



# Depression and Anxiety around the Time of Pregnancy in Hawai'i



**PRESENTATION TO THE PERINATAL ADVOCACY NETWORK  
JULY 31, 2014**

**EMILY K. ROBERSON, PHD, MPH  
HAWAI'I PREGNANCY RISK ASSESSMENT MONITORING SYSTEM  
FAMILY HEALTH SERVICES DIVISION  
HAWAI'I STATE DEPARTMENT OF HEALTH**

# Background



- Depression and anxiety are common among pregnant and postpartum women, as well as among women of reproductive age in general. [41] [73] [98] [112] [135]
  - When these conditions and other psychiatric disorders occur around the time of pregnancy, they have been associated with poor birth outcomes, decreased maternal health, and continued ill effects throughout infancy and childhood. [5] [39] [47] [98]
- Treatments available for depression and anxiety include counseling or therapy, behavioral interventions, and prescription medications. [34] [73]
  - Pregnant and postpartum women require special considerations with respect to treatment of psychiatric conditions, which can make medical decisions complicated. [24] [34] [92]

# Background



- There is much that is not known about the safety and effects of specific psychiatric medications, particularly in pregnancy.
- Healthcare providers treating women with psychiatric conditions must be concerned with not only the potential dangers of continuing treatment by using prescription medications of unknown safety throughout pregnancy, but also with the dangers of discontinuing treatment. [24]
  - Some providers choose to administer medications at lower levels during pregnancy in an attempt to reduce perceived risks to the fetus. [52] [103]
  - Some patient become noncompliant out of fear of potentially harming their fetuses with prescription drugs. [89]
    - Both of these scenarios are of special concern with regards to psychiatric medications, as reducing or discontinuing medication can cause a relapse of serious psychiatric symptoms, including self-harm behaviors. [26] [103] [76]
    - Psychiatric conditions such as maternal depression and anxiety have both been independently associated with harmful maternal behaviors during pregnancy as well as poor birth outcomes. [24] [12] [88] [96]

# Study Aims



- Anxiety and depression before, during, and after pregnancy, along with related help-seeking behaviors and treatment strategies, are not well-described for the State of Hawai‘i.
- This study sought to describe the prevalence of depression and anxiety, along with pharmaceutical treatment and help seeking behaviors, among a multiethnic population of women who recently gave birth to a live infant in Hawai‘i.

# Data Source



- Hawai‘i Pregnancy Risk Assessment Monitoring System (PRAMS)
  - Partnership project between the United States Centers for Disease Control and Prevention (CDC) and selected state and city health departments.
    - ✦ Hawai‘i PRAMS began data collection in 2000, and the program is currently housed within the Hawai‘i State Department of Health, Family Health Services Division.
  - Self-reported survey of recently-pregnant women collecting information on maternal behaviors, attitudes, and experiences before, during, and immediately after pregnancy
    - ✦ Standardized data collection protocol centers on a self-administered mailed questionnaire with telephone follow-up for non-responders
  - Analytic dataset includes information collected from PRAMS survey questions, as well as from selected linked birth certificate variables
  - Data are weighted annually to be representative of all pregnancies resulting in live births in the state in a given year.
    - ✦ For this project, data were available for 4,735 respondents, representing a total population of approximately 55,690 women who had a live birth in Hawai‘i in the years 2009-2011.

# Methods



- Hawai‘i PRAMS data from 4,735 respondents were used to estimate prevalence of several indicators related to anxiety and depression before, during, and after pregnancy among women with recent live births.
- Data were weighted to be representative of all pregnancies resulting in live births in Hawai‘i from 2009 to 2011.
- Prevalence estimates, confidence intervals, and p-values were generated using SAS-callable SUDAAN 10.0 to account for complex sampling.

# Measures



**11. During the 3 months before you got pregnant with your new baby, did you have any of the following health problems?** For each one, circle **Y** (Yes) if you had the problem or circle **N** (No) if you did not.

