 3 measured aspects of breastfeeding patterns are discussed below.

Exclusive breastfeeding

EBF at initiation of feeding occurred 38.0% of the time (Table 1). Thirty-six women (18.0%) chose to exclusively breastfeed their infants for 6 months. Significantly more multiparous women ($n = 63$; 31.5%) exclusively breastfed at initiation ($\chi^2 = 7.06$; $P = 0.01$) than primiparous women ($n = 5$; 2.5%). A similar significant relationship ($\chi^2_{\text{just}} = 5.43$; $P = 0.02$) was found between multiparous ($n = 31$; 15.5%) and primiparous ($n = 5$; 2.5%) mothers who exclusively breastfed at 6 months. In the EBF regression model, none of the predictor variables was statistically significant (Table 3). Women who exclusively breastfed at initiation of feeding were slightly ($M = 27.19$; $SD = 5.35$) but not significantly ($t = -.99$; $P = 0.33$) older than women who chose to partially breastfeed at initiation ($M = 26.40$; $SD = 5.75$).

Partial breastfeeding

Fifty-nine (29.5%) women chose to breastfeed just partially and never exclusively. Seventy-five percent ($n = 45$) of primiparous women chose to partially breastfeed upon initiation of feeding, which was significantly lower ($\chi^2 = 7.06$; $P = 0.01$) than the percentage of multiparous women who chose PBF ($n = 77$; 55.0%).

Duration of breastfeeding

Eighteen (9.0%) women had weaned their infants by 1 month of age and by 6 months nearly half had weaned (Table 2). Within the combined EBF and PBF regression model, maternal age, number of children, and initial breastfeeding status were statistically significant predictors of duration of breastfeeding (Table 4). Mothers with longer breastfeeding durations were those who initially breastfed exclusively (Figure 1), who were older than 20 (Figure 2), and who had 2-4 children (Figure 3).

DISCUSSION

The breastfeeding initiation rate was 26.85% among Native Hawaiian women participating in the WIC Program at the WCCHC and living on the Waianae coast of O'ahu during the 3-year study period. This rate is considerably lower than the previously reported 64% for Native Hawaiian women and may reflect the widespread multiple high-risk socioeconomic issues found within the study population. A further exploration of the barriers to breastfeeding in this community is currently underway.

Breastfeeding patterns within the sample were identified over a 3-year period (January 1, 2003—December 31, 2005) using retrospective data. The identification of these patterns provides a more informed context for program planning focused on improving breastfeeding rates within this vulnerable population. Federal and state agencies have a long history of inadequate data gathering related to breastfeeding patterns that includes lack of clearly defined outcome variables (ie, breastfeeding, EBF, PBF, and weaning), reliance on maternal recall months after events, and inconsistent data collection techniques.^{7,21} In 2006, the Hawaii WIC Program began collecting more detailed information about their breastfeeding participants,²² including data on EBF. Similar changes in data collection are also underway for Centers for Disease Control and Prevention's national datasets.

Characteristics of the sample

Ethnicity and income had minimal variability within the sample due to the study inclusion criteria. In national datasets, WIC participants with college educations breastfeed significantly more often and at higher rates^{15,22}; however, consistent with Pregnancy Risk Assessment Monitoring Survey data for Hawaii,⁶ education was not a significant factor in this sample. The age and parity (60% of the primiparous women were in the 21-29 age category) distributions mirrored national and state data trends.²³ The percentage of unmarried women (63.8%) in this sample was much higher than the national (34.9%) and state (32.6%) averages,²³ but has consistently been reported for Native Hawaiian women within the state.²⁴ Although the percentage of single-parent households within the state (8.1%) is highest among Native Hawaiians (15.8%), the *'ohana* or extended family households encompassing grandparents, aunts/uncles, and close family friends is a common and traditional family structure.²⁴ It is unclear to what extent this sociocultural norm influences the reported effects of single parenthood¹⁵ on infant feeding practices in this population. The relationships found between the demographic variables and the breastfeeding patterns identified are discussed in the next section.

Breastfeeding patterns

The patterns identified within the Native Hawaiian WIC participant population are congruent with many national trends and are also reflective of the specific environmental and social context in which the data collection took place.

EBF pattern

EBF for at least 6 months is the criterion standard recommended by national and international experts.^{2,25} Nationally, EBF rates have been increasing in the general population⁶ and among WIC participants.¹⁵ Ryan and Zhou¹⁵ using *Ross Mother's Survey* (a commercial national survey) data reported a national 31.5% EBF initiation rate for WIC participants and an EBF initiation rate of 54.7% for non-WIC mothers during 2003. EBF rates for any sector of population in Hawaii are not available for this time period. The EBF initiation rate found in this sample was higher (38.0%) than previously reported,^{7,10} perhaps reflecting the national trend of increasing breastfeeding awareness²⁶ and the enhanced efforts of WIC to promote breastfeeding.²²

The majority of participants fell far short of the 6 month, EBF recommendation. The pattern of EBF decreases monthly over 6 months, with the highest decreases noted in the second and fifth months (Table 2). Maternal employment and childcare needs may have affected these decreases; however, additional exploration of the factors affecting changes in feeding behaviors is needed. Consistent with other research findings,^{1,27} maternal age and parity were significantly different in mothers who breastfed the recommended 6 months and those who did not (Table 1). However, no significant predictor variables were identified for duration of EBF (Table 3). The EBF subgroup may have been too small to identify predictor variables. A larger sample of EBF mothers and/or measurement of different variables may be needed to uncover the predictors. As previously discussed, the lack of accurate EBF data makes it impossible to situate our findings within a larger context.

