Do Black-White Racial Disparities in Breastfeeding Persist in the Military Community?

Abstract

The persistence of myriad racial health disparities has moved the U.S. government to prioritize the reduction of such disparities as an official *Healthy People 2020* policy. Despite this effort, there has been surprisingly little research investigating racial disparities in breastfeeding. This is the first article to conduct a comparative analysis of breastfeeding behavior between military and civilian-affiliated mothers, and we focus on African American mothers among whom breastfeeding disparities are largest. The military setting provides stable employment to populations who face an otherwise poor labor market, offers educational opportunities and healthcare to soldiers and family members and provides universal healthcare which includes breastfeeding consultation. Using the Pregnancy Risk Assessment Monitoring System (PRAMS) data, we analyze breastfeeding initiation and duration. We find that breastfeeding is more prevalent among all women in the military setting and that the black-white gap in breastfeeding duration common among civilians is significantly reduced among military affiliates. This study suggests that the military context should be examined more closely to identify potential implications for civilian policy.

Introduction

The American Academy of Pediatrics defines breastfeeding as the healthiest option for infants, recommending exclusive breastfeeding for the first six months of life and continued breastfeeding through age one [1]. Breastfeeding prevalence in the U.S. has been rising as this public health message has become more widely spread; however, it still falls below recommended levels. The factors that predict breastfeeding are primarily socioeconomic in

nature. Low income, unmarried, and non-college educated mothers are least likely to breastfeed [2-4].

There are also notable racial disparities in breastfeeding, with black mothers being the least likely group to initiate and continue breastfeeding. In 2008, breastfeeding initiation for the U.S. population as a whole was 74.6%, while for non-Hispanic black women it was 58.9%; the respective percentages breastfeeding at six months were 44.4% compared to 30.1% for black mothers [5]. Such disparities reflect, in part, racial differences in socioeconomic, employment, and marital status; however, racial disparities still persist even after controls for such explanations are accounted for [6-10]. Asian-American and Latina breastfeeding initiation rates and duration, on the other hand, tend to be highest of all ethnic groups [27]. For this reason, our paper focuses in on the breastfeeding rates of non-Hispanic black women.

The persistence of many racial health disparities [11] has moved the U.S. government to prioritize the reduction of such disparities by 2020 [12]. Despite this effort, there has been surprisingly little research investigating racial disparities in breastfeeding [13]. Breastfeeding confers important health benefits, such as reduced breast and ovarian cancers among mothers and reduced respiratory and lessened adult obesity among infants [26]. Thus, disparities in breastfeeding also compound health disparities later in life.

Breastfeeding practices among the military family population have received little attention [14, 15]. We speculate that such well-known racial disparities may disappear in the military setting. On the one hand, the military-affiliated population is disproportionately comprised of minority women who lack college degrees [16], and thus one would expect breastfeeding rates to be low there. On the other hand, the military setting provides stable employment to populations who face an otherwise poor labor market and offers educational

opportunities and healthcare to soldiers and family members [17]. Individuals in the military also have characteristics associated with breastfeeding, such as very high marriage rates [18-20]. Notably, military health insurance features a well-child program, which, since 2001, has covered breastfeeding consultation for military families [21].

The few studies that have included military populations show that breastfeeding prevalence is high among military affiliates [14, 22, 23]. While these studies laid important groundwork, they used samples from single military branch hospitals and did not collect data from civilians for comparison controls. None have examined the comparative persistence of racial disparities, although it is notable that the two that do use race as a control variable show no difference in breastfeeding rates among military-affiliated women of different races. Soldiers must return to work six to eight weeks post-partum (and deployments are postponed for six months to one year depending on the branch; see [24]), yet differences in breastfeeding duration among active duty mothers and wives of soldiers have been shown to be minimal [14, 22]. In this article we conduct a comparative analysis between military and civilian-affiliated mothers to examine racial disparities in breastfeeding initiation and duration.

