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Predictors of Exclusive Breastfeeding at Least 8 Weeks Among Asian and Native Hawaiian or Other Pacific Islander Race Subgroups in Hawaii, 2004–2008

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Abstract

Breastfeeding is nurturing, cost-effective, and beneficial for the health of mother and child. Babies receiving formula are sick more often and are at higher risk for childhood obesity, diabetes, asthma, and other conditions compared with breastfed children. National and international organizations recommend exclusive breastfeeding for 6 months. Exclusive breastfeeding in Asian and Native Hawaiian or Other Pacific Islander (NHOPI) subgroups is not well characterized. Data

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from the 2004–2008 Hawaii Pregnancy Risk Assessment Monitoring System, a population-based surveillance system on maternal behaviors and experiences before, during, and after pregnancy, were analyzed for 8,508 mothers with a recent live birth. We examined exclusive breastfeeding status for at least 8 weeks. We calculated prevalence risk ratios across maternal race groups accounting for maternal and sociodemographic characteristics. The overall estimate of exclusive breastfeeding for at least 8 weeks was 36.3 %. After adjusting for maternal age, pre-pregnancy weight, cesarean delivery, return to work/school, and self-reported postpartum depressive symptoms, the racial differences in prevalence ratios for exclusive breastfeeding for each ethnic group compared to Whites were: Samoan (aPR = 0.54; 95 % CI 0.43–0.69), Filipino (aPR = 0.58; 95 % CI 0.53–0.63), Japanese (aPR = 0.58; 95 % CI 0.52–0.65), Chinese (aPR = 0.64; 95 % CI 0.58–0.70), Native Hawaiian (aPR = 0.67; 95 % CI 0.61–0.72), Korean (aPR = 0.72; 95 % CI 0.64–0.82), and Black (aPR = 0.79; 95 % CI 0.65–0.96) compared to white mothers. Providers and community groups should be aware that just over one-third of mothers breastfeed exclusively at least 8 weeks with lower rates among Asian, NHOPI, and Black mothers. Culturally appropriate efforts to promote exclusive breastfeeding are recommended particularly among Asian subgroups that have high breastfeeding initiation rates that do not translate into high exclusivity rates.

Keywords

Breastfeeding; Disparities; Asian; Hawaiian; Pacific Islanders; Obesity; PRAMS

Introduction

Breast milk is widely acknowledged as the normative standard for infant feeding, offering a range of benefits for both child and mother [1]. Breastfeeding provides medical, nutritional, developmental, psychological, social, economic, and environmental advantages over other methods of infant feeding, is cost-effective, and beneficial for the health of mother and child. Formula-fed children require more doctor visits and are at higher risk for childhood obesity, diabetes, asthma, and several other health issues as compared with breastfed children [1–3]. To realize the full benefits of breastfeeding, the promotion of exclusive breastfeeding for 6 months, continued breastfeeding with complementary foods added at 6 months, and ongoing support of breastfeeding for at least 1 year and as long as mutually desired by mother and child is endorsed by the American Academy of Pediatrics and the American Academy of Family Physicians; whereas the World Health Organization recommends 6 months of exclusive with continuation to 2 years of partial breastfeeding and then as long as mutually desired [1, 4, 5].

Breastfeeding initiation estimates increased dramatically from 60 % in 1993–1994 to 77 % in 2005–2006 [6]. Final data from the National Immunization Survey for 2008 births reports that nearly three-fourths (74.6 %) of mothers of children born in the US initiated breastfeeding, but less than half (44.4 %) of these mothers breastfeed for at least 6 months [7]. The rates of exclusive breastfeeding are lower, with just over one-third (34.3 %) exclusively breastfeeding at 3 months and only 14.6 % exclusively breastfeeding at 6 months [7]. Maintaining high initiation rates and promoting exclusivity of breastfeeding has been a focus of initiatives at multiple levels including mothers and their families,

communities, health care, employers, and policy makers [8]. Additionally, if 90 % of babies in the US were breastfed exclusively for 6 months with continued breastfeeding for at least 1–2 years, nearly \$13 billion dollars a year in healthcare and other costs would be saved and 911 deaths would be prevented annually; and a compliance rate of 80 % would result in an estimated \$10.5 billion dollars saved and 741 deaths prevented [9].

