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Disparities in self-reported postpartum depression among Asian, Hawaiian, and Pacific Islander women in Hawai'i: Pregnancy, Risk, Assessment, and Monitoring System (PRAMS), 2004-2007

D. K. Hayes

Hawaii Department of Health

Van M. Ta Park

San Jose State University, van.ta@sjsu.edu

E. Hurwitz

University of Hawaii at Manoa

K. M. Mitchell-Box

University of Hawaii at Manoa

L. J. Fuddy

Hawaii Department of Health

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Abstract

Objectives Postpartum depression affects 10–20% of women and causes significant morbidity and mortality among mothers, children, families, and society, but little is known about postpartum depression among the individual Asian and Pacific Islander racial/ethnic groups. This study sought to identify the prevalence of postpartum depression among common Asian and Pacific Islander racial/ethnic groups.

Methods Data from the Hawaii Pregnancy Risk Assessment and Monitoring System (PRAMS), a population-based surveillance system on maternal behaviors and experiences before, during, and after the birth of a live infant, were analyzed from 2004 through 2007 and included 7,154 women. Questions on mood and interest in activities since giving birth were combined to create a measure of Self-reported Postpartum Depressive Symptoms (SRPDS). A series of generalized logit models with maternal race or ethnicity adjusted for other sociodemographic characteristics evaluated associations between SRPDS and an intermediate level of symptoms as possible indicators of possible SRPDS.

Results Of all women in Hawaii with a recent live birth, 14.5% had SRPDS, and 30.1% had possible SRPDS. The following Asian and Pacific Islander racial or ethnic groups were studied and found to have higher odds of SRPDS compared with white women: Korean (adjusted odds ratio [AOR]=2.8;95% confidence interval [CI]:2.0–4.0), Filipino (AOR=2.2;95% CI:1.7–2.8), Chinese (AOR=2.0;95% CI:1.5–2.7), Samoan (AOR=1.9;95% CI=1.2–3.2), Japanese (AOR=1.6;95% CI:1.2–2.2), Hawaiian (AOR=1.7;95% CI:1.3–2.1), other Asian (AOR=3.3;95% CI:1.9–5.9), other Pacific Islander (AOR= 2.2;95% CI:1.5–3.4), and Hispanic (AOR=1.9;95% CI:1.1–3.4). Women who had unintended pregnancies (AOR=1.4;95% CI:1.2–1.6), experienced intimate partner violence (AOR=3.7;95% CI:2.6–5.5), smoked (AOR=1.5;95% CI:1.2–2.0), used illicit drugs (AOR=1.9;95% CI:1.3–3.9), or received Women, Infant, and Children (WIC) benefits during pregnancy

(AOR=1.4;95% CI:1.2–2.6) were more likely to have SRPDS. Several groups also were at increased risk for possible SRPDS, although this risk was not as prominent as seen with the risk for SRPDS.

Conclusion One in seven women reported SRPDS, and close to a third reported possible SRPDS. Messages about postpartum depression should be incorporated into current programs to improve screening, treatment, and prevention of SRPDS for women at risk.

Keywords: Postpartum Depression, Asian, Pacific Islanders, Hawaiian, Women, Disparities

Introduction

In the United States, a major depressive disorder is estimated to occur in at least 16% of adults during their lifetime and in approximately 7% of adults in a 12-month period [1]. Women are nearly twice as likely to experience depression as men with the peak incidence occurring during the reproductive period from 18 to 44 years of age [2–6].