Materials and Methods

Study Design

We analyze retrospective cohort data of women of all races from the Pregnancy Risk Assessment Monitoring System (PRAMS), an ongoing state-based surveillance system, funded by the Centers for Disease Control and Prevention (CDC). Our sample consists of singleton births to 306,808 civilian women and to 6,601 military-affiliated women. PRAMS is designed to monitor selected self-reported maternal behaviors and experiences among women who recently

delivered a live-born infant. Using standardized data collection methods, monthly stratified samples are selected from recent birth certificates. Surveys are obtained from mothers using a mixed-mode data collection method with mailed questionnaires and telephone follow-up for non-respondents. Survey data are linked to birth certificate data and weighted for sample design, non-response, and non-coverage. Our study included states with a 70% or greater response rate from PRAMS phases 3, 4, and 5, which covers births over a ten-year period from 1995 through 2005.

We identified military-affiliated mothers by making a special request to PRAMS-participating states to flag births occurring in military hospitals. Although not all states in our data have military hospitals with delivery services, we identified additional military-affiliated births based on the woman's health insurance coverage as of delivery that indicate Department of Defense coverage (TRICARE and Champus). The PRAMS data are uniquely suited for this study, because they are the only data that contain both civilian and large enough samples of military births to examine how breastfeeding practices compare in both settings. Although we cannot distinguish between active duty soldiers and spouses and daughters from the data, military demographics indicate that the vast majority of mothers in the military community are not active duty, but rather spouses, at about a 1:4 ratio [25]. An advantage to a sample heavily weighted toward military spouses is that they are not subject to military admission criteria, as soldiers are, and yet they experience all of the economic and community benefits of military affiliation. As we noted earlier, even active duty women have time to initiate breastfeeding.

Measures

The PRAMS data contain a wide range of maternal characteristics that have been found to influence breastfeeding behaviors. These include basic demographic characteristics (maternal

age, infant age at survey, parity, ethnicity), measures of socioeconomic status (for SES) (educational attainment, marital status, government assistance, financial hardship), and health-related factors (quality of prenatal care, preterm birth, whether the infant was in the ICU, stressful events during pregnancy). These variables are first examined for how they correspond to the sub-samples of interest in the next section and are then used as independent variables in multivariate regressions. Appendix 1 describes the construction of these variables in detail. For our dependent variables we examine breastfeeding initiation and breastfeeding duration. We define "ever breastfed" as whether the mother reported that she breastfed for at least one week based on previous studies that have determined this to be better indication for true breastfeeding initiation [13]. We define breastfeeding duration in weeks to cessation.

First we examine how our independent and dependent variables compare across the military and civilian samples using t-tests and chi-square goodness of fit tests to compare their means and proportions. For the multivariate analyses that follow, we model both breastfeeding initiation and breastfeeding duration. First, we predict the likelihood of ever breastfeeding using logistic regression. Second, we examine breastfeeding duration in weeks using Cox proportional hazards regression, which calculates the risk of weaning as the dependent variable among those who ever initiated breastfeeding. Because the survey was administered to mothers within a few months after birth, we control for right censoring for those infants who were no longer included in the estimates at later dates. Duration estimates, therefore, may be lower than they otherwise would be for a sample that had the opportunity to breastfeed for a full year. Analyses were conducted using Stata svyset to account for selection and response probabilities of the survey design.

Results

Dependent Variables

The top of Table 1 shows descriptive statistics for our two dependent variables: breastfeeding initiation (for at least one week) and breastfeeding duration. The table is stratified by whether the mother is affiliated with the military or is a civilian.

--Table 1 about here--

Supporting previous studies, we find significant differences in breastfeeding among the military-affiliated population, with 8% more initiating breastfeeding. Among those who do initiate breastfeeding, we find that military-affiliated women breastfeed for a week longer on average. Figures 1 and 2 show how these associations vary by ethnicity.

--Figure 1 about here--

Pearson chi-squared tests for differences in Figure 1 show statistically significant increases in breastfeeding initiation among both black and white military affiliates compared to their civilian counterparts. Fourteen percent more black military affiliates and 8% more white military affiliates initiate breastfeeding than their same-race civilian counterparts. Although both black and white women in the military are more likely to initiate breastfeeding, the racial gap initiation is less than halved for that among civilian women.