Hawaii's populations includes several diverse Asian and Native Hawaiian or Other Pacific Islander (NHOPI) race groups that are not often reported in the general literature. According to the US Census Bureau in 2010, over 17 million Asians (alone or in combination) live in the US, with 15.3 % (2.7 million) of them belonging to more than one race group; and 1.2 million NHOPI (alone or in combination) live in the US, with 55.9 % (685,182) of NHOPI belonging to more than one race group [10]. In addition to the large proportion that are of multiple race groups, Asians and NHOPI are a diverse population with several distinct subgroups having different cultures, languages, and periods of residence in the US [11, 12].

Breastfeeding practices among subgroups of Asian and NHOPI populations are not well characterized in the literature. The few studies that exist often report only on an overall Asian group that combines several subgroups together or are limited to select population subgroups, such as those participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) or new immigrants [13–16]. Due to the range of health benefits conferred through exclusive breastfeeding, determining population level estimates within individual Asian and NHOPI subgroups may identify disparate groups that could benefit from health promotion efforts.

This study estimates exclusive breastfeeding rates among the predominantly Asian and NHOPI population subgroups in Hawaii and assesses for differences among demographic and other factors. The results will help in the identification of populations that may benefit from outreach and focused interventions.

Materials and Methods

The 2004–2008 Hawaii Pregnancy Risk Assessment Monitoring System (PRAMS) survey data were analyzed. PRAMS is an ongoing state and population-based surveillance system that monitors selected maternal behaviors and experiences among mothers before, during, and after a pregnancy that resulted in a live birth. The PRAMS survey is based on a self-reported questionnaire mailed to selected participants using the birth certificate as a sampling frame, with follow-up mailings and a phone survey for non-responders. Additional information about the PRAMS survey, including specific details on methodology, is available online at <http://www.cdc.gov/PRAMS>. A total of 11,818 mothers were surveyed, with an overall response rate of 76 % (n = 8,991). We eliminated 483 records where breastfeeding status could not be determined. This resulted in a sample of 8,508 mothers, of which 356 were excluded due to missing breastfeeding information and an additional 127 excluded due to missing information on breastfeeding exclusivity. An additional 426 were excluded due to missing information on covariates (310 due to missing/improbable information on weight status) for a final sample of 8,082 mothers.

To determine exclusivity of breastfeeding, we analyzed the question “At what age was your baby given something other than breast milk?” Response choices were: blank spaces to enter either the number of weeks or months of the child; “My baby was less than 1 week old”; and “I have not fed my baby anything besides breast milk.” If the last option was selected, then the infant’s age when the survey was completed was used to determine current breastfeeding status. Although the Healthy People 2020 objective measure contains targets for exclusive breastfeeding for at least 3 months and for at least 6 months [17], we used an outcome variable of exclusive breastfeeding with timing for at least 8 weeks. The median age of the infant at survey completion was 108 days, and ranged from 67 to 270 days, so this intermediate measurement of 8 weeks was selected to reflect the timing for those mothers who completed the survey. Mothers that never breastfed were considered to have breastfed <8 weeks exclusivity in accordance with Healthy People 2020 recommended calculations [17].

The Hawaii birth certificate collects information on all racial/ethnic groups that are reported at delivery by the parents for the mother and father. For race of both the mother and father, this information is converted to one of 22 single racial groups by an algorithm implemented by the Office of Health Status Monitoring in the Hawaii Department of Health [18]. The priority of this algorithm for individuals that list multiple races is Hawaiian, followed by the first non-Caucasian race reported. Thus, individuals that report being Hawaiian in combination with another race would be considered part-Hawaiian and to be consistent with race reporting in Hawaii, for this report they are combined with the Hawaiian single race group and considered to be Native Hawaiian. A total of 22 singly coded maternal race variables (including part-Hawaiian) were categorized into 9 groups to ensure sufficient sample size for reliable estimates: Black, White, Filipino, Japanese, Chinese, Korean, Native Hawaiian, Samoan, and Other/Unknown.