	No	Yes
a. Asthma . . . . .	N	Y
b. High blood pressure (hypertension) . .	N	Y
c. Anemia (poor blood, low iron) . . . . .	N	Y
d. Heart problems . . . . .	N	Y
e. Epilepsy (seizures) . . . . .	N	Y
f. Thyroid problems . . . . .	N	Y
g. Depression . . . . .	N	Y
h. Anxiety . . . . .	N	Y

**69. Below is a list of feelings and experiences that women sometimes have after childbirth. Read each item to determine how well it describes your feelings and experiences. Then, write on the line the number of the choice that best describes how often you have felt or experienced things this way since your new baby was born. Use the scale when answering:**

	1	2	3	4	5
	Never	Rarely	Sometimes	Often	Always
a. I felt down, depressed, or sad. . .					<input type="text"/>
b. I felt hopeless . . . . .					<input type="text"/>
c. I felt slowed down . . . . .					<input type="text"/>

**75. Since your new baby was born, have you asked for help for anxiety from a doctor, nurse, or other health care worker?**

- No
- Yes

# Measures



**76. Did you use any of these drugs in the month before you got pregnant?** For each item, circle **Y** (Yes) if you used it or circle **N** (No) if you did not.

- |   | No | Yes |
|---|----|-----|
| a. Prescription drugs . . . . .   | N  | Y   |
| If yes, what kinds? —————> Please tell us:  |    |     |
|   |    |     |
| b. Marijuana (pot, bud) or hashish (hash) . . . . .   | N  | Y   |
| c. Amphetamines (uppers, ice, speed, crystal meth, crank). . . . .                              | N  | Y   |
| d. Cocaine (rock, coke, crack) or heroin (smack, horse). . . . .                                | N  | Y   |
| e. Tranquilizers (downers, ludes) or hallucinogens (LSD/acid, PCP/angel dust, ecstasy). . . . . | N  | Y   |
| f. Sniffing gasoline, glue, hairspray, or other aerosols . . . . .                              | N  | Y   |

**77. Did you use any of these drugs when you were pregnant?** For each item, circle **Y** (Yes) if you used it or circle **N** (No) if you did not.

- |   | No | Yes |
|---|----|-----|
| a. Prescription drugs . . . . .   | N  | Y   |
| If yes, what kinds? —————> Please tell us:  |    |     |
|   |    |     |
| b. Marijuana (pot, bud) or hashish (hash) . . . . .   | N  | Y   |
| c. Amphetamines (uppers, ice, speed, crystal meth, crank). . . . .                              | N  | Y   |
| d. Cocaine (rock, coke, crack) or heroin (smack, horse). . . . .                                | N  | Y   |
| e. Tranquilizers (downers, ludes) or hallucinogens (LSD/acid, PCP/angel dust, ecstasy). . . . . | N  | Y   |
| f. Sniffing gasoline, glue, hairspray, or other aerosols . . . . .                              | N  | Y   |

# Measures



- **Postpartum depression was assessed according to CDC PRAMS guidelines.**
  - CDC recommends using a cut off of greater than or equal to 10 as an indication of postpartum depressive symptoms. This cut off point is calculated by adding parts a, b & c of the depression question together (depressed, hopeless, and slowed down).
- **Write-in responses to the prescription drug use question were manually reviewed in order to properly adjust for misspellings, multiple drugs listed, and other factors.**
  - Responses were then coded into categories using SAS 9.2 “string” and “upcase” commands.
  - Entries > 30 characters are listed in a separate comment file; these responses were also manually reviewed and then coded into groups by unique ID number.
  - In addition, some women refer to prescription drug usage during pregnancy in an open-ended section at the back of the Hawai‘i PRAMS survey. These responses were also manually reviewed and then coded into groups by unique ID number if appropriate.

# Measures



- The following prescription anxiety and/or depression medications (alone or in combination) were included in this analysis:
  - Alprazolam, Amitriptyline, Aripiprazole, Bupropion, Buspirone, Citalopram, Clozapine, Clonazepam, Diazepam, Desvenlafaxine, Duloxetine, Escitalopram, Fluoxetine, Fluvoxamine, Lamotrigine, Lorazepam, Nortriptyline, Paroxetine, Quetiapine, Sertraline, Trazodone, and Venlafaxine
  - Entries that did not specifically list drug names, but instead included a reference to non-specific antidepressant or anxiety medication were also included.