An estimated 10–20% of women in the United States suffer from major depression within 6 months of giving birth [7, 8]. About 1 in 7 women who give birth to a live infant experience clinical depression from 39 weeks before pregnancy through 39 weeks postpartum [9]. Postpartum depression is typically defined as an onset of major depression from the time a woman gives birth through the 12 months following birth. The Centers for Disease Control and Prevention’s (CDC) Healthy People 2010 objective (16-5) to “reduce maternal illness and complications due to pregnancy” includes a developmental objective (16-5c) of “postpartum complications, including postpartum depression.” Women who have postpartum depression are at greater risk for relapsing during subsequent pregnancies as well as developing a major depressive disorder outside the perinatal period [8]. Furthermore, associations between postpartum depression and intimate partner violence, suicide, homicide, and other behaviors that are not conducive to the optimal development of a child have been documented. Postpartum depression can be disabling for new mothers and limit their ability to care for their infants resulting in significant familial and societal costs, including increased use of health care services and hospitalizations of children; decreased likelihood of having a smoke alarm in the home; decreased likelihood of putting infants to sleep on their backs; and decreased use of age-appropriate services, such as well-child visits and immunization coverage [10, 11]. In most cases, postpartum depression can be treated on an outpatient basis to help promote healthy motherhood and alleviate some of the burden and costs to families and society [12–15].

According to the US Census Bureau, there were nearly 15 million Asians and 1 million Native Hawaiians or Other Pacific Islanders (NHOPI) in the US in 2007 [16]. Asians and NHOPI are a diverse population with several distinct subgroups having different cultures, languages, and periods of residence in the US [17,18]. In 2007, there were almost 1.3 million persons living in Hawaii with 39.9% classified as Asian, 8.9% classified as NHOPI, and 18.6% classified as multiple race [16]. There is a definite literature gap regarding postpartum depression among subgroups of Asian and Pacific Islander women. The few studies that exist often report only on an overall Asian group that combines several subgroups together or are limited to select subgroups. These studies show inconsistent results with both higher and lower rates of postpartum depression among Asian and Pacific Islander compared with white women [19–23]. Due to the importance and potentially severe consequences related to postpartum depression, it is vital to determine population level estimates among distinct Asian and Pacific Islander subgroups.

Hawaii is unique in that over half of the population consists of Asian, Hawaiian, and Pacific Islanders, and thus provides an opportunity to analyze differences in postpartum depression among these subgroups. These findings may provide information for those working with Asian and Pacific Islander families to identify those at risk and develop outreach programs. The objective of this study was to analyze postpartum depression among the predominant Asian and Pacific Islander subgroups in Hawaii, to compare these estimates to other racial and ethnic groups, and to assess if any differences are related to demographic and other characteristics.

Methods

We analyzed Hawaii's Pregnancy Risk Assessment Monitoring System (PRAMS) survey data from 2004 through 2007. PRAMS is an ongoing state- and population-based surveillance system that monitors selected maternal behaviors and experiences among women before, during, and after their pregnancies that result in live births. The PRAMS survey used birth certificates as a sampling frame and is based on a self-reported

questionnaire that was mailed to selected participants. The survey included follow-up mailings and phone surveys for respondents who did not respond to the initial mailings. A total of 9,428 women were surveyed, and the overall response rate was 77% (n = 7,233). Of all responders, 78% completed the survey during the mail phase and the remaining 22% completed the survey during the phone phase. We eliminated 79 records (1.1%) because they were missing information for the outcome variable of postpartum depression resulting in a study sample of 7,154.

In 2004, the Hawaii PRAMS began including two questions related to postpartum depression that were based on the Patient Health Questionnaire-2 (PHQ-2). The PHQ-2 has been validated in many settings and with several diverse population groups as a method with a high sensitivity to screen for depressive disorder and to monitor treatment outcomes [24–28]. These questions were slightly modified in PRAMS to reflect the period stated in the question and the expansion and change in terminology of response options from a four to a five level Likert scale. These changes to the question were assessed, reviewed, and piloted by the Centers for Disease Control & Prevention. The two questions related to postpartum depressive symptoms were:

Since your new baby was born, how often have you felt down, depressed, or hopeless?

Since your new baby was born, how often have you had little interest or little pleasure in doing things?