Maternal age, calculated by mother’s age upon birth of the infant, was categorized into age groups of <20, 20–24, 25–34, and 35 or more years. Maternal education was categorized as “<High School” for mothers with <12 years, “High School or Equivalent” for mothers with 12 years, “Some College” for mothers with 13–15 years, and “College Graduate” for mothers with 16 or more years. Marital status was described as married or not married as no further detail is available to researchers in the analytic PRAMS data file. Preconception body mass index (BMI; calculated as weight in kilograms divided by the square of height in meters) standard categories based on self-reported height and weight prior to pregnancy included underweight (BMI:<18.5); normal weight (BMI 18.5–24.9); overweight (BMI 25.0–29.9); and obese (BMI ≥ 30.0). A BMI of less than 10.0 or more than 85.0 were assigned to a missing value for the variable due to likely implausible combinations (n = 10). Insurance at delivery was classified as private, military, Medicaid, and no insurance. Mode of delivery was assessed as vaginal or cesarean. Self-reported postpartum depressive symptoms were based on mothers’ responses to two standard questions related to postpartum depressive symptoms and a determination of likelihood to have symptoms were derived based on procedures used in previous PRAMS research [19]. Return to work/school was categorized as yes/no at time of survey completion, since the literature has shown that returning to work/school is a barrier to breastfeeding [8].

Annual prevalence estimates and 95 % confidence intervals (CIs) were calculated for exclusive breastfeeding lasting at least 8 weeks. An approach using predicted marginals estimated prevalence ratios for exclusive breastfeeding for at least 8 weeks with maternal race as the primary variable, following recommendations for surveys using a complex sampling design [20]. Covariates were selected based on review of the general literature and availability in the PRAMS data. A model building strategy that assessed for relative significance of the individual risk factors (using a change of less than 10 % in the log likelihood ratio as the criterion) was used to develop the final model. The final model included the individual covariates of maternal age, pre-pregnancy weight status, mode of delivery, return to work/school, and postpartum depressive symptoms. Other variables not included in the final model included insurance at delivery, maternal education, and marital status. Results of assessments for interaction were not significant between race and pre-pregnancy weight status, mode of delivery, return to work/school, and postpartum depressive symptoms. Data were weighted to reflect the state's population of mothers with a recent live birth. SAS version 9.2 (SAS Institute, Inc, Cary, North Carolina) and SAS-callable SUDAAN version 10.0 (Research Triangle Institute, North Carolina) were used to account for the complex sampling design to provide population estimates and calculate accurate variance estimates with a significance level of $p < 0.05$. The PRAMS protocol was reviewed and approved by the Institutional Review Boards at CDC and the Hawaii State Department of Health.

Results

In Hawaii, the two largest groups represented in the sample of breastfeeding mothers were Native Hawaiian and White mothers, with each comprising approximately a quarter of the population. The four major Asian subgroups (Filipino, Japanese, Chinese, and Korean) together made up more than a third of the population (Table 1).

Overall, an estimated 36.3 % of mothers exclusively breastfed for at least 8 weeks in Hawaii (Table 2). White mothers had the highest estimate of exclusive breastfeeding, followed by Korean and Black mothers. All individual Asian and NHOPI subgroups and Black mothers had estimates that were lower than 40 % with Samoan, Filipino, and Japanese mothers having estimates of <30 % exclusive breastfeeding for at least 8 weeks. Mothers under 25 years of age had the lowest estimate of exclusive breastfeeding for at least 8 weeks, while mothers 35 or more years of age had the highest estimate. Compared to mothers of normal pre-pregnancy weight status, mothers who were overweight or obese prior to pregnancy had significantly lower estimates of exclusive breastfeeding for at least 8 weeks. Mothers without insurance at delivery had the highest rates of exclusive breastfeeding for at least 8 weeks, followed by mothers with military insurance. Having had a cesarean compared to a vaginal delivery and mothers that self-reported postpartum depressive symptoms compared to not having symptoms had lower estimates of exclusive breastfeeding at least 8 weeks. Similarly, mothers who returned to work/school compared to mothers that did not had lower estimates.

After adjusting for maternal age, pre-pregnancy weight status, mode of delivery, return to work/school, and self-reported postpartum depressive symptoms, compared to Whites, the

racial differences in prevalence ratios for exclusive breastfeeding persisted for all groups analyzed. The prevalence risk ratios were about 40 % lower in Japanese, Filipino and Samoan mothers, about 30 % lower in Chinese, Korean and Native Hawaiian mothers, and about 20 % lower among Black mothers compared to White mothers (Table 3).