--Figure 2 about here--

Figure 2 shows breastfeeding over time for each subgroup among those who initiated breastfeeding.[i] Pearson chi-squared tests show significant differences in breastfeeding duration

for each group except for Latinas, who have the same rates regardless of military affiliation. The military-civilian differences are most extreme for black mothers, among whom military-affiliated women are more likely to be breastfeeding at each four-week interval. Because white military-affiliated mothers also have longer durations of breastfeeding, the black-white gap in the military persists, although it is smaller than among civilian women. Interestingly, Asian mothers in the military are less likely to breastfeed for as long as their civilian counterparts, although this difference disappears at 16 weeks of breastfeeding duration.[ii]

Independent Variables

Table 1 shows bivariate tabulations by civilian and military affiliation for the control variables used in the analyses. Notable compositional differences between the two populations can be seen. Military affiliates have higher proportions married (88% vs. 65%) and lesser reported financial hardship (24% vs. 35%) among military affiliates. The financial and emotional supports derived from marriage, as well as greater financial security generally, are positively associated with breastfeeding and may be driving the trends shown in the figures. On the other hand, military-affiliates are younger, less likely to have a college degree (although more likely to be a high school graduate), and more likely to report prenatal stress from residential relocation, all of which are associated with lesser breastfeeding. (These military-civilian differences also hold for each of the ethnic groups, not shown.) We control for these and other differences in the statistical models that follow.

Table 2 shows odds ratios from logistic regression models predicting breastfeeding initiation. In Model 1, military affiliation is associated with a 46% increased odds of breastfeeding. Interactions between the ethnicity and military variables were not significant, indicating that the black-white racial gap persists in the military setting, even though overall

initiation rates are higher for both groups than for civilians. The military affiliation odds ratio is cut by half in Model 2 when we control for SES, with college education most strongly associated with breastfeeding initiation. The addition of other controls in Models 3 and 4 do little to change the association between military affiliation and breastfeeding initiation, which remains significant. Military women continue to be about 20% more likely to breastfeed than civilian women.

--Table 2 about here--

Table 3 shows hazard ratios, also known as relative risk ratios, from the models predicting breastfeeding duration. As in Table 2, the coefficients are exponentiated into odds, except in this instance the values greater than one predict quitting while values less than one predict continuation. The models show that military affiliation is associated with a slightly longer duration of breastfeeding, but this association is explained completely by SES in Model 2. Again, the most important mediator is maternal education. Although the descriptive analyses showed significant ethnic differences among military affiliates as compared to civilians, the interaction between military affiliation and maternal race/ethnicity was significant only for black women. The longer duration of breastfeeding for black women in the military persists throughout the models regardless of controls, indicating that although breastfeeding duration varies among black and white women in the military, it is significantly smaller than the black-white gap among civilians.

Discussion

Our results on breastfeeding initiation and duration confirm past findings regarding breastfeeding behavior among women in the military. Because past studies rely on unrepresentative samples, lack a civilian comparison, or do not conduct analyses at the

multivariate level, we provide rigorous confirmation of a positive military association with breastfeeding initiation and prevalence.

In particular, we find that breastfeeding initiation is particularly strong in the military community. Controls for SES differences in education and marriage explain half of this association; in the full models, women in the military are still 17% more likely to initiate breast-feeding than civilian women. We speculate that this may relate to the military's universal healthcare system, which is programmatically supportive of breastfeeding. In addition, the military community is disproportionately comprised of young families that live and work in communities with supportive social networks. The peer influence effects of breastfeeding may be particularly strong in such a setting.

Our findings also indicate longer breastfeeding duration among women in the military than in the civilian setting. This finding, unlike our finding for breastfeeding initiation, is completely explained by socioeconomic characteristics of the women, most importantly educational attainment. Given that soldiers must return to work within 6 to 8 weeks of birth of a child, they may have more opportunity than civilian mothers to breastfeed for the first two months; however, Figure 2 also shows that they continue breastfeeding at higher rates even after their maternity leave. The fact that most mothers in the military community are spouses may explain this. A drawback to our data is that it lacks a variable indicating whether or not the mothers are employed. Since the military subsample is comprised primarily of military spouses, a higher number than that of civilians may be out of the labor force, although previous work has found very little to no difference between active duty and military spouse populations in breastfeeding duration [14, 22].