For both questions, check boxes were provided with the following Likert scale: “Always, Often, Sometimes, Rarely, and Never.” SRPDS were determined to exist if respondents answered “Always” or “Often” to either question. Possible SRPDS were determined to exist if respondents answered “Sometimes” to either question and did not answer “Always” or “Often” to the other question. The remaining respondents who answered “Rarely” or “Never” were classified as not having SRPDS. This response pattern is consistent with the PHQ-2 screening test for the general adult population that identifies an increased risk for depression in adults with the

highest scores as well as those with intermediate scores [24, 28]. Clinical guidelines recommend additional diagnostic evaluation for any depressive disorder in adults with intermediate (specificity = 0.81–0.86) or higher scores (specificity = 0.91–0.97) [25, 27].

Birth certificates issued in Hawaii collect information on as many racial or ethnic groups as are entered, but these groups are converted to one of 22 single race groups by the Office of Health Status Monitoring (OHSM) in the Hawaii Department of Health [29]. This conversion to a single race group prevents the ability to analyze the 33.4% of women having a live birth in Hawaii reporting more than one of the five federally-designated racial groups (white, black, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaskan Native) [30]. For our analysis, we categorized the 22 singly coded maternal race variables done by OHSM into the following 12 groups to ensure a sample size of at least 100 in order to provide reliable estimates: black, Chinese, Filipino, Hawaiian, Japanese, Korean, Samoan, white, Hispanic, other Asian, other Pacific Islander, and other or unknown. The “Hawaiian” group includes mothers who were coded as part-Hawaiian. The “white” reference group includes mothers who were coded as Portuguese or Caucasian. Mexican, Cuban, and Puerto Rican mothers were coded as “Hispanic.” The “other Pacific Islander” group includes other Pacific Islanders and mothers who were categorized as Guamanian. The “other Asian” group includes Vietnamese, Asian Indian, and other Asian persons. For this analysis, the “other” group is predominantly American Indian or Alaskan Native (n=83), with “other or unknown” (n=5) and those missing (n=13) a race group accounting for the remainder of the “Other” group.

Maternal age, calculated by the mother’s age at the time of the infant’s birth, was categorized into age groups of <20 years, 20–34 years, and 35 or more years. Maternal education was categorized as <12 years, 12–15 years, and 16 or more years. An unintended pregnancy was defined as not “trying to get pregnant” and wanting to get pregnant “later” or “never.” In contrast, women were classified as having an intended pregnancy if they wanted to get pregnant “sooner” or “then” or were “trying to get pregnant.” For our analysis, other

combinations of answers were considered a missing response (2.5%) and were primarily the result of respondents not answering the question on the timing of the pregnancy. For smoking status, a mother was categorized as a smoker if she reported smoking at least one cigarette during the last three months of pregnancy. Self-reports of using any illicit substances during pregnancy determined illicit drug use. Intimate partner violence was categorized by a “yes” response to questions related to physical abuse during pregnancy by a husband or partner or an ex-husband or ex-partner. Participation in the special supplemental nutrition program for Women, Infants, and Children (WIC) was included as a demographic covariate and proxy for socioeconomic status and categorized as “yes” or “no.”

Prevalence estimates of demographic data and other characteristics by SRPDS categories were determined. A generalized logit modeling procedure determined crude and adjusted odd ratios (AORs) for SRPDS and possible SRPDS compared with those without SRPDS as the reference group for both outcomes. Racial/ethnic and other sociodemographic covariates were used to develop a final adjusted model for respondents with SRPDS. Covariates were selected on the basis of review of the general literature to identify possible predictors of postpartum depression. During model building, we evaluated the SRPDS outcome for relative significance and importance of the individual risk factors. To allow comparison with respondents with possible SRPDS, we ran the model with the same predictors found in the model for SRPDS. We used SAS version 9.1 (SAS Institute Inc., Cary, NC) and SAS-callable SUDAAN version 9.0 (Research Triangle Institute, Research Triangle Park, NC) for our analysis to account for the complex survey design.