Discussion

Efforts have been made to promote breastfeeding in society, but more needs to be done with culturally appropriate methods among various subpopulations to encourage mothers to sustain breastfeeding to recommended levels. This study highlighted that less than half of all mothers exclusively breastfeed for at least 8 weeks in the multicultural society of Hawaii in which about 85–90 % initiate breastfeeding [7, 21]. All individual Asian and NHOPI subgroups and Black mothers are at increased risk for not exclusively breastfeeding, even after controlling for demographic and other factors. Emphasizing the importance of breastfeeding for all populations is needed in society to ensure benefits to mothers, children, families, and society.

In many national reports, Asian and NHOPI subgroups are usually combined into an “Asian and Pacific Islander” group, which typically has the highest estimates of breastfeeding initiation, breastfeeding at 6 months, and breastfeeding at 18 weeks [22]. However, our study demonstrated significantly lower estimates of exclusive breastfeeding and heterogeneity among individual Asian and Pacific Islander subgroups compared with White mothers in Hawaii. This is in contrast to that seen between both the aggregated Asian group and the aggregated NHOPI group in the National Immunization Survey for the US population, which shows similar rates of exclusive breastfeeding at both 3 and 6 months compared to the non-Hispanic White reference group [23]. Of the Asian and NHOPI subgroups in our study, we showed variation in exclusively breastfeeding for at least 8 weeks which highlights the importance of disaggregation of the combined Asian and NHOPI groups into smaller subgroups whenever possible. The findings in the final adjusted model and the lack of interaction effects between race and other variables potentially in the causal pathway reinforce the notion that race has an impact on exclusive breastfeeding status. We were unable to locate any other studies that examined exclusive breastfeeding rates beyond the early postpartum period in the US among Asian and NHOPI subgroups.

This study showed an interesting pattern among the population subgroups in Hawaii in rates of breastfeeding initiation compared to breastfeeding exclusivity rates at 8 weeks. A fact sheet produced by the Hawaii PRAMS program demonstrates high breastfeeding initiation rates with 90.6 % of all mothers initiating breastfeeding in the same 2004–2008 aggregated time period that was analyzed in this study [21]. Among the various population groups in Hawaii: all Asian subgroups had initiation rates that ranged from 91.9 % for Filipino to 96.6 % among Korean mothers; whereas NHOPI subgroups had estimates of 81.2 % for Samoan and 89.1 % for Native Hawaiian mothers; while Black mothers had a rate of 88.8 %; and white mothers had a rate of 93.6 % [21]. The reversal in all Asian subgroups from high initiation rates similar and higher to that of white mothers in Hawaii towards much lower estimates of exclusive breastfeeding at least 8 weeks was not expected. This reversal is also in contrast to that reported nationally in the National Immunization data for Asian mothers

as an aggregated group [23]. Whereas, continued lower rates of exclusive breastfeeding based on lower initiation rates were seen in the Native Hawaiian, Samoan, and Black mothers. These findings in Hawaii are unclear and merits further evaluation to understand cultural, financial, and other possible explanations for this change. The heterogeneity suggests that there may be different factors contributing to the lower rates of exclusive breastfeeding among Asian groups. Different results are seen among these same groups for non-exclusive (or any) breastfeeding of at least 8 weeks with the Filipino race group having the largest drop off (66.9 %), while Japanese (84.3 %), Chinese (83.0 %), and Korean (82.1 %) still having substantially higher rates than the white mothers (76.6 %) in Hawaii [21]. Further analysis to understand these changes could include evaluation of factors such as the acculturation levels of various race subgroups in Hawaii. For example, the variation could be related to acculturation such as that shown for higher rates of breastfeeding among mothers who were immigrants compared to those born in the US [24]. A measure of acculturation such as maternal nativity or time living in the US were not available in the PRAMS analytic file for analysis so any variation in this indicator comparing the various race subgroups could not be assessed. It could also potentially be related to lack of education or knowledge about the importance of exclusive breastfeeding [8]. Other supportive system measures or reasons for stopping breastfeeding were not available to better characterize other factors that may be related to the variation seen among Asian and NHOPI subgroups for exclusively breastfeeding outcomes. Understanding differences among these population subgroups could be used to inform specific interventions to promote breastfeeding to optimize health and reduce disparities.