# Results



- Among women who gave birth to a live infant in Hawai‘i between the beginning of 2009 and end of 2011:
  - **4.9%** (95% CI: 4.2-5.7) reported that they had depression in the three months before pregnancy
  - **5.9%** (95% CI: 5.1-6.8) reported that they had anxiety in the three months before pregnancy
    - ✦ There was significant overlap between the two groups; **7.6%** (95% CI: 6.7-8.6) reported suffering from anxiety, depression, or both in the three months before pregnancy.
  - **9.1%** (95% CI: 8.1-10.2) screened positive for postpartum depression (PPD)
  - **6.9%** (95% CI: 6.0-7.9) reported asking a doctor, nurse, or other health care worker for help for anxiety since their new baby was born

# Results



- Pre-pregnancy depression prevalence estimates differed significantly by:
  - Maternal race/ethnicity ( $p < 0.0001$ )
  - FPL ( $p < 0.05$ )
- Pre-pregnancy anxiety prevalence estimates differed significantly by:
  - Maternal race/ethnicity ( $p < 0.0001$ )
- PPD prevalence estimates differed significantly by:
  - FPL ( $p < 0.01$ )
  - Maternal age was borderline statistically significant ( $p = 0.0544$ )
- Postpartum seeking help for anxiety estimates differed significantly by:
  - FPL ( $p < 0.01$ ),
  - Maternal race/ethnicity ( $p < 0.05$ )
  - Maternal education level ( $p < 0.05$ )

**Table 4.1. Selected mental health indicators by maternal characteristics**

<b>Maternal characteristics</b>	<b>Total n* (% of total population)</b>	<b>Pre-pregnancy Depression n* (% prevalence)</b>	<b>Pre-pregnancy Anxiety n* (% prevalence)</b>	<b>Postpartum Depression n* (% prevalence)</b>	<b>Postpartum Sought Help for Anxiety n* (% prevalence)</b>
<b>Total</b>	55,691 (100)	2,694 (4.9)	3,223 (5.9)	5,048 (9.1)	3,704 (6.9)
<b>Age (years)</b>					
Less than 20	4,044 (7.3)	216 (5.4)	183 (4.6)	298 (7.4)	299 (7.5)
20-24 years old	13,160 (23.6)	759 (5.8)	837 (6.4)	1,265 (9.6)	995 (7.8)
25-29 years old	15,205 (27.3)	780 (5.2)	905 (6.0)	1,660 (10.9)	935 (6.3)
30-34 years old	13,602 (24.4)	570 (4.2)	787 (5.9)	1,219 (9.0)	815 (6.1)
35 or older	9,681 (17.4)	369 (3.9)	511 (5.4)	606 (6.3)	660 (7.2)
<b>Race/Ethnicity</b>					
Hawaiian	16,738 (30.1)	918 (5.5)	1,057 (6.4)	1,776 (10.6)	970 (6.0)
White	12,813 (23.0)	853 (6.8)	1,158 (9.2)	1,232 (9.6)	818 (6.5)
Filipina	9,922 (17.8)	226 (2.3)	252 (2.6)	829 (8.4)	653 (6.9)
Japanese	5,191 (9.3)	159 (3.1)	202 (3.9)	430 (8.3)	243 (4.8)
Other Pacific Islander <sup>a</sup>	4,113 (7.4)	#	#	189 (4.6)	498 (12.6)
Other Asian <sup>b</sup>	4,034 (7.2)	152 (3.8)	168 (4.2)	295 (7.3)	260 (6.6)
Other or unknown <sup>c</sup>	2,880 (5.2)	364 (12.9)	345 (12.1)	297 (10.3)	263 (9.5)
<b>Marital Status</b>					
Married	34,081 (61.2)	1,522 (4.5)	2,018 (6.0)	2,909 (8.5)	2,052 (6.2)
Other	21,610 (38.8)	1,172 (5.5)	1,206 (5.6)	2,140 (9.9)	1,651 (7.9)
<b>Education level</b>					
Less than high school	4,097 (7.5)	204 (5.0)	214 (5.3)	258 (6.3)	413 (10.7)
High school graduate	21,743 (39.7)	1,160 (5.4)	1,433 (6.7)	2,058 (9.5)	1,568 (7.4)
Some college or more	28,915 (52.8)	1,310 (4.6)	1,555 (5.5)	2,634 (9.1)	1,626 (5.8)
<b>Federal Poverty Level (%)</b>					
Less than or equal to 100%	15,138 (29.3)	939 (6.3)	886 (5.9)	1,780 (11.8)	1,364 (9.3)
101 – 200%	13,427 (26.0)	638 (4.8)	675 (5.1)	1,174 (8.7)	763 (5.9)
201% or greater	23,099 (44.7)	859 (3.8)	1,324 (5.8)	1,731 (7.5)	1,224 (5.4)
<b>Parity</b>					
First live birth	22,598 (40.6)	979 (4.4)	1,122 (5.0)	2,191 (9.7)	1,574 (7.2)
Not first live birth	33,062 (59.4)	1,714 (5.2)	2,101 (6.4)	2,857 (8.6)	2,123 (6.6)