Results

Of all women in Hawaii with a recent live birth, 14.5% had SRPDS. Estimates of SRPDS were higher among Samoan, black, Hawaiian, and Filipino women compared with white women. SRPDS was higher among women aged less than 20 years compared with women age 20 years or more. Women with a lower education level, an

unintended pregnancy, who smoked, used illicit drugs during pregnancy, experienced intimate partner violence, or who were WIC recipients during prenatal care all reported high estimates of SRPDS (Table 1).

Many of these differences persisted in the final adjusted model (Table 2, Figure 1). There were important differences by race, with the following groups having a higher likelihood of SRPDS than white women: Korean (adjusted odds ratio [AOR]=2.8, 95% confidence Interval [95% CI]=2.0-4.0), Filipino (AOR=2.2, 95% CI=1.7-2.8), Chinese (AOR = 2.0, 95% CI=1.5-2.7), Samoan (AOR = 1.9, 95% CI=1.2-3.2), Japanese (AOR = 1.6, 95% CI=1.2-2.2), Hawaiian (AOR = 1.7, 95% CI=1.3-2.1), other Asian (AOR=3.3, 95% CI=1.9-5.9), other Pacific Islander (AOR=2.2, 95% CI=1.5-3.4), and Hispanic (AOR=1.9, 95% CI=1.1-3.4). Women with an unintended pregnancy were more likely to report SRPDS (AOR=1.4, 95% CI=1.2-1.6) than those with an intended pregnancy. Other factors associated with a higher likelihood of SRPDS included experiencing intimate partner violence during pregnancy (AOR = 3.7; 95% CI = 2.6–5.5), smoking during the last trimester (AOR = 1.5; 95% CI = 1.2–2.0), using illicit drugs (AOR = 1.9; 95% CI = 1.3–3.9), and receiving WIC benefits during pregnancy (AOR = 1.4; 95% CI = 1.2–1.6). Women with less than 12 years of education (AOR = 2.0; 95% CI = 1.5–2.8) and women with 12–15 years of education (AOR = 1.6; 95% CI = 1.3–1.9) were more likely to have SRPDS compared with women who had 16 or more years of education.

Possible SRPDS occurred in 30.1% of all mothers. Rates were higher among Chinese, Filipino, Korean, Samoan, other Asian, other Pacific Islander, unknown race, or other race women who had an unintended pregnancy; had less education; had experienced intimate partner violence; and were under 35 years of age (Table 1).

In the final adjusted model, the following race and ethnicities were more likely to have possible SRPDS compared with white women: Korean (AOR = 1.8; 95% CI = 1.4–2.3), Chinese (AOR = 1.7; 95% CI = 1.4–2.0), other Pacific Islander (AOR = 1.7; 95% CI = 1.2–2.3), and Filipino (AOR = 1.6; 95% CI = 1.3–1.9). Women who had an unintended pregnancy (AOR = 1.4; 95% CI = 1.2–1.5) were more likely to have possible

SRPDS compared with women who intended to become pregnant. Additionally, women who experienced intimate partner violence (AOR = 2.2; 95% CI = 1.5–3.1) during pregnancy compared with women who did not were more likely to have possible SRPDS (Table 2, Fig. 2).

Discussion

This study assessed estimates of postpartum depression in the community of Hawaii and demonstrated that almost half (45.6%) of women who recently gave birth to a live infant reported symptoms that may warrant further evaluation for postpartum depression. About 15% of all women were in the highest risk category for postpartum depression, including almost all the women in the Asian and Pacific Islander groups; women in these groups were twice as likely as white women to report SRPDS. There also were disparities among other characteristics, such as experiencing intimate partner violence during pregnancy, smoking, during pregnancy, using drugs during pregnancy, and receiving WIC benefits during prenatal care. About 30% of all women were in the intermediate risk category for postpartum depression and merit consideration for further clinical evaluation.