The 2011 US Surgeon General's Call to Action to Support Breastfeeding identified many barriers to breastfeeding, including a lack of knowledge on the benefits of breastfeeding for mothers, social norms favorable toward formula feeding, embarrassment, lactation problems, poor family and social support, employment, and barriers related to health services [8]. Among mothers in our study, our findings support the notion that return to work/school after childbirth is a predictor of not exclusively breastfeeding for at least 8 weeks. Other factors in the adjusted model, such as cesarean delivery, preconception obesity, and self-reported depressive symptoms were also associated with not exclusively breastfeeding for 8 weeks, but to a lesser extent in the individual Asian and NHOPI subgroups in our study. The finding that mothers with no health insurance coverage at delivery had higher estimates of exclusive breastfeeding was unexpected. Poverty, difficulty in paying for formula, and likelihood of not returning to work among mothers without health insurance coverage may have contributed to this finding in the unadjusted analysis. It could also be related to the relatively small number of mothers that reported not having insurance in the population. However, this difference among mothers with no health insurance coverage no longer contributed to the final model, which suggests that some combinations of race, age, preconception weight status, return to work or school, and self-reported postpartum depressive symptoms accounted for the difference seen in the unadjusted analysis.

Infant feeding outcomes is associated with long term health consequences for both the mother and the child, and formula feeding has been associated with increased incidence of some diseases like diabetes and some cancers [3, 8]. Nationally, adult women in the

aggregated Asian and NHOPI group have higher death rates for stroke, cancer, and diabetes than non-Hispanic White women [25]. Regarding cancer incidence and mortality, Native Hawaiian, Samoan, and Korean women have higher overall rates of cancer death compared to non-Hispanic White women, while other Asian and NHOPI subgroups have lower overall rates [26]. Our study showed lower prevalence of exclusive breastfeeding among many of these same population subgroups. In addition to other dietary and lifestyle changes, the promotion of exclusive breastfeeding may help improve long term outcomes among these populations by reducing the risks of developing certain chronic diseases for both the breastfeeding mother and her child. The linkage between breastfeeding and long term health is gaining awareness, as shown in a recent review article from Australia, which estimated that the proportion of chronic disease in the population attributable to not breastfeeding was 6–24 % and concluded that breastfeeding is of public health significance in preventing chronic disease [27]. Additionally, obesity is one of the leading risk factors for chronic disease and the Centers for Disease Control and Prevention has recommended breastfeeding promotion as 1 of 24 community strategies to prevent obesity [28]. Further research and understanding of these links between reproductive health and chronic disease prevention are needed. For example, a recent publication emphasized the importance of breastfeeding as part of a life course approach to prevention chronic disease [29].

Limitations of this study include use of the self-reported data based on questions about breastfeeding and other topics that may be subject to social desirability bias. The cross-sectional nature of the data prevents an assessment of temporality of events such as postpartum depressive symptoms and return to work/school and breastfeeding status at 8 weeks. Another limitation of this study is that race categorization is limited to the single race reported in the Hawaii birth certificate data. A recent study of births that included all the information on race/ethnicity entered on the birth certificate showed that in Hawaii about a third of both mothers and fathers reported more than one of the 5 standard federal race groups (White, Black, Asian, NHOPI, American Indian or Alaskan Native), compared to 1.0–2.7 % of births in California, Utah, Pennsylvania, and Washington [30]. Due to the large proportion of mothers who are of multiple race groups in Hawaii, the ability to generalize these results is limited, particularly among Asian and NHOPI subgroups that may live outside of Hawaii. This study was based on a diverse population in Hawaii and although many of these same populations live in communities across the country, there could be substantial acculturation and cultural differences in those groups outside of Hawaii. However, these results can provide some insight into breastfeeding patterns in these subgroups, but it will be important to validate them before generalizing due to potential differences of these groups.

In Hawaii, many approaches are utilized to promote breastfeeding including legislative, coalitions, and specific programs. Laws in Hawaii protect breastfeeding in public and the right of women to continue breastfeeding when they return to work. The Hawaii WIC program, which serves about half of the mothers in the state, provides practical assistance through programs such as the Breastfeeding Peer Counselor Program or with their electric breast pump loan programs. The Hawaii Department of Health used American Recovery and Reinvestment Act of 2009 (ARRA) funds to collaborate with maternity hospitals on the Baby-Friendly Hospital Initiative based on the 10 Steps to Successful Breastfeeding [31].

