https://doi.org/10.24095/hpcdp.38.7/8.01

Original quantitative research

Mental health indicators among pregnant Aboriginal women in Canada: results from the Maternity Experiences Survey

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This article has been peer reviewed.

Abstract

Introduction: There is little research done on mental health among pregnant Aboriginal women. Therefore, the purpose of the study was to examine the prevalence of postpartum depression (PPD) and its determinants, including pre-existing depression among non-Aboriginal and Aboriginal women in Canada.

Methods: The Maternity Experiences Survey (MES) is a national survey of Canadian women's experiences and practices before conception, up to the early months of parenthood. Predictors of PPD were calculated using the Mantel-Haenszel correction method relative to the risk estimates based on the odds ratio from adjusted regression analysis. The analysis was conducted among women who self-identified as Aboriginal (Inuit, Métis or First Nations living off-reserve) and those who identified as non-Aboriginal.

Results: The prevalence of pre-existing depression was higher among self-reported First Nations off-reserve and Métis women than non-Aboriginal women. Inuit women had the lowest prevalence of self-reported pre-existing depression, and Aboriginal women reported a higher prevalence of PPD than non-Aboriginal women. Pre-existing depression was not a predictor for PPD for Inuit or Métis women in this study but was a positive predictor among First Nations off-reserve and non-Aboriginal women. A disproportionally higher number of Aboriginal women reported experiencing abuse, as compared to non-Aboriginal women.

Conclusion: Our study demonstrated that common predictors of PPD including anxiety, experiencing stressful life events during pregnancy, having low levels of social support, and a previous history of depression were consistent among non-Aboriginal women. However, with the exception of the number of stressful events among First Nations off-reserve, these were not associated with PPD among Aboriginal women. This information can be used to further increase awareness of mental health indicators among Aboriginal women.

Keywords: *postpartum depression, Aboriginal, pregnant, mental health*

Highlights

- Métis and First Nations women reported a higher prevalence of pre-existing depression than non-Aboriginal women while Inuit women reported the lowest prevalence.
- Overall, Inuit, Métis and First Nations women had a higher prevalence of postpartum depression than non-Aboriginal women.
- A disproportionally higher number of Aboriginal women reported experiencing abuse, as compared to non-Aboriginal women.

Introduction

The Canadian Mental Health Association estimates that up to 20% of new mothers experience postpartum depression (PPD).[1] Antenatal depression is the strongest predictor for PPD.[2] Antenatal depression has been associated with poor maternal functioning and poorer birth outcomes such as higher preterm birth rates and increased rates of caesarean deliveries.[3-5] Further, predictors for PPD include: anxiety, marital stress, stressful life events during pregnancy, lack of prenatal care, partner instability, and low levels of social support, to name but a few.[4] Given the potential negative effects of PPD on a woman and child, knowledge of the prevalence and the predictors of PPD are necessary to implement preventative measures and to help health practitioners ensure that appropriate supports are in place for those most likely to experience PPD.[2]

In Canada, Aboriginal peoples are a collective name for the original peoples of North America and their descendants and are comprised of three groups: First Nations, Métis and Inuit.[6] Aboriginal women's health status, when compared to that of non-Aboriginal Canadian women, can only be understood in the context of a range of health determinants that arise from the history of colonization and the legacy of Indian Residential Schools, including socioeconomic status, education and employment conditions, social support networks, physical environment, and

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access to health services.[7] The social determinants of health make many Aboriginal women more vulnerable than other Canadian women in terms of their health status. At the same time, it is important to acknowledge the resilience of Aboriginal peoples and in particular, the promising practices arising across the country to reduce disparities in maternal and child health outcomes.[8] Unfortunately, accurate descriptions of the health disparities experienced by Aboriginal women have been limited by a lack of standardized First Nations, Métis, and Inuit identifiers in vital registration, health care utilization, and surveillance databases.

While some research has demonstrated that Aboriginal women have higher levels of PPD symptoms compared to non-Aboriginal women,[2,8] the prevalence of predictors of PPD have not previously been well described. To address this research gap with respect to the perinatal mental health of Aboriginal women, this study examines the prevalence of PPD and its determinants along with other mental health indicators (including pre-existing depression) in First Nations living off-reserves, Métis, and Inuit women in Canada.