Our study demonstrated significantly higher estimates of SRPDS among all the women in the Asian and Pacific Islander subgroups compared with white women in Hawaii. Estimates for subgroups of Asian and Pacific Islander women in our study occur near the upper range, while the rate for white women in Hawaii tend to be lower compared to that reported in the general literature [31]. Other studies of Asian women show varying results: with some suggesting higher risks for postpartum depression, particularly among recent immigrants [22, 32], while other studies suggest lower or equal risks [20]. Results also vary among studies that examine Asian subgroups [21, 23]. We located a study that examined postpartum depression among Pacific Islander populations and showed an overall estimate of 16.4% for postpartum depression in New Zealand, ranging from 7.6% in Samoan women to 30.7% in Tongan women [33]. Another study showed relatively low rates of severe depression among Pacific Islander populations in the United States [23]. We were unable to locate any studies

that examine postpartum depression in Hawaiian women. Hawaii is composed of numerous racial and ethnic groups that include recent immigrants and the descendants of groups who have lived in Hawaii for multiple generations. We were unable to assess the immigrant status or period of time living in the US. This study showed variation in both SRPDS and possible SRPDS among several of the Asian and Pacific Islander racial groups that are typically aggregated together in national studies and suggests the importance of evaluating specific subgroups when possible.

The strongest predictor of both SRPDS and possible SRPDS was the experience of intimate partner violence during the pregnancy. Other studies have identified psychological abuse as the primary form of intimate partner violence associated with postpartum depressive symptoms [31, 34–36]. The questions on the PRAMS survey relate to physical abuse only, but our study still showed a significant association with intimate partner violence. Intimate partner violence is a sensitive issue that may not be shared initially with health care providers because of lack of privacy, disruptions with continuity of care, time constraints, and insufficient provider training [35, 37]. Educating providers on the best methods for discussing both physical and psychological components of intimate partner violence and improving knowledge of appropriate referral services is needed to help providers help mothers and their families. Our study suggests that women who suffer from intimate partner violence during pregnancy should be evaluated for signs and symptoms of depression and followed closely in the postpartum period as they are more likely to develop signs and symptoms of postpartum depression.

Other significant risk factors for SRPDS included an unintended pregnancy, lower education attainment, using illicit drugs during pregnancy, and smoking during pregnancy. An unintended pregnancy can introduce a significant amount of stress and uncertainty in a person and can be associated with depression, especially if the pregnancy was unwanted. A higher education attainment (ie., >16 years of education) may be reflective of a higher socioeconomic status with increased resources or coping skills and explain the lower risk of SRPDS in

those with more education. Alternatively, women with higher education may be somewhat less likely to report symptoms suggestive of postpartum depression because of societal concerns or because they may have developed additional coping skills. However, it is likely that many factors contribute to the results that are related to education in this analysis. The use of illicit drugs or smoking during pregnancy may be markers for a high-risk pregnancy, and the mother and her infant need to be followed closely if the mother engaged in either of these activities. The use of illicit drugs may be related to stressful life situations and inadequate coping skills and using drugs could be an attempt to relieve acute or chronic stress, including stress that is due to depression. These are associated with events that occur before the baby is born and highlight potential areas for clinicians to monitor during prenatal and postpartum visits.

The limitations of this study include the self-reported nature of the questions about intimate partner violence, illicit drug use, and other topics that may be subject to social desirability bias. Pregnancy intention may change during the period from conception through postpartum, and the PRAMS survey does not query details needed to clarify this complex topic. Furthermore, our proxy for postpartum depression is based on two questions that have shown a high specificity as clinical screening questions in adults but have a relatively low predictive value, a characteristic that highlights that these questions should not be construed as diagnostic but rather are an initial screening for depression [28]. These questions were modified for PRAMS and have not been evaluated in the Asian, Hawaiian, and Pacific Islander populations. Another limitation of this study is due to how racial categorization is limited by the single race reported by the Office of Health Status and Monitoring in the data released to Hawaii PRAMS. A recent study of births that examined all information regarding race and ethnicity that was entered on a birth certificate showed that about a third of both mothers (33.4%) and fathers (32.4%) reported more than one of the five federally-designated racial groups (white, black, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaskan Native) compared with 1.0–2.7% of births in 2003 in California, Utah, Pennsylvania, and Washington [30]. If the detailed information among Asian

and Pacific Islander subgroups is considered, the vast majority of births in Hawaii should be multiracial and this impact on birth and other outcomes may affect the findings.