The goal of the Baby-Friendly Hawaii Project (BFHP) is to increase the proportion of women and infants who remain exclusively breastfeeding throughout their hospital stay (<http://www.babyfriendlyUSA.org>). Since 1997, only one hospital has been designated a Baby-Friendly hospital in the state. Now, with the assistance of the BFHP, several of Hawaii's hospitals have entered the Baby-Friendly designation process. The 10 Steps to Successful Breastfeeding emphasized in the BFHP have been shown to improve both initiation and duration of breastfeeding with greater benefit seen with each additional step that is implemented [32, 33]. While Hawaii laws protect breastfeeding mothers from dismissal or discrimination at work, state and national laws fall short of providing maternity leave accompanied by financial support that may help mothers sustain exclusive breastfeeding. Some examples of laws that have been implemented in other states to promote breastfeeding include: exempting breastfeeding mothers from jury duty, prohibiting child care facilities from discriminating against breastfed babies, and requiring that a working mother be given breaks to breastfeed or pump her milk.

To ensure that the population benefits from breastfeeding, more efforts are needed that focus on both duration and exclusivity. The Healthy People 2020 objectives related to exclusive breastfeeding are to increase the proportion who exclusively breastfeed to 46.2 % of infants at age 3 months and 25.5 % at 6 months [17]. Our study highlights that at just 8 weeks postpartum, mothers are already well below and not meeting the 3 months exclusive objective particularly among Asian and NHOPI subgroups. Our study also demonstrates that high initiation rates do not translate into high exclusivity rates for all subgroups. Understanding reasons for these differences can lead to targeted interventions to promote exclusive breastfeeding which should be addressed at multiple time periods including prenatal care, in the hospital environment, and through outpatient contacts with appropriately trained clinicians and outreach workers. Additionally, supporting exclusive breastfeeding in particular populations may improve overall long term health through prevention of chronic disease. To improve exclusive breastfeeding rates, providers and community groups should be aware of the lower rates among Asian and NHOPI mothers and the subgroups of these populations in Hawaii. With awareness and understanding of these differences, strategies can be developed to promote breastfeeding initiation and exclusive breastfeeding.

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Table 1

Characteristics of study population, Hawaii Pregnancy Risk Assessment Monitoring System (PRAMS), 2004–2008

	N	Estimate (%)	95 % CI ^a
Maternal race			
White	1.667	21.3	(21.0–21.6)
Native Hawaiian	1.835	27.6	(27.3–27.9)
Samoan	206	2.9	(2.6–3.3)
Filipino	1.627	18.3	(18.0–18.5)
Japanese	987	12.2	(11.6–12.7)
Chinese	903	3.6	(3.5–3.7)
Korean	397	1.6	(1.5–1.7)
Black	159	2.4	(2.0–2.7)
Other/unknown	727	10.2	(9.6–10.8)
Maternal age			
<20 years	573	8.2	(7.6–8.9)
20–24	1.854	24.4	(23.4–25.3)
25–34	4.334	49.5	(48.4–50.5)
35 or more	1.747	18.0	(17.2–18.8)
Maternal education			
<High school	599	8.7	(8.1–9.4)
High school or equivalent	2.964	39.9	(38.8–41.0)
Some college	2.194	24.9	(24.0–25.9)
College graduate	2.307	26.4	(25.6–27.3)
Marital status			
Married	5.876	64.6	(63.6–65.6)
Not married	2.632	35.4	(34.4–36.4)
Pre-pregnancy weight status			
Underweight (BMI < 18.5)	546	6.0	(5.5–6.5)
Normal (BMI 18.5–24.9)	4.817	56.6	(55.5–57.7)
Overweight (BMI 25–29.9)	1.673	21.6	(20.7–22.5)
Obese (BMI ≥ 30)	1.162	15.8	(15.1–16.7)
Insurance at delivery			
No insurance	109	1.2	(1.0–1.5)
Medicaid	2.494	33.5	(32.5–34.5)
Military	4.690	51.3	(50.2–52.4)
Private	1.134	14.0	(13.3–14.7)
Mode of delivery			
Cesarean	2.188	25.6	(24.7–26.5)
Vaginal	6.318	74.4	(73.5–75.3)
Return to work/school			
Yes	3.837	45.0	(43.9–46.0)

	N	Estimate (%)	95 % CI ^a
No	4.554	55.0	(54.0–56.1)
Self-reported postpartum depressive symptoms			
Yes	1.180	14.2	(13.5–15.0)
No	7.243	85.8	(85.0–86.5)
Total	8.508		

^a95 % CI refers to the 95 % Confidence Interval

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Table 2

Exclusive breastfeeding at least 8 weeks by characteristics, Pregnancy Risk Assessment Monitoring System (PRAMS), 2004–2008