PBF pattern

The majority of the sample for PBF is consistent with the *Ross Mother's Survey* and *Hawaii Infant Feeding* study findings for WIC participants.^{15,28} It has been suggested that provision of free formula by the WIC program contributes to early weaning and PBF.^{14,29} It is impossible to make any assumptions about this hypothesis based on our findings. Other researchers have found that maternal employment contributes to PBF,²⁷ which may also have had an effect on the study sample; however, employment data were not available. Although WIC provides no-cost breast pumps to participants, the availability of time and location for pumping breast milk while at work is nonexistent for mothers working in low-income jobs.³⁰ The role of extended families, which may include nonmaternal infant care-givers, could have had an effect as well. We are currently exploring this hypothesis while collecting data as part of the larger ethnographic infant feeding study.

Duration of breastfeeding pattern

Consistent with national and state trends, younger women breastfed a significantly shorter period of time than older women.¹⁵ First time mothers also had shorter breastfeeding durations.^{15,27} Breastfeeding initiation rates have been steadily increasing nation-wide and within the Hawaii WIC population, but weaning prior to 6 months has remained high locally and nationally.^{6,15} Duration of breastfeeding pattern identified within this sample mirrors the state and national trend, but remains at lower levels than either, reinforcing the existence of additional disparities within this population. The need to better understand the nature and the extent of these disparities requires additional prospective data collection. Once greater clarity about this situation is reached, program planning to improve breastfeeding outcomes can be undertaken.

As previously stated, duration of EBF is not usually measured and therefore not included in prediction models. The inclusion of this variable is a strength of this investigation and yielded significant results. EBF at initiation of breastfeeding predicted longer duration of breastfeeding in this sample, which reinforces the importance of targeting early breastfeeding experiences

as a key point in time for interventions. The WHO Baby Friendly Hospital Initiative³¹ provides a set of clear evidence-based interventions aimed at facilitating EBF. It is the criterion standard for lactation management in the early postpartum period while mothers remain in the hospital. After leaving the hospital, the opportunities a mother has to receive breastfeeding support to assist her in maintaining EBF vary from none to private lactation clinics. Low-income areas frequently have fewer breastfeeding services; this is particularly true for women on the island of O'ahu.³³ Within the Waianae community, participants may seek breastfeeding assistance from the WIC office and/or their WCCHC primary providers, most of whom are very supportive of continued breastfeeding. However, in other populations, researchers have found that women often do not seek assistance and that home visiting programs are a more effective intervention.³³

Limitations

Retrospective designs inherently have limitations. Employment could have been a factor in the EBF and PBF patterns; however, these data were not available within the WIC dataset. Social and/or family support of breastfeeding is another variable frequently mentioned in the literature as having an effect on breastfeeding patterns²⁷ and was not measured because of the study design. It is also possible that other variables not considered could also be predictors of EBF.

A few others issues arose concerning the data that could be corrected with a prospective design. For example, a major drop-off in breastfeeding has frequently been reported during the first month postpartum.²⁷ As a result, a number of women initiating breastfeeding may not have been included in the sample if they had switched to formula feeding prior to their intake visit at WIC. This would have caused inaccurate results. Errors could have been made at several points during the data entry and abstraction phases, and maternal recall may not have been accurate. A prospective design with checks for accuracy of data collection and input would have provided stronger evidence.

Conclusions

Breastfeeding patterns within the Native Hawaiian community of Waianae, who participate in the WIC program, were identified. EBF rates were low, with few women meeting the *Healthy People 2010* breastfeeding objectives. Predictors of EBF were not identified, which may be the result of the small number of women who exclusively fed breast milk. A more rigorous design focusing on EBF is needed to validate the findings of this retrospective study. The importance of initiating EBF was reinforced as a significant factor in breastfeeding duration.

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Figure 1.
Breastfeeding survival function by initial status.

Figure 2.
Breastfeeding duration by age groupings.

Figure 3.
Breastfeeding survival function by number of children.