Perhaps our most important contribution to the breastfeeding literature is our inquiry as to whether racial breastfeeding disparities persist in the military as they do in civilian society. Notably, we find that the black-white gap in breastfeeding duration is smaller in the military setting. Our control variables do not explain this association. It may be a matter of unobserved SES selectivity of black soldiers and their families into military service. Or it may be that factors related to increased breastfeeding in the military have a disproportionate impact on groups who are most marginalized in civilian society. Understanding what might be driving this reduced racial disparity in the military setting should be prioritized for its potential application to enable black women in civilian life to continue breastfeeding for longer durations.

We speculate that our findings on breastfeeding duration may be *underestimated* due to two factors. The first is war. An important detail for any study employing military samples is the role played by wartime stress on breastfeeding practices. Although deployed mothers of newborns have a minimum of 6 months before deployment, this will obviously impact their ability to breastfeed longer than 6 months (although there are heroic anecdotes of deployed mothers who pump and ship their breast milk home from abroad [24]). In addition, mothers with deployed spouses will have less support at home and may be less likely to continue breastfeeding. Sixty-five percent of our sample gave birth prior to 2001, while the rest gave birth after 2001. In separate analyses we used a crude wartime control for whether the birth took place pre- or post- the Iraq and Afghanistan wars; however, the variable was insignificant and we excluded it from our models. The effect of wartime on breastfeeding among military families should be examined more closely with better data.

The second reason our results may be underestimated is the potentially unobserved difference between those who initiate breastfeeding in a civilian setting and those who initiate

breastfeeding in a military setting. If there are stronger peer and normative influences to initiate breastfeeding in military communities, it may be that more individuals opt in to the practice who would not ordinarily have done so. They may therefore be less dedicated to continuing breastfeeding than women who initiate breastfeeding in a less normative and cohesive civilian setting. Future studies might explore whether it is possible to control for this possibility using a two-stage selection model with instrumental variable analysis.

Conclusion

Our findings provide new insights on breastfeeding among various racial/ethnic groups in the United States. This is the first study that uses a representative sample of women in the military and civilian society to investigate both breastfeeding initiation and duration by the mother's race/ethnicity. We find that all women in military are significantly more likely to initiate breastfeeding than civilian women and this difference does not vary by race/ethnicity nor is it fully explained by maternal socio-demographic characteristics or health behaviors. We also find that among those who initiate breastfeeding, women in the military breastfeed for longer durations than civilian women, but this difference is explained by observed socio-demographic variables—all except among black women. Black women in the military breastfeed for a longer duration than civilian black women. We speculate that features of the military environment that are conducive to breastfeeding are likely to play a role, including high quality healthcare and prenatal counseling. There may also be a community diffusion affect. Ethnic civilian populations, and Blacks in particular, are highly segregated. In the military setting, many different ethnic groups come into close and sustained contact with one another. In this type of setting, positive health behaviors may diffuse across groups that do not normally have much social contact with one another.

To eliminate the racial disparities identified in *Healthy People 2020*, one approach is to better identify contexts where racial disparities are mitigated in order to identify the factors that contribute to these observed differentials. Further research is needed on the causal mechanisms behind this paper's findings, which may have implications for health policy that could be generalized to civilian society.