	Estimate (%)	95 % CI ^a
Maternal race		
White	51.9	(49.6–54.2)
Native Hawaiian	31.8	(29.8–33.9)
Samoaan	24.2	(19.0–30.3)
Filipino	28.9	(26.8–31.0)
Japanese	29.4	(26.7–32.2)
Chinese	33.8	(31.2–36.5)
Korean	38.0	(33.9–42.2)
Black	37.0	(30.1–44.5)
Other/unknown	41.7	(38.2–45.2)
Maternal age		
<20 years	36.3	(35.3–37.4)
20–24	33.4	(29.7–37.3)
25–34	33.4	(31.3–35.5)
35 or more	35.7	(33.4–38.0)
Maternal education		
<High school	32.2	(28.6–36.0)
High school or equivalent	33.8	(32.1–35.5)
Some college	35.1	(33.1–37.1)
College graduate	42.4	(40.5–44.4)
Marital status		
Married	38.8	(35.3–37.4)
Not married	31.9	(30.2–33.7)
Pre-pregnancy weight status		
Underweight (BMI < 18.5)	38.8	(34.7–43.2)
Normal (BMI 18.5–24.9)	39.5	(38.2–40.9)
Overweight (BMI 25–29.9)	33.6	(31.4–35.9)
Obese (BMI ≥ 30)	29.3	(26.8–32.0)
Insurance at delivery		
No insurance	66.1	(56.7–74.5)
Medicaid	34.1	(32.3–36.0)
Private	35.5	(34.2–36.9)
Military	42.2	(39.4–45.1)
Mode of delivery		
Cesarean	30.3	(28.4–32.2)
Vaginal	38.4	(37.2–39.6)
Return to work/school		
Yes	32.1	(30.6–33.6)

	Estimate (%)	95 % CI^a
No	40.0	(38.6–41.4)
Self-reported postpartum depressive symptoms		
Yes	29.9	(27.3–32.6)
No	37.4	(36.3–38.5)
Total	36.3	(35.3–37.4)

^a95 % CI refers to the 95 % Confidence Interval

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Table 3

Crude and adjusted prevalence ratios for exclusive breastfeeding at least 8 weeks, Hawaii Pregnancy Risk Assessment Monitoring System (PRAMS), 2004–2008

	Crude PR	(95 % CI) ^a	Adjusted PR ^b	(95 % CI)
Maternal race				
White	Ref		Ref	
Native Hawaiian	0.61	(0.57–0.66)	0.67	(0.61–0.72)
Samoaan	0.47	(0.37–0.59)	0.54	(0.43–0.69)
Filipino	0.56	(0.51–0.61)	0.58	(0.53–0.63)
Japanese	0.57	(0.51–0.63)	0.58	(0.52–0.65)
Chinese	0.65	(0.59–0.71)	0.64	(0.58–0.70)
Korean	0.73	(0.65–0.82)	0.72	(0.64–0.82)
Black	0.71	(0.58–0.87)	0.79	(0.65–0.96)
Other/unknown	0.80	(0.73–0.88)	0.86	(0.78–0.95)
Maternal age				
<20 years	0.87	(0.57–0.66)	0.89	(0.79–1.01)
20–24	0.87	(0.37–0.59)	0.85	(0.79–0.92)
25–34	Ref		Ref	
35 or more	0.93	(0.86–1.00)	0.95	(0.89–1.03)
Pre-pregnancy weight status				
Underweight (BMI < 18.5)	0.98	(0.88–1.10)	0.98	(0.87–1.10)
Normal	Ref		Ref	
Overweight (BMI 25–29.9)	0.85	(0.79–0.92)	0.88	(0.82–0.95)
Obese (BMI ≥ 30)	0.74	(0.67–0.82)	0.77	(0.70–0.85)
Mode of delivery				
Cesarean	0.79	(0.73–0.85)	0.79	(0.73–0.85)
Vaginal	Ref		Ref	
Return to work/school				
Yes	0.80	(0.76–0.85)	0.85	(0.80–0.90)
No	Ref		Ref	
Self-reported postpartum depressive symptoms				
Yes	0.80	(0.73–0.88)	0.84	(0.76–0.92)
No	Ref		Ref	

^a 95 % CI refers to the 95 % Confidence Interval

^b Final model adjusted for all other variables listed