Methods

The Maternity Experiences Survey (MES), which was developed by the Public Health Agency of Canada (PHAC), is a national survey of Canadian women's experiences and practices prior to conception and up to the early months of parenthood. The primary objective of the survey was to provide data on Canadian women's experiences during pregnancy, birth, and the postpartum period.

Mothers 15 years of age and older who had given birth to a live, singleton baby in Canada between November 1, 2005 and May 15, 2006 and who lived with their infant at the time of data collection were eligible to participate in the survey. Mothers under 15 years of age at the time of giving birth, First Nations' mothers living on reserves or women living in institutions, and any woman who had a multiple birth (e.g., twins), stillbirth, suffered an infant death, or was no longer living with her baby were excluded.[9] A stratified, random sample of 8542 women was selected without replacement, using recent births drawn from a Census-based sampling frame. In total, 6421 completed enough of the questionnaire to be considered respondents for the MES study cohort.[9] Sampling weights and additional post-strata, based on the mother's first language and Aboriginal status, were used.[9] The 6421 respondents were thus weighted to represent 76 508 women, which are considered a nationally represented sample. Interviews were conducted primarily by telephone between October 23, 2006 and January 31, 2007. Most (96.9%) women were interviewed between five and nine months postpartum, with the timing ranging from five to 14 months. Interviews were conducted in English, French, and 13 non-official languages.[9]

The analysis included women (excluding those that did not report their ethnicity) who self-identified as First Nations off-reserve (2.5%, n = 1435), Métis (2.5%, n = 1456), or Inuit (0.5%, n = 239), and women who did not identify as Aboriginal, that is, they self-defined as non-Aboriginal (94.5%, n = 55 405).

Mental health variables included Edinburgh Postnatal Depression Scale (EPDS) scores, pre-existing depression, perceived stress, number of stressful events, history of abuse, levels of social support, and substance use in pregnancy (drugs and alcohol). Women were considered to have symptoms of PPD if their EPDS score was ≥ 13. If women answered yes to the following question, "Before your pregnancy, had you ever been prescribed anti-depressants or been diagnosed with depression?" they were considered to have a history of depression. Women were also asked a series of questions relating to stress. Women were asked to think about the amount of stress in their lives during the 12 months before their baby was born and responded with "not stressful", "somewhat stressful" and "very stressful." Similar to definitions reported by Dzakpasu et al.[10] and Kingston et al.,[11] high stress was defined as experiencing three or more stressful events (death in family/friend, moved, change in employment/housing status, divorce, relationship issues, financial stress, physical altercations, jail, and substance abuse) in the past 12 months before the baby was born. Women were asked a series of ten questions, which included questions about physical and/or sexual violence and threats of violence to determine if they had suffered abuse. A "yes" response to any of these items was categorized as abuse, in accordance with the Daoud et al. study.[12] Social support was determined by the following question "during your pregnancy, how often was support available to you when you needed it?" If women responded "none of the time", they were considered to have no social support; if they responded "a little of the time" or "some of the time" they were considered to have low social support, and if they responded "most of the time" or "all of the time" they were considered to have social support. If women responded anything other than "was not drinking at the time/stopped drinking" to the following question, "After you realized you were pregnant, how often did you drink alcoholic beverages?" they were considered to have consumed alcohol while pregnant. If women responded yes to the following question "After you realized you were pregnant, did you use street drugs?" they were considered to have used drugs while pregnant.

Sociodemographic characteristics included self-reported age (in years), marital status, education, and employment status. A variable labeled low-income cut-off (LICO) was derived using a set of criteria used by Statistics Canada to identify an income threshold below which a family will likely devote a larger share of its income on the necessities of food, shelter, and clothing than the average family in Canada. This was dichotomized as "at/below LICO" and "above LICO." Marital status categories included: single/never married, married, living common-law, divorced, separated, widowed, and refused. Education was based on the highest level of formal education completed and were grouped as: less than high school, completed high school and some post-secondary, post-secondary, and university degree.

Pregnancy-related characteristics included parity (primiparous/multiparous), time to first prenatal care visit (first trimester/after first trimester), pregnancy planning status (planned/unplanned), and smoking status. Planned and unplanned pregnancy was determined by a proxy question "Thinking back to just before you became pregnant, would you say that you wanted to be pregnant...?" If women answered "later" or "not at all" they were considered an unplanned pregnancy and if women responded "sooner" or "then" they were considered a planned pregnancy. Lastly, if women responded "daily" or "occasionally" to the following question "During the last three months of your

pregnancy, did you smoke daily, occasionally or not at all?" they were considered to have smoked during pregnancy.