\*Weighted, rounded to nearest whole number, category-specific estimates may not equal overall total due to rounding and differences in missing values;

<sup>a</sup>Number too small to report; <sup>b</sup>Other Pacific Islander includes: Samoan, Guamanian, and other Pacific Islander; <sup>c</sup>Other Asian includes: Chinese, Korean,

Vietnamese, Asian Indian, and other Asian; <sup>c</sup>Other or unknown includes: African American, American Indian, Puerto Rican, Cuban, Mexican, and all others

# Results



- The total prevalence of antianxiety and/or antidepressant prescription use was **2.3%** (95% CI: 1.8-2.9) in the month before pregnancy and **1.4%** (95% CI: 1.0-1.9) during pregnancy.
  - Women with **depression** in the three months before pregnancy:
    - ✦ **27.8%** (95% CI: 21.2-35.7) took antidepressant/antianxiety drugs before pregnancy
    - ✦ **18.7%** (95% CI: 13.0-26.0) took either type of medication during pregnancy
  - Women with **anxiety** in the three months before pregnancy:
    - ✦ **23.5%** (95% CI: 17.8-30.3) took antidepressant/antianxiety drugs before pregnancy
    - ✦ **11.4%** (95% CI: 7.4-17.0) took either type of medication during pregnancy
  - Women with **depression, anxiety, or both** in the three months before pregnancy:
    - ✦ **25.4%** (95% CI: 20.1-31.5) took antidepressant/antianxiety drugs before pregnancy
    - ✦ **13.8%** (95% CI: 9.8-19.0) took either type of medication during pregnancy
- Among women who reported taking antidepressant and/or antianxiety medication in the month before pregnancy:
  - **52.2%** (95% CI: 40.3-63.8) took either type of medication during pregnancy

# Results



- Women who reported pre-pregnancy depression were **significantly more likely** to screen positive for PPD than women who did not report depression in the three months before pregnancy (**43.8%** vs. **7.2%**;  $p < 0.0001$ ).
- Among women who reported pre-pregnancy depression, those who took antidepressant or antianxiety medication during pregnancy **were not significantly more likely** to screen positive for PPD than were those who did not take these types of medications during pregnancy (**51.2%** vs. **42.2%**;  $p = 0.4029$ ).

**Table 4.2. Postpartum depression (PPD) prevalence, by pre-pregnancy depression and treatment**

<b>Pre-pregnancy Depression and Pregnancy Treatment Status</b>	<b>PPD N*</b>	<b>PPD % prevalence (95% CI)</b>	<b>P-value</b>
<b>Total</b>	5,048	9.1 (8.1-10.2)	
<b>No pre-pregnancy depression reported</b>	3,771	7.2 (6.3-8.3)	
<b>Pre-pregnancy depression reported</b>	1,181	43.8 (36.1-51.9)	p < 0.0001
<b>Medication<sup>a</sup> used during pregnancy</b>	257	51.2 (32.6-69.4)	
<b>No medication<sup>a</sup> used during pregnancy</b>	924	42.2 (33.8-51.1)	p = 0.4029

\*Weighted, rounded to nearest whole number, category-specific estimates may not equal overall total due to rounding and differences in missing values; <sup>a</sup>Medication includes the following drugs, alone or in combination: Alprazolam, Amitriptyline, Aripiprazole, Bupropion, Buspirone, Citalopram, Clozapine, Clonazepam, Diazepam, Desvenlafaxine, Duloxetine, Escitalopram, Fluoxetine, Fluvoxamine, Lamotrigine, Lorazepam, Nortriptyline, Paroxetine, Quetiapine, Sertraline, Trazodone, and Venlafaxine.