Strengths of this study include an assessment of a large number of women and their feelings about postpartum depressive symptoms during the first few months after the birth of a child, a period that coincides with the peak onset of postpartum depression. Although the data are cross-sectional and collected after pregnancy, we were able to assess some events that occurred earlier than when the survey was actually completed, such as intimate partner violence during pregnancy, an unintended pregnancy, and other factors. These events may signify moments when providers could intervene to prevent the development of postpartum depression or to lessen its impact during the postpartum period. The relatively large number of variables included in the PRAMS survey allows researchers to control for several factors associated with postpartum depression in multivariable modeling procedures. Hawaii data allows the determination of estimates among several distinct Asian and Pacific Islander racial groups that are generally too small in numbers to report throughout most jurisdictions and may provide information for those working with these populations.

One project that increased awareness of perinatal depression among providers and the community in Hawaii was *“Improving Women’s Health Through Screening and Intervention for Depression During and Around the time of Pregnancy”* within the federal healthy start initiative. This project sought to institute a system of care responsive to the mental health needs of Asian and Pacific Islanders in a culturally appropriate way. Some of the results of this project included the development of a mental wellness resource list for Hawaii Island, protocols for depression screenings and intervention/referral matrix, use of consortia to increase awareness among health care providers and within the community [38]. Additionally, all perinatal health programs that have purchase of service contracts with the Maternal and Child Health Branch in the Hawaii Department of Health screen their clients for depression during pregnancy and in the postpartum period, and provide appropriate services and referrals when needed. Through screening and referrals, these programs have

improved awareness among individuals and providers in Hawaii, but more needs to be done as this represents less than 20% of births in Hawaii. For example, the Hawaii WIC program sees close to half of all births in the State on a regular basis and represents a great opportunity to screen and provide appropriate referral services for depression both prenatally and in the postpartum period. Screening in family planning settings may also represent an opportunity to identify and provide referral services to those that may be at higher risk.

In the continuum of care provided over a women's lifetime, providers must identify key moments that may predict future adverse health outcomes. Pregnancy is a unique time in a woman's life and involves frequent encounters with the health care system, which provide opportunities to promote not only a healthy pregnancy and its outcomes but also a healthy lifestyle that can affect the lifespan of a woman and her family. Historically, these encounters have focused on the current pregnancy, but awareness of the need to understand preconception and postpartum needs is growing. Increasing awareness of disparities in postpartum depression among Asian and Pacific Islander groups and assuring that adequate resources are available to meet their needs can help decrease morbidity and mortality in families and improve the health of society.

Table 1 Sociodemographic characteristics of respondents by Self-Reported Postpartum Depressive Symptoms, Pregnancy Risk Assessment and Monitoring System (PRAMS), Hawaii, 2004–2007