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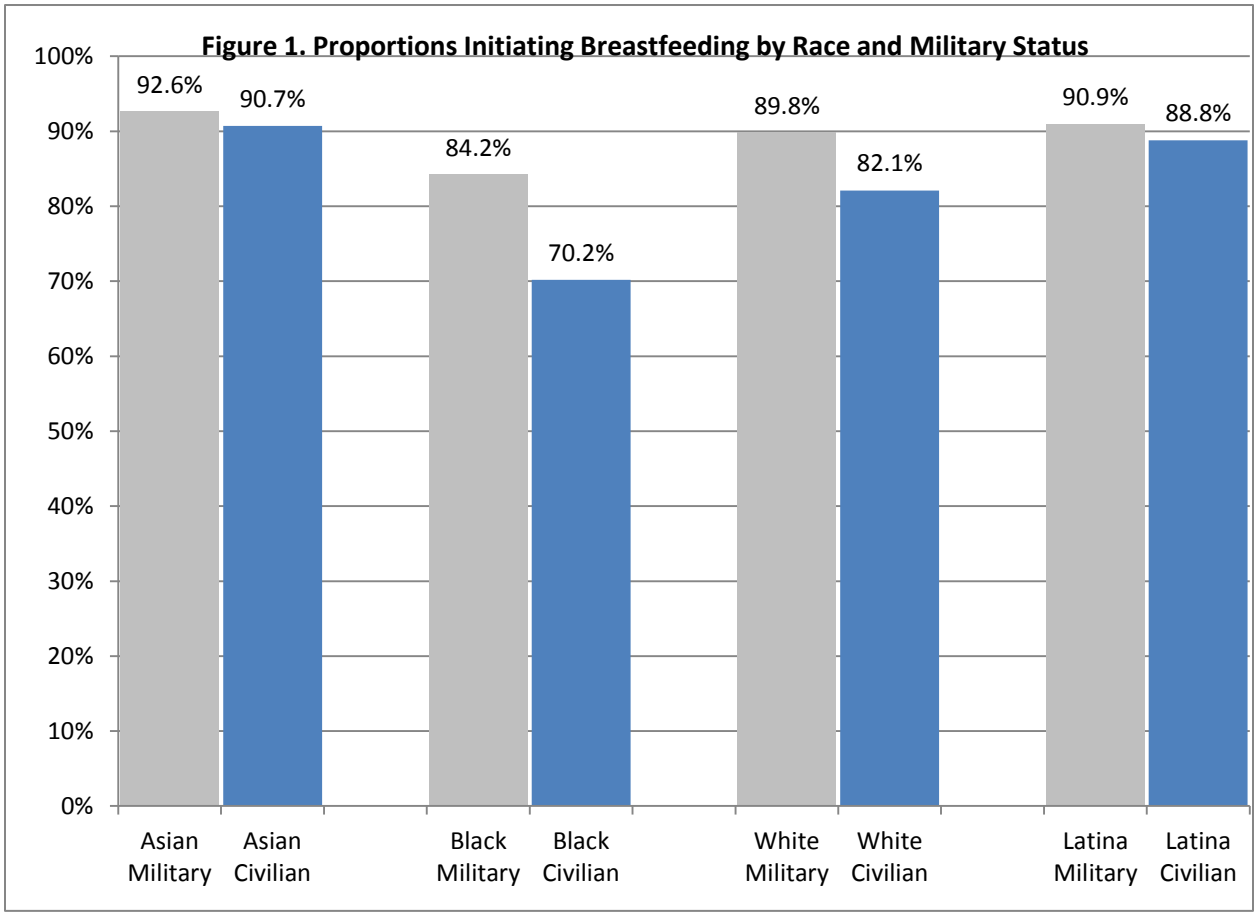
Notes

[i] Each 4-, 8-, and 16-week period measurement in the figure excludes individuals for whom there was no data available because they received the survey before their infant was that old. In the multivariate analyses we account for these individuals using right censorship.

[ii] A larger percentage of Asians in the military are Filipino compared to in the civilian population [28] and this is also the case in our data. While we can only speculate, recent research has shown that infant formula lobbying in the Philippines has been linked to lowered breastfeeding rates among Filipino women [29].