Data were analyzed using SPSS, version 21.0. Using the Mantel-Haenszel correction method proposed by Zhang and Yu,[13] relative risk estimates were calculated based on the odds ratio from adjusted regression analysis. This correction method has shown to be a valid method to yield an estimate that represents the true relative risk. All analyses used sampling weights, and variance and 95% confidence intervals (CI) were also calculated. Univariate analysis was used to estimate unadjusted odds ratios and any variables showing an association at $p < 0.05$ with the outcome were included in the Mantel-Haenszel model to calculate adjusted relative risk (ARR). The models were adjusted for significant pregnancy, mental health, and sociodemographic variables, which included: age, marital status, education, employment, LICO, parity, time to prenatal care, planned pregnancy status, smoking status during pregnancy, a history of pre-existing depression, abuse, stress, and social support. ARR were calculated for all Aboriginal groups for all mental health and psychosocial variables (non-Aboriginal women were the reference group). We then stratified our analysis into four groups: non-Aboriginal, First Nations off-reserve, Métis, and Inuit to compare women with PPD to those without PPD (reference group).

Results

Sample characteristics

Differences between Aboriginal and non-Aboriginal women were noted in terms of sociodemographic characteristics. Overall, First Nations off-reserve, Métis, and Inuit women were younger, more likely to be single, had fewer years of formal education, and were more likely to report being at or below the low-income cut-off (LICO) than non-Aboriginal women (see Table 1).

Pre-existing and postpartum depression

First Nations off-reserve and Métis women reported a higher prevalence of pre-existing depression than non-Aboriginal women (22.1%, 28.8%, versus 17.8%), while Inuit women reported the lowest prevalence with 9.4%. When compared to non-Aboriginal women, after controlling for potential confounding variables, Inuit women were more likely to have pre-existing depression (ARR 1.9; 95% CI: 1.5–2.5), while Métis women were less likely to have pre-existing depression (ARR 0.8; 95% CI: 0.7–0.9). No differences were found among First Nations off-reserve women (ARR 1.0; 95% CI: 0.9–1.2).

Overall, First Nations off-reserve, Métis, and Inuit women had a higher prevalence of PPD than non-Aboriginal women (Table 1), with 12.9%, 9.1%, 10.6% reporting symptoms of depression as indicated by the EPDS compared to 5.6%. However, after adjusting for confounders, there were no statistically significant differences found for PPD between First Nations off-reserve, Métis and Inuit women compared to non-Aboriginal women (Table 2).

When comparing women with no PPD to those who experienced symptoms of PPD

TABLE 1
Sociodemographic and selected mental health characteristics among the total Maternity Experiences Survey (MES) sample stratified by Aboriginal and non-Aboriginal status

Variable	Non-Aboriginal (%, 95% CI)	Inuit (%, 95% CI)	Métis (%, 95% CI)	First Nations off-reserve (%, 95% CI)	*p*-value
	n = 55 405	n = 239	n = 1456	n = 1435	
Sociodemographic variables					
Age group					< 0.01
15–19	1.9 (1.7–2.0)	13.4 (9.2–18.9)	7.3 (6.0–8.9)	11.7 (10.1–13.7)	
20–24	12.0 (11.7–12.3)	38.1 (30.7–46.7)	26.3 (23.7–29.1)	25.2 (22.9–28.2)	
25–29	32.1 (31.7–32.6)	30.5 (23.9–38.4)	30.7 (28.0–33.7)	31.8 (29.3–35.2)	
30–34	35.0 (34.6–35.5)	13.0 (8.8–18.4)	25.3 (22.7–28.0)	21.1 (18.1–22.8)	
35–39	15.7 (15.4–16.0)	5.0 (2.6–8.8)	8.0 (6.6–9.5)	8.7 (7.3–10.5)	
40–44	3.1 (2.9–3.2)	0	1.4 (0.9–2.2)	1.5 (1.0–2.3)	
45–49	< 1	0	1.0 (0.5–1.6)	0	
Marital status					< 0.01
Single, never married	6.6 (6.4–6.9)	–	15.5 (13.6–17.7)	25.7 (23.2–28.5)	
Married	62.5 (61.8–63.1)	–	51.3 (47.7–55.2)	27.0 (24.3–29.8)	
Common-law	29.1 (28.6–29.5)	–	30.5 (27.7–33.4)	40.9 (37.7–44.4)	
Divorced/separated	1.7 (1.6–1.8)	–	1.7 (1.1–2.5)	6.5 (5.2–7.9)	
Highest level of education completed					< 0.01
< high school	6.7 (6.5–6.9)	51.9 (43.2–61.9)	13.5 (11.6–15.5)	28.4 (25.7–31.3)	
High school and/or some post-secondary	19.4 (19.0–19.7)	27.2 (21.0–34.7)	39.4 (36.2–42.7)	34.9 (31.9–38.1)	
Post-secondary	39.6 (39.0–40.1)	14.2 (9.9–19.9)	33.1 (30.2–36.2)	30.2 (27.5–33.2)	
University degree	34.2 (33.7–34.7)	4.2 (2.0–7.7)	14.1 (12.2–16.1)	6.3 (5.0–7.7)	
Employment status					< 0.01
Employed	83.6 (82.8–84.3)	51.5 (42.8–61.4)	76.5 (72.1–81.2)	59.2 (54.9–62.9)	