		SRPDS	Possible SRPDS	None
	N	Prevalence (95% CI)	Prevalence (95% CI)	Prevalence (95% CI)
Overall	7154	14.5 (13.7–15.4)	30.1 (29.0–31.1)	55.4 (54.2–56.5)
Race/ethnicity				
Black	147	14.0 (9.4–20.2)	27.8 (21.3–35.3)	58.3 (50.4–65.7)
White	1345	8.6 (7.3–10.2)	26.6 (24.4–29.0)	64.7 (62.2–67.1)
Hispanic	117	16.6 (11.0–24.2)	28.8 (21.5–37.4)	54.6 (45.8–63.2)
Hawaiian	1549	17.2 (15.4–19.1)	27.9 (25.8–30.1)	54.9 (52.5–57.3)
Samoan	165	17.9 (12.9–24.3)	33.2 (26.5–40.6)	48.9 (41.6–56.3)
Other Pacific Islander	278	19.3 (15.2–24.2)	37.6 (32.2–43.3)	43.1 (37.5–48.8)
Filipino	1394	16.2 (14.5–18.2)	34.2 (31.8–36.6)	49.6 (47.1–52.1)
Japanese	830	11.9 (9.9–14.2)	28.9 (26.0–32.0)	59.2 (55.9–62.4)
Chinese	775	12.5 (10.6–14.7)	33.7 (30.8–36.6)	53.8 (50.8–56.9)
Korean	340	16.6 (13.4–20.3)	35.3 (31.0–39.8)	48.2 (43.6–52.8)
Other Asian	110	20.8 (14.5–28.9)	30.7 (23.0–39.6)	48.5 (39.6–57.6)
Other/unknown	101	19.2 (12.7–28.0)	34.2 (25.8–43.8)	46.5 (37.3–56.0)
Maternal age				
<20 years	492	22.6 (19.2–26.5)	33.0 (29.0–37.3)	44.3 (40.0–48.7)
20–34 years	5202	13.8 (12.9–14.8)	30.7 (29.4–31.9)	55.5 (54.2–56.9)
≥35 years	1460	13.7 (12.0–15.5)	26.2 (24.0–28.6)	60.1 (57.5–62.6)
Maternal education				
<12 years	526	23.3 (19.9–27.1)	33.0 (29.2–37.2)	43.6 (39.5–47.9)
12–15 years	4388	15.6 (14.6–16.7)	30.4 (29.1–31.8)	54.0 (52.5–55.5)
16 or more years	2125	8.4 (7.3–9.7)	28.6 (26.7–30.6)	63.0 (60.9–65.0)
Pregnancy intention				
Unintended	2766	17.6 (16.3–19.1)	33.1 (31.4–34.9)	49.2 (47.3–51.1)
Intended	4209	12.2 (11.2–13.2)	27.7 (26.4–29.1)	60.1 (58.6–61.6)
Smoking during the last 3 months of pregnancy				
Yes	524	23.9 (20.5–27.6)	30.1 (26.4–34.2)	46.0 (41.8–50.2)
No	6520	13.6 (12.8–14.5)	29.9 (28.8–31.0)	56.5 (55.3–57.7)
Illicit drug use during pregnancy				
Yes	174	28.2 (22.0–35.3)	31.2 (24.8–38.4)	40.7 (33.6–48.1)
No	6851	14.0 (13.2–14.9)	30.0 (28.9–31.1)	56.0 (54.8–57.1)
Intimate partner violence during pregnancy				
Yes	219	37.5 (31.3–44.0)	35.0 (29.0–41.5)	27.5 (22.0–33.8)
No	6839	13.7 (12.9–14.5)	29.9 (28.8–31.0)	56.4 (55.3–57.6)
WIC recipient during pregnancy				
Yes	2794	18.4 (17.0–19.9)	31.7 (30.0–33.4)	49.9 (48.1–51.8)
No	4209	11.4 (10.5–12.4)	29.0 (27.6–30.4)	59.6 (58.1–61.1)

SRPDS = Self-Reported Postpartum Depressive Symptoms; CI = confidence interval;
WIC = Women, Infants, and Children program

Table 2 Generalized logit model^a: crude and adjusted odds ratios of Self-Reported Postpartum Depressive Symptoms by selected sociodemographic characteristics, Pregnancy Risk Assessment and Monitoring System (PRAMS), Hawaii, 2004–2007