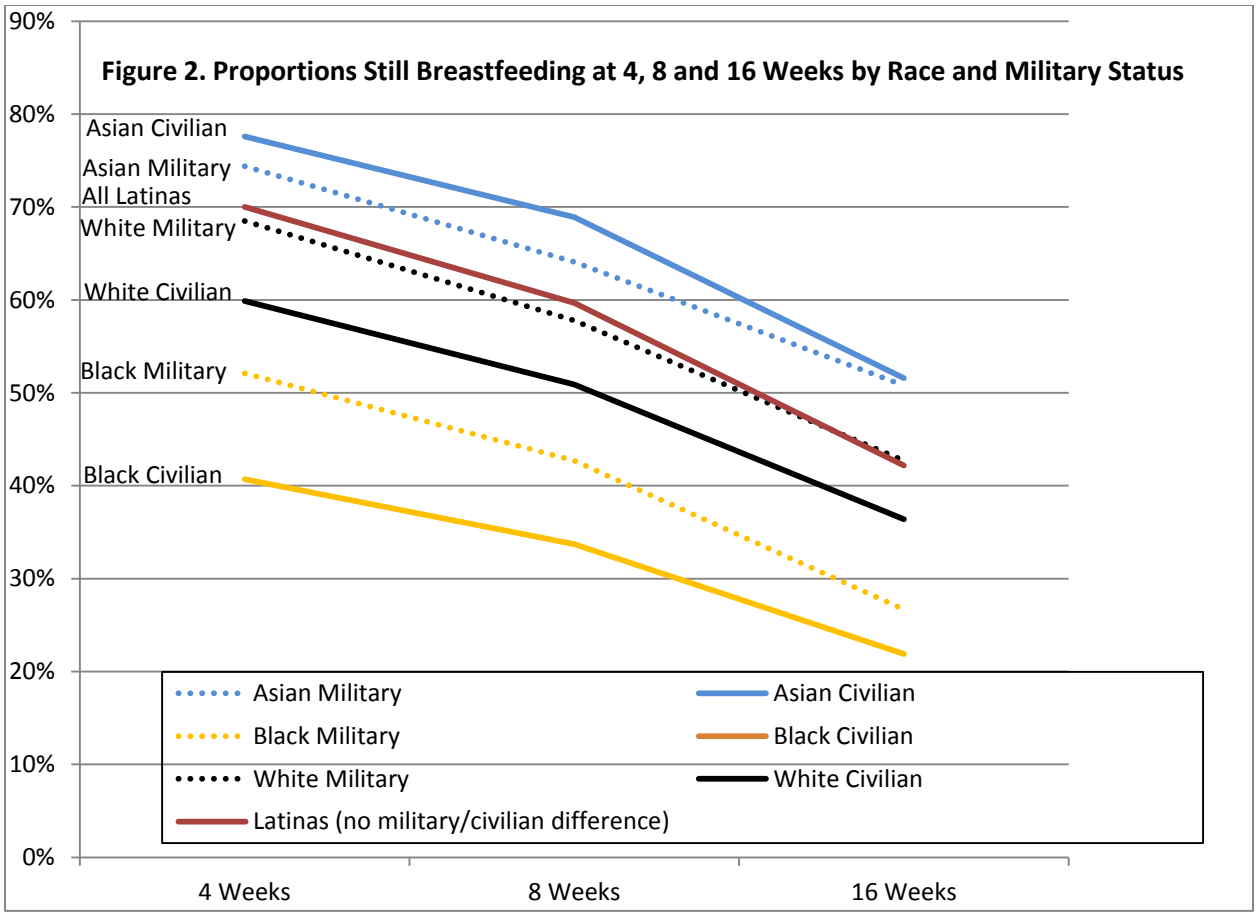


Figure 2. Proportions Still Breastfeeding at 4, 8 and 16 Weeks by Race and Military Status
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Asian Civilian
Asian Military
All Latinas
White Military
White Civilian
Black Military
Black Civilian
4 Weeks
8 Weeks
16 Weeks
Asian Military
Asian Civilian
Black Military
Black Civilian
White Military
White Civilian
Latinas (no military/civilian difference)

Table 1. Descriptive Means and Proportions: PRAMS Data by Military Status

%s are weighted; N is unweighted.