Continued on the following page

TABLE 1 (continued)
Sociodemographic and selected mental health characteristics among the total Maternity Experiences Survey (MES) sample stratified by Aboriginal and non-Aboriginal status

Variable	Non-Aboriginal (%, 95% CI)	Inuit (%, 95% CI)	Métis (%, 95% CI)	First Nations off-reserve (%, 95% CI)	*p*-value
	n = 55 405	n = 239	n = 1456	n = 1435	
Parity					< 0.01
Primiparous	45.5 (45.0–46.1)	25.5 (19.5–32.8)	45.3 (41.9–48.9)	47.8 (43.8–51.0)	
Prenatal care					< 0.01
First prenatal care visit in first trimester	96.6 (95.9–97.5)	91.2 (86.9–96.9)	92.9 (86.2–96.1)	93.8 (87.9–96.9)	
Pregnancy planning status					
Planned pregnancy	74.4 (73.2–74.8)	53.9 (42.8–62.8)	53.4 (48.7–56.2)	55.4 (49.9– 58.7)	
Low-income cut-off					< 0.01
At/below LICO	13.9 (13.5–14.2)	36.0 (28.8–44.4)	28.6 (25.9–31.5)	47.0 (43.6–50.7)	
Above LICO	79.5 (78.8–80.3)	36.4 (29.2–44.9)	62.7 (58.7–66.9)	37.4 (34.3–40.7)	
Missing	6.6 (6.4–6.9)	27.6 (21.4–35.1)	8.6 (7.2–10.3)	15.5 (13.6–17.7)	
Mental health variables					
Edinburgh Depression Scale					< 0.01
Symptoms of PPD	5.6 (5.4–5.8)	10.6 (6.8–15.4)	9.1 (7.6–10.8)	12.9 (11.1–14.9)	
History (hx) of depression					< 0.01
Hx of depression	17.8 (17.4–18.1)	9.4 (5.9–14.2)	28.8 (25.9–31.4)	22.1 (19.7–24.7)	
Perceived stress					< 0.01
Somewhat stressful	45.3 (44.7–45.9)	45.6 (37.4–55.0)	44.0 (40.6–47.5)	47.1 (44.0–51.2)	
Very stressful	12.2 (11.9–12.4)	13.4 (9.2–18.9)	16.0 (14.1–18.3)	16.0 (14.0–18.2)	
Number of stressful events					< 0.01
High (≥ 3 events)	8.5 (8.3–8.7)	24.3 (18.4–31.4)	24.6 (22.1–27.3)	25.3 (22.8–28.0)	
Abuse					< 0.01
Experienced abuse	5.5 (5.2–5.6)	26.4 (20.3–33.7)	12.0 (10.2–13.8)	19.6 (17.4–22.0)	
Frequency of abuse					< 0.01
Once	42.9 (29.9–32.9)	55.6 (42.4–71.5)	35.4 (29.6–42.1)	40.3 (34.8–46.4)	
More than once	57.1 (55.3–59.0)	44.4 (32.8–58.9)	64.6 (56.6–73.4)	59.7 (53.0–67.0)	
Social support					< 0.01
No social support	< 1	4.2 (2.0–7.7)	2.1 (1.4–2.9)	0	
Low social support	8.9 (8.6–9.1)	15.3 (11.1–21.6)	7.4 (6.0–8.8)	13.0 (11.3–15.1)	
Alcohol use					< 0.01
Consumed alcohol in pregnancy	12.0 (11.7–12.3)	4.2 (2.0–7.7)	6.1 (4.9–7.5)	3.9 (2.9–5.1)	
Drug use					< 0.01
Used drugs in pregnancy	1.0 (0.9–1.1)	6.8 (3.8–10.9)	6.9 (5.6–8.3)	1.9 (1.3–2.8)	
Smoking					< 0.01
Smoked during pregnancy	8.2 (7.9–8.4)	44.4 (36.3–53.6)	16.6 (14.5–18.8)	12.1 (10.5–14.2)	