# Results



- Women who reported pre-pregnancy anxiety were **significantly more likely** overall to report seeking help for anxiety postpartum than women who did not have anxiety in the three months before pregnancy (**31.4%** vs. **5.3%**;  $p < 0.0001$ ).
- Among women who reported having anxiety pre-pregnancy, women who took antidepressant or antianxiety medication during pregnancy **were significantly more likely** to seek help for anxiety in the postpartum period than were those who did not take these types of medications during pregnancy (**57.4%** vs. **28.0%**;  $p < 0.05$ ).

**Table 4.3. Postpartum anxiety (PPA) help seeking prevalence, by pre-pregnancy anxiety and treatment**

<b>Pre-pregnancy Anxiety and Pregnancy Treatment Status</b>	<b>PPA help seeking N*</b>	<b>PPA help seeking % prevalence (95% CI)</b>	<b>P-value</b>
<b>Total</b>	3,704	6.9 (6.0-7.9)	
<b>No pre-pregnancy anxiety reported</b>	2,675	5.3 (4.5-6.3)	
<b>Pre-pregnancy anxiety reported</b>	995	31.4 (24.9-38.7)	p < 0.0001
<b>Medication<sup>a</sup> used during pregnancy</b>	210	57.4 (35.7-76.6)	
<b>No medication<sup>a</sup> used during pregnancy</b>	785	28.0 (21.4-35.6)	p = 0.0108

\*Weighted, rounded to nearest whole number, category-specific estimates may not equal overall total due to rounding and differences in missing values; <sup>a</sup>Medication includes the following drugs, alone or in combination: Alprazolam, Amitriptyline, Aripiprazole, Bupropion, Buspirone, Citalopram, Clozapine, Clonazepam, Diazepam, Desvenlafaxine, Duloxetine, Escitalopram, Fluoxetine, Fluvoxamine, Lamotrigine, Lorazepam, Nortriptyline, Paroxetine, Quetiapine, Sertraline, Trazodone, and Venlafaxine.

# Discussion



- Both depression and anxiety are common among women with recent live births in Hawai'i, and there is substantial overlap between the two conditions.
- There are differences in both conditions by demographic factors, and these differences do not necessarily track in exactly the same way.
  - For example, racial/ethnic differences related to pre-pregnancy anxiety, pre-pregnancy depression, and post-partum anxiety help-seeking behaviors were all statistically significant in our population, while differences in PPD were not ( $p = 0.1425$ ).
    - ✦ This may be related to the fact that PPD in this study was measured through use of a validated screening tool, whereas the other indicators were based on maternal report of the condition/behavior.
      - If so, this may imply that observed differences in pre-pregnancy anxiety, pre-pregnancy depression, and post-partum anxiety help-seeking reflect differences or bias related to reporting, possibly including social desirability factors.

# Discussion



- This is the first study to examine use of psychiatric medication during pregnancy using maternally reported, population-based data from the PRAMS survey.
  - This PRAMS study provides a different perspective from existing prescription drug research.
    - ✦ Population-based and weighted to be representative of all pregnancies resulting in live births in Hawai‘i
    - ✦ Can capture use of medications that might be missed in other datasets due to recreational or occasional use of drugs prescribed to other individuals or drugs obtained through illicit means

# Discussion



- While the prevalence estimates for anxiety and depression medication use before and during pregnancy in Hawai‘i are novel on their own, the additional inclusion of other mental health indicators helps to provide a more detailed picture of the larger setting in which use of these medications is taking place.
- The finding that approximately one in four Hawai‘i women with depression, anxiety, or both before pregnancy also reported that they took antidepressant or anti-anxiety medication immediately before pregnancy shows that psychiatric medication use is relatively common among women with depression or anxiety in Hawai‘i.