	Military	Civilian	sig diff
N	6,631	306,808	
Dependent Variables			
Ever Breastfed	89.1%	81.4%	***
Mean Breastfeeding Duration (weeks)	8.6	7.6	**
Independent Variables			
Maternal & Pregnancy Demographics			
Mother's Age			
<20	10.2%	11.7%	*
20-29	64.4%	52.2%	***
30-34	17.6%	23.0%	***
35+	7.8%	13.1%	***
First child	46.7%	41.6%	***
Year of infant birth	2000.9	2001.2	
Region			
Southeast	40.7%	35.9%	***
Northeast	6.5%	16.5%	***
Midwest	3.6%	25.4%	***
Southwest	1.5%	5.0%	***
West	46.0%	13.8%	***
Infant age in weeks at interview	16.1	16.6	
Mother's Race			
White	65.4%	64.4%	
Black	18.4%	16.9%	*
Asian	6.1%	3.1%	***
Latina	8.3%	14.4%	***
Other	1.9%	1.3%	***
Socioeconomic Factors			
Education			
College degree	20.6%	25.7%	***
Associates degree	32.7%	22.2%	***
High school graduate	39.6%	32.7%	***
No high school degree	7.1%	19.4%	***
Financial hardship	23.6%	35.3%	***
Married	87.7%	65.1%	
Government Assistance	10%	40%	***
Health-Related Factors			
Prenatal Care Consultation Throughness	8.6	8.2	
Stressful Events			

Emotional incidents	32.6%	33.4%	
Partner-related incidents	35.3%	34.6%	
Traumatic incidents	14.9%	20.5%	***
Relocated	55.2%	36.0%	***

+p<.10 *p<.05 **p<.01 ***p<.001, as determined by t-tests and Chi-2 tests

Table 2. Logistic Regression Odds Predicting Breastfeeding Initiation

	Model 1		Model 2		Model 3		Model 4	
Independent Variables								
Military	1.46	***	1.17	*	1.21	*	1.17	*
Maternal & Pregnancy Demographics								
Mother's Age								
<20	0.50	***	0.84	***	0.84	***	0.84	***
20-29 (reference)								
30-34	1.62	***	1.05	*	1.04	+	1.05	*
35+	1.72	***	1.12	***	1.12	***	1.13	***
Birth Parity								
1st Birth	1.73	***	1.52	***	1.52	***	1.52	***
Year of birth	0.76	***	0.75	***	0.75	***	0.75	***
Region								
Southeast	1.07	**	1.12	***	1.12	***	1.12	***
Northeast (reference)								
Midwest	1.00		1.00		1.01		1.01	
Southwest	1.22	***	1.27	***	1.27	***	1.26	***
West	2.94	***	3.00	***	3.03	***	3.00	***
Mother's Race								
White (reference)								
Black	0.62	***	0.84	***	0.84	***	0.85	***
Asian	2.05	***	1.80	***	1.84	***	1.86	***
Latina	2.20	***	3.29	***	3.29	***	3.32	***
Other	1.08	+	1.38	***	1.38	***	1.38	***
Socioeconomic Factors								
Education								
College degree			3.06	***	3.06	***	3.06	***
Associates degree			1.60	***	1.60	***	1.60	***
HS graduate *(*reference*)*								
No HS degree			0.84	***	0.83	***	0.83	***
Financial hardship			1.00		1.00		0.98	
Married			1.54	***	1.54	***	1.57	***
Medicaid insurance			0.90	***	0.91	***	0.90	***
Health-Related Factors								
Prenatal Consultation					0.98	***	0.98	***
Preterm					0.93	*	0.93	*
ICU					1.11	***	1.11	***
Stressful Events								
Emotional							0.95	*
Partner-related							1.01	
Traumatic							1.07	**
Relocated							1.12	***

+p<.10 *p<.05 **p<.01 ***p<.001

Table 3. Cox Hazard Regression Odds Predicting Cessation of Breastfeeding Duration