Abbreviations: CI, confidence interval; hx, history; LICO, low-income cut-off; PPD, postpartum depression.

Notes: Not all groups add to 100% due to rounding and missing information.

–: suppressed due to small cell count (< 5).

(stratified by ethnicity), non-Aboriginal women and First Nations off-reserve women who developed PPD were more likely to have a history of pre-existing depression. This observation was not found in Métis women and data could not be presented for Inuit women due to small cell counts (Table 3).

Abuse/violence

A disproportionally higher number of Aboriginal women reported experiencing abuse compared to non-Aboriginal women. The prevalence of self-reported abuse was 19.6% for First Nations off-reserve women, 12.0% for Métis women, 26.4% for Inuit women, and 5.5% among non-Aboriginal women.

When adjusting for confounding factors, First Nations off-reserve and Inuit women were more likely to experience abuse than non-Aboriginal women (ARR 2.8; 95% CI: 1.7–4.8 and ARR 4.3; 95% CI: 1.9–7.3).

TABLE 2
Unadjusted associations of mental health indicators among Aboriginal and non-Aboriginal women

	Inuit		Métis		First Nations off-reserve	
	Unadjusted RR (95% CI)	ARR[a] (95% CI)	Unadjusted RR (95% CI)	ARR[a] (95% CI)	Unadjusted RR (95% CI)	ARR[a] (95% CI)
Edinburgh Depression Scale						
No PPD	1	1	1	1	1	1
Symptoms of PPD	0.8 (0.5–1.4)	0.7 (0.2–1.6)	1.3 (1.0–1.8)	0.9 (0.4–1.8)	2.1 (1.7–2.8)	1.8 (1.0–3.2)
Hx of depression						
No hx of depression	1	1	1	1	1	1
Hx of depression	1.8 (1.2–1.6)	1.9 (1.5–2.5)	1.4 (1.1–1.8)	0.8 (0.7–0.9)	0.8 (0.6–1.0)	1.0 (0.9–1.2)
Perceived stress						
Not stressful	1	1	1	1	1	1
Somewhat stressful	0.5 (0.3–0.9)	0.8 (0.3–1.9)	0.9 (0.7–1.3)	0.9 (0.4–1.7)	0.6 (0.4–0.8)	0.8 (0.4–1.6)
Very stressful	1.4 (1.0–1.9)	0.8 (0.4–1.5)	1.0 (0.7–1.3)	0.9 (0.6–1.4)	0.6 (0.4–0.7)	0.9 (0.6–1.4)
Number of stressful events						
Low (< 3 events)	1	1	1	1	1	1
High (≥ 3 events)	1.6 (1.4–1.7)	1.8 (0.8–3.1)	1.6 (1.3–1.7)	3.0 (1.7–5.3)	1.9 (1.6–2.4)	2.2 (1.3–3.9)
Abuse						
No abuse	1	1	1	1	1	1
Experienced abuse	3.6 (2.4–4.4)	4.3 (1.9–7.3)	0.8 (0.6–1.0)	1.3 (0.7–2.4)	1.2 (1.0–1.5)	2.8 (1.7–4.8)
Social support						
No social support	1.5 (0.3–6.3)	1.9 (0.3–4.3)	0.4 (0.1–1.8)	1.1 (0.2–2.5)	0.4 (0.1–1.3)	0.7 (0.4–1.3)
Low social support	5.9 (4.4–8.1)	4.2 (1.6–6.7)	0.7 (0.5–1.0)	0.6 (0.3–1.2)	0.8 (0.6–1.0)	1.2 (0.8–2.1)
Social support	1	1	1	1	1	1
Smoking						
No smoking	1	1	1	1	1	1
Smoked during pregnancy	3.4 (2.4–4.5)	4.8 (4.0–5.8)	0.9 (0.7–1.2)	1.5 (0.8–1.8)	1.5 (1.3–1.6)	1.6 (1.3–1.9)