# Discussion



- This study also showed that almost half of women who used these drugs before pregnancy discontinued when they became pregnant.
  - Discontinuation rates during pregnancy in this population are likely to be even higher than 50% if one assumes that some of these women had unintended pregnancies (of which approximately half of all pregnancies are [49]) that resulted in inadvertent drug exposures early in pregnancy, with later cessation of medication use once the pregnancy was discovered.
    - ✦ Although the Hawai'i PRAMS survey does not collect information on psychiatric treatment plans or medical oversight of medication use, this is important information for health care providers in light of concerns about psychiatric medication noncompliance during pregnancy. [26] [76] [89] [103]
    - ✦ More investigation is needed to determine if the anxiety and/or depression medication cessation in pregnancy observed in this study reflects medically-supervised changes in treatment plans, prescription medication noncompliance, or perhaps occasional and/or recreational use of psychiatric medication that may or may not be prescribed to the individual using it.

# Discussion



- The examination of PPD and postpartum anxiety help-seeking behavior in light of pre-pregnancy anxiety and depression and prescription drug use during pregnancy attempted to take a preliminary look at postpartum mental health outcomes while controlling for confounding by indication.
  - Although our sample size prevented more complex analysis of the issue as part of this study, the initial results as reported in tables 4.2 and 4.3 are intriguing.
  - The observed differences between PPD and postpartum help seeking for anxiety deserve further investigation.

# Limitations



- Hawai'i PRAMS survey limitations
  - Self-reported data; recall, other reporting bias
    - ✦ Women are more likely to recall use of some types of medications than others when retrospectively asked about medication use during pregnancy. [134]
      - Documented effects are modest for the time period during which the majority of PRAMS surveys are completed. [134]
  - Mode bias
    - ✦ Mothers who completed the surveys via mail were significantly more likely to report prescription drug use both before and during pregnancy.
      - Previous investigations into mode bias effects on PRAMS survey responses found that most differences were minimal or nonexistent, and attempts to control for mode bias resulted in very small absolute differences in estimates.
      - Approximately 81% of survey respondents completed the Hawai'i PRAMS questionnaire by mail in 2009-2011.

# Limitations



- Hawai‘i PRAMS prescription drug use question
  - Comprehension
    - ✦ Example: some individuals might only have listed medications that were prescribed to them, not medications they used recreationally
  - Clarity of responses
    - ✦ Spelling errors, reference to medication purpose or class instead of drug name (“antidepressants”), individual did not know what she took
      - In this study:
        - <5 (unweighted) cases where a drug listed was not able to be reliably identified due to spelling
        - <10 where women did not remember or state what type of medication they used during pregnancy
        - <20 where the space was left blank

# Limitations



- Limitations for this study specifically
  - Relatively small unweighted numbers of women who used prescription anxiety and depression medications
    - ✦ Limited the complexity of the analyses that were possible
    - ✦ Small numbers issues when looking at specific drugs, in combination with the frequency of multiple drugs being listed for single individuals, necessitated grouping prescription different antidepressants or antianxiety medications (with different mechanisms of action and potential side effects) together.

# Implications



- This study reflects a preliminary step in an attempt to more fully describe the mental health landscape as it relates to pregnancy in Hawai‘i.
- More research is needed to fully describe the burden of anxiety and depression around the time of pregnancy, associated risk factors, and the risks and benefits of different treatment strategies.
  - ✦ This information is crucial for mental health providers, public health workers, and women who are pregnant or may become pregnant.
- More study is sorely needed in order to better inform providers, patients, and researchers moving forward.

# Acknowledgements



## **Thank you to my coauthors:**

Eric Hurwitz, DC, PhD, Chair

Abby Collier, PhD

Robert Cooney, PhD

Alan Katz, MD, MPH

Dongmei Li, PhD

# Acknowledgements



Hawai'i State Department of Health  
Family Health Services Division and Maternal and Child Health Branch

Hawai'i PRAMS Data Manager Jane Awakuni

All of the women who have responded to the Hawai'i PRAMS survey since the program began as a pilot project in 1999

This research was made possible in part by grant #1U01DP003145 from the Centers for Disease Control and Prevention.

# References



➤ See handout

# Mahalo for your attention!



## QUESTIONS?

Emily K. Roberson, PhD, MPH  
Hawai'i PRAMS Program  
Phone: (808) 733-4060  
[emily.roberson@doh.hawaii.gov](mailto:emily.roberson@doh.hawaii.gov)