Independent Variables	Model 1		Model 2		Model 3		Model 4	
Military	0.93	*	1.03		1.01		1.00	
Military*Black	0.91	*	0.85	*	0.84	*	0.84	*
Maternal & Pregnancy Demographics								
Mother's Age								
<20	1.66	***	1.26	***	1.26	***	1.24	***
20-29 (reference)								
30-34	0.68	***	0.83	***	0.84	***	0.84	***
35+	0.62	***	0.76	***	0.76	***	0.77	***
1st Birth	1.09	***						
Year of birth	0.98	***	1.17	***	1.15	***	1.16	***
Region			0.98	***	0.98	***	0.98	***
Southeast	1.13	***						
(Northeast reference)			1.13	***	1.12	***	1.12	***
Midwest	1.04	*						
Southwest	1.09	***	1.05	**	1.05	**	1.04	**
West	0.70	***	1.07	**	1.07	**	1.06	**
Mother's Race			0.69	***	0.68	***	0.68	***
White (reference)								
Black	1.36	***	1.21	*	1.20	*	1.19	*
Asian	0.85	***	0.92	**	0.91	**	0.92	**
Latina	0.97	*	0.79	***	0.79	***	0.80	***
Other	0.95	*	0.82	***	0.82	***	0.82	***
Socioeconomic Factors								
Education								
College degree			0.57	***	0.57	***	0.58	***
Associates degree			0.84	***	0.85	***	0.58	***
HS graduate (reference)								
No HS degree			1.01		1.00		1.00	
Financial hardship			1.09	***	1.09	***	1.05	***
Married			0.76	***	0.77	***	0.79	
Medicaid insurance			1.01		1.00		1.00	
Health-Related Factors								
Prenatal Consultation					1.03	***	1.03	***
Preterm					1.20	***	1.21	***
ICU					1.07	***	1.07	***
Stressful Events								
Emotional							1.06	***
Partner-related							1.12	***
Traumatic							1.02	
Relocated							1.01	

Appendix 1: Independent Variable Measurements

Regression Variable	How Measured
Maternal & Pregnancy Factors	
Maternal Age	
<20	0-1 (1 if mother was less than 20 at birth)
20-29	Reference category
30-35	0-1 (1 if mother was between 30 and 35 at birth)
36+	0-1 (1 if mother was 36 or older at birth)
First birth	0-1 (if mother's first birth)
Year of infant birth	1995-2005 Year of birth
Southeast	0-1 (1 if state is AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)
Northeast	0-1 (1 if state is CT, MA, ME, NH, VT, DE, MD, NJ, NY, PA, YC)
Midwest	0-1 (1 if state is IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI)
Southwest	0-1 (1 if state is AZ, NM, OK, TX)
West	0-1 (1 if state is CO, ID, MT, NV, UT, WY, AK, CA, HI, OR, WA)
Infant age at interview	10-200 weeks as of survey
Socioeconomic Factors	
Education:	
College degree	0-1 (1 if mother had college degree at birth)
Associates degree	0-1 (1 if mother had only an Associates degree at birth)
High School degree	Reference category
No High School degree	0-1 (1 if mother had less than a high school degree at birth)
Government Assistance	0-1 (1 if mother received financial assistance in 12 months prior to birth. This includes Temporary Assistance for Needy Families (TANF), WIC, food stamps, Supplemental Security, and Medicaid coverage.
Married	0-1 (1 if mother was married at birth)
Financial Stressors	0-1 (1 if mother or partner lost a job or if couldn't pay bills during the 12 months before birth)
Health-Related Factors	
Prenatal Care Quality:	
Consultation Thoroughness	1-11 (Variable is additive by each topic discussed by medical personnel at prenatal care visits: smoking, alcohol consumption, illegal drug use, seat belt safety, partner abuse, breastfeeding, postnatal birth control methods, unsafe medicines, etc.)
Stressful Events:	
Emotional Incidents	0-1 (if a family member had been hospitalized or if someone close had died during the 12 months before birth)
Partner-related Incidents	0-1 (1 if there was marital conflict, separation or divorce, or if the partner hadn't wanted the baby during the 12 months before birth)
Traumatic Incidents	0-1 (1 if mother experienced homelessness, a physical fight, incarceration of her partner or herself, and a drinking or substance abuse problem for someone close to her in the 12 months before birth)
Relocated	0-1 (1 if the mother had changed residence during the 12 months before birth)