Abbreviations: ARR, adjusted relative risk; CI, confidence interval; hx, history; LICO, low-income cut-off; PPD, postpartum depression; RR, relative risk.

Note: Reference group: non-Aboriginal women.

[a] Adjusted for age, marital status, education, employment, LICO, parity, time to prenatal care, planned pregnancy status, alcohol use, drug use and smoking status during pregnancy.

There were no significant differences of self-reported abuse between Métis women and non-Aboriginal women. However, when examining determinants of PPD within the respective ethnicity groups, having experienced abuse was a predictor for PPD among non-Aboriginal women (ARR 2.1; 95% CI: 1.3–3.5) but was not a predictor for Métis or First Nations off-reserve women. Data for Inuit women could not be presented due to unreliable estimates (attributed to small cell counts).

Social support

Overall, more than half of survey respondents reported having social support available to them (56%). Inuit women reported the least amount of social support among all categories of women whereas the majority of non-Aboriginal women, First Nations off-reserve, and Métis women reported they had social support most or all of the time.

In comparison to non-Aboriginal women, there were no significant differences in social support for First Nations off-reserve or Métis women, but Inuit women were significantly more likely to report low social support (ARR 4.2; 95% CI:1.6–6.7). Having little or no social support was a positive predictor for PPD among non-Aboriginal women, but this was not the case for First Nations off-reserve or Métis women. Data for Inuit not presented due to unreliable estimates (attributed to small cell counts).

Perceived stress and stressful events

Overall, all women reported that most days in the past year were somewhat stressful (44%) and very stressful (15%). First Nations off-reserve, Métis, and Inuit women reported a higher number of stressful events (more than 3 stressful events) during their pregnancy compared to non-Aboriginal women 25.3%, 24.6%, 24.3%, compared to 8.5% respectively.

When compared to non-Aboriginal women, no significant differences in perceived levels of stress during pregnancy for all Aboriginal women were found. However, First Nations off-reserve and Métis were more likely to report a high number (more than 3) of stressful events (ARR 2.2 95%CI: 1.3–3.9 and ARR 3.0 95% CI: 1.7–5.3) than non-Aboriginal women. Levels of perceived stress and the number of stressful events were found to be positive predictors for PPD among non-Aboriginal women, however, only the number of stressful events was a predictor for PPD among First Nations women.

Discussion

In this study, the prevalence of pre-existing depression was higher among self-reported First Nations off-reserve and

TABLE 3
Determinants of PPD among Aboriginal and non-Aboriginal women

	Non-Aboriginal		Métis		First Nations off-reserve	
	Unadjusted RR (95% CI)	ARR[a] (95% CI)	Unadjusted RR (95% CI)	ARR[a] (95% CI)	Unadjusted RR (95% CI)	ARR[a] (95% CI)
Hx of depression						
No hx of depression	1	1	1	1	1	1
Hx of depression	2.1 (1.7–2.5)	2.5 (1.8–3.5)	1.8 (1.0–2.6)	0.4 (0.2–0.7)	6.7 (5.2–8.0)	4.4 (1.4–8.6)
Perceived stress						
Not stressful	1	1	1	1	1	1
Somewhat stressful	4.1 (3.1–5.4)	7.6 (4.8–12.1)	1.0 (0.8–2.1)	0.7 (0.3–1.4)	[b]	[b]
Very stressful	2.4 (1.9–3.2)	2.9 (1.9–4.3)	0.7 (0.1–1.3)	0.5 (0.3–0.8)	[b]	[b]
Number of stressful events						
Low (< 3 events)	1	1	1	1	1	1
High (≥ 3 events)	1.4 (1.3–2.1)	1.7 (1.3–2.7)	2. 6 (1.9–3.9)	1.1 (0.7–1.2)	1.3 (1.1–5.3)	2.3 (1.3–3.9)
Abuse						
No abuse	1	1	1	1	1	1
Experienced abuse	1.3 (1.1–1.6)	2.1 (1.3–3.5)	4.7 (1.2–6.6)	1.0 (0.5–1.8)	0.6 (0.4–4.3)	0.6 (0.2–2.7)
Social support						
No social support	6.2 (3.8–9.9)	3.1 (2.3–3.9)	3.6 (1.0–6.4)	1.1 (0.7–1.6)	0.5 (0.4–6.0)	0.6 (0.4–1.1)
Low social support	1.2 (1.0–1.5)	2.2 (2.0–3.1)	2.2 (0.8–5.1)	1.6 (0.8–4.1)	0.7 (0.1–2.3)	0.5 (0.3–1.1)
Social support	1	1	1	1	1	1
Smoking						
No smoking	1	1	1	1	1	1
Smoked during pregnancy	1.5 (1.2–1.8)	1.3 (0.9–2.1)	1.0 (0.7–2.9)	2.5 (0.4–4.4)	3.7 (2.7–4.2)	2.4 (0.4–7.6)