	SRPDS		Possible SRPDS	
	Crude OR (95% CI)	Adjusted OR ^b (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Race/ethnicity				
Black	1.8 (1.1–2.9)	1.4 (0.8–2.4)	1.2 (0.8–1.7)	1.0 (0.7–1.5)
White	referent	referent	referent	referent
Hispanic	2.3 (1.3–3.9)	1.9 (1.1–3.4)	1.3 (0.8–2.0)	1.4 (0.9–2.1)
Hawaiian	2.3 (1.9–2.9)	1.7 (1.3–2.1)	1.2 (1.0–1.5)	1.1 (0.9–1.3)
Samoan	2.7 (1.8–4.3)	1.9 (1.2–3.2)	1.6 (1.2–2.4)	1.4 (1.0–2.1)
Other Pacific Islander	3.4 (2.3–4.8)	2.2 (1.5–3.4)	2.1 (1.6–2.8)	1.7 (1.2–2.3)
Filipino	2.4 (1.9–3.1)	2.2 (1.7–2.8)	1.7 (1.4–2.0)	1.6 (1.3–1.9)
Japanese	1.5 (1.1–2.0)	1.6 (1.2–2.2)	1.2 (1.0–1.4)	1.3 (1.0–1.5)
Chinese	1.7 (1.3–2.3)	2.0 (1.5–2.7)	1.5 (1.3–1.8)	1.7 (1.4–2.0)
Korean	2.6 (1.9–3.6)	2.8 (2.0–4.0)	1.8 (1.4–2.3)	1.8 (1.4–2.3)
Other Asian	3.2 (1.9–5.3)	3.3 (1.9–5.9)	1.5 (1.0–2.4)	1.6 (1.0–2.6)
Other/unknown	3.1 (1.8–5.4)	2.1 (1.1–3.9)	1.8 (1.1–2.8)	1.6 (1.0–2.6)
Maternal age				
<20 years	2.2 (1.7–3.0)	1.1 (0.8–1.5)	1.7 (1.3–2.2)	1.4 (1.0–1.8)
20–34 years	1.1 (0.9–1.3)	0.8 (0.7–1.0)	1.3 (1.1–1.5)	1.2 (1.0–1.4)
≥35 years	referent	referent	referent	referent
Maternal education				
<12 years	4.0 (3.0–5.2)	2.0 (1.5–2.8)	1.7 (1.3–2.1)	1.1 (0.8–1.4)
12–15 years	2.2 (1.8–2.6)	1.6 (1.3–1.9)	1.2 (1.1–1.4)	1.1 (0.9–1.2)
≥16 years	referent	referent	referent	referent
Pregnancy intention				
Intended	referent	referent	referent	referent
Unintended	1.8 (1.5–2.0)	1.4 (1.2–1.6)	1.5 (1.3–1.6)	1.4 (1.2–1.5)
Smoking during the last 3 months of pregnancy				
Yes	2.2 (1.7–2.7)	1.5 (1.2–2.0)	1.2 (1.0–1.5)	1.1 (0.9–1.4)
No	referent	referent	referent	referent
Illicit drug use during pregnancy				
Yes	2.8 (1.9–4.0)	1.9 (1.3–3.9)	1.4 (1.0–2.0)	1.4 (0.9–2.0)
No	referent	referent	referent	referent
Intimate partner violence during pregnancy				
Yes	5.6 (4.0–7.9)	3.7 (2.6–5.5)	2.4 (1.7–3.4)	2.2 (1.5–3.1)
No	referent	referent	referent	referent
WIC recipient during pregnancy				
Yes	1.9 (1.7–2.2)	1.4 (1.2–1.6)	1.3 (1.2–1.5)	1.1 (1.0–1.3)
No	referent	referent	referent	referent

OR = adjusted odds ratio; SRPDS = Self-Reported Postpartum Depressive Symptoms; CI = confidence interval

^a Generalized logit comparisons were women with SRPDS compared with women without SRPDS; women with possible SRPDS compared with women without SRPDS^b Adjusted OR reflects odds ratio adjusted for all other variables listed

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