Table 1

Comparison of participants' characteristics and duration of breastfeeding ($N = 200$)

Variables	n (%)	n (%)		χ^2	P
		BF < 6 months	BF $\geq$ 6 months		
Maternal age, y					
20 or younger	24 (12.0)	18 (9.0)	6 (3.0)	8.72	0.013
21-29	118 (59.0)	55 (27.5)	63 (31.5)		
30 and older	58 (29.0)	23 (11.5)	35 (17.5)		
Education					
Less than high school	11 (5.5)	6 (3.0)	5 (2.5)	0.72	0.697
High school	173 (86.5)	81 (40.5)	92 (46.0)		
Any college	16 (8.0)	9 (3.5)	7 (4.5)		
Parity					
Primiparous	60 (30.0)	39 (19.5)	21 (10.5)	11.37	0.003
Multiparous	117 (58.5)	45 (22.5)	72 (36.0)		
Grand multiparous (≥ 5)	23 (11.5)	12 (6.0)	11 (5.5)		
Prenatal WIC*	173 (86.5)	79 (45.7)	94 (54.3)	2.80	0.094
Married [†]	72 (36.2)	30 (15.1)	42 (21.1)		
Exclusive breastfeeding at initiation	76 (38.0)	25 (12.5)	53 (26.5)	13.03	0.000

* WIC indicates Special Supplemental Nutrition Program for Women, Infants, and Children.

[†] Missing data on 1 participant.

Table 2

Monthly distribution of mothers who exclusively breastfed, partially breastfed, and weaned (N = 200)

Month	n (%)		Any breastfeeding	PBF	Weaned, n/cumulative total (% of 200)
	EBF				
1	76 (38.0)		182 (91.0)	106 (53.0)	18/18 (9.0)
2	63 (31.5)		167 (83.5)	104 (52.0)	15/33 (16.5)
3	58 (29.0)		154 (77.0)	96 (48.0)	13/46 (23.0)
4	54 (27.0)		141 (70.5)	87 (43.5)	13/59 (29.5)
5	42 (21.0)		115 (57.5)	73 (36.5)	26/85 (42.5)
6	36 (18.0)		104 (52.0)	68 (34.0)	11/96 (48.0)

* EBF indicates exclusive breastfeeding; PBF, partial breastfeeding.

Table 3

Cox regression results for duration of exclusive breastfeeding model

	<i>b</i>	<i>SE</i>	χ^2	df	<i>P</i>	Hazard	LCL	UCL
Maternal age, y								
Younger than 21	0.150	0.260	34	1	0.56	1.16	0.70	1.94
22-29	0.00					1.00		
30 and older	-0.030	0.210	0.02	1	0.89	0.97	0.64	1.46
Education								
Less than high school	-0.100	0.340	0.08	1	0.77	0.90	0.46	1.77
High school	0.00					1.00		
Any college	0.010	0.300	0.01	1	0.99	1.01	0.56	1.79
Number of children								
One	0.00					1.00		
Two to four	-0.290	0.202	0.04	1	0.15	0.75	0.51	1.11
Five or more	-0.160	0.330	0.24	1	0.62	0.85	0.44	1.63
Prenatal WIC participation								
No	0.00					1.00		
Yes	-0.160	0.240	0.47	1	0.49	0.85	0.53	1.35
Marital status								
Not married	0.00					1.00		
Married	-0.120	0.190	0.40	1	0.53	0.89	0.62	1.28

* *b* indicates regression coefficient; *SE*, standard error; χ^2 , chi-square test; df, degrees of freedom; *P*, probability value; Hazard, hazard ratio; LCL and UCL, the lower and upper 95% confidence limits for the hazard ratio; and WIC, Special Supplemental Nutrition Program for Women, Infants, and Children. Categories with *b* = 0.00 are the reference groups.

Table 4

Cox regression results for duration of the combined exclusive breastfeeding and partial breastfeeding model

	<i>b</i>	<i>SE</i>	χ^2	df	<i>P</i>	Hazard	LCL	UCL
Maternal age, y								
Younger than 21	0.710	3.05	7.1	1	0.02	2.03	1.14	3.63
22-29	0.00					1.00		
30 and older	-0.280	3.00	8.8	1	0.35	0.75	0.42	1.36
Education								
Less than high school	-0.040	4.40	0.01	1	0.92	0.96	0.40	2.29
High school	0.00					1.00		
Any college	0.290	3.70	0.61	1	0.43	1.33	0.65	2.72
Number of children								
One	0.00					1.00		
Two to four	-0.510	2.63	7.6	1	0.05	0.60	0.36	1.01
Five or more	-0.140	4.20	0.12	1	0.73	0.87	0.38	1.96
Prenatal WIC participation								
No	0.00					1.00		
Yes	-0.330	2.81	4.2	1	0.23	0.72	0.41	1.24
Marital status								
Not married	0.00					1.00		
Married	0.060	2.50	0.07	1	0.79	1.07	0.66	1.73
Initial breastfeeding status								
Exclusive	0.00					1.00		
Partial	0.540	2.44	9.5	1	0.03	1.71	1.07	2.75

* *b* indicates regression coefficient; *SE*, standard error; χ^2 , chi-square test; df, degrees of freedom; *P*, probability value; Hazard, hazard ratio; LCL and UCL, the lower and upper 95% confidence limits for the hazard ratio; and WIC, Special Supplemental Nutrition Program for Women, Infants, and Children. Categories with Hazard = 1.00 are the reference groups.