Abbreviations: ARR, adjusted relative risk; CI, confidence interval; hx, history; LICO, low-income cut-off; PPD, postpartum depression; RR, relative risk.

Notes: Reference group: women with no PPD stratified by ethnicity.

Inuit data are not available due to small cell counts and large variance.

[a] Adjusted for age, marital status, education, employment, LICO, parity, time to prenatal care, planned pregnancy status, alcohol use, drug use and smoking status during pregnancy.
[b] Unable to report due to high variance.

Métis women than non-Aboriginal women. Inuit women had the lowest prevalence of self-reported pre-existing depression, and Aboriginal women reported a higher prevalence of PPD than non-Aboriginal women.

A meta-analysis revealed the strongest predictors of PPD included depression during pregnancy, anxiety during pregnancy, experiencing stressful life events during pregnancy, low levels of social support, and a previous history of depression.[4] These predictors were consistent in our study among the non-Aboriginal population; however, with the exception of the number of stressful events among First Nations off-reserve women, the above stated predictors were not associated with PPD among Aboriginal women. Pre-existing depression was not a predictor for PPD for Inuit or Métis women in this study sample but was a positive predictor among First Nations off-reserve and non-Aboriginal women. Studies have shown there is a lack of culturally appropriate access to pre- and postnatal care for Aboriginal women,[14-19] and that the impact of intergenerational trauma on Aboriginal women, intersecting racism and sexism have an impact on mental health. While we were unable to identify any specific predictors aside from pre-existing depression, these other influences can be contributing to the higher prevalence of PPD among Aboriginal women and cannot be overlooked.

Many studies have found a link between abuse and PPD.[12,17,18] Research suggests that physical abuse during pregnancy is associated with additional predictors for preterm birth, particularly stress and behavioral predictors such as substance abuse.[12] The data in this study suggest that Aboriginal women experience a higher prevalence of abuse/violence and stressful events during the pregnancy period than non-Aboriginal women; however, the link between substance use and abuse was not seen when adjusting for potential confounding variables (data not shown). In this study, abuse does not appear to be a risk factor for PPD among Aboriginal women but is positively associated with PPD among non-Aboriginal women. Regardless, the high prevalence of abuse self-reported by Aboriginal women is disconcerting and should not be ignored.

Pre- and postnatal screenings are important as they can facilitate the identification of potential predictors for PPD, ensure timely diagnosis, and allow early interventions to be initiated for the benefit of the woman and the baby.[2] While standardized screening tools can be used, our study highlights that known predictors for PPD may not be common in Aboriginal populations. Previous research shows lower levels of social support to be associated with higher rates of PPD in the postpartum period, but this was not found in our study. In our study we noted that First Nations off-reserve, Métis, and Inuit women

reported higher levels of social support than non-Aboriginal women but having no or low social support was only predictive for PPD among non-Aboriginal women. A study by Leahy-Warren, McCarthy and Corcoran[19] found that differentiating the type of social support was important for predicting postpartum depression. They found that in the general population functional and informal social support was significantly related to postnatal depression whereas women who received informational support, instrumental support, emotional support and/or appraisal support were less likely to experience postnatal depressive symptoms. As this study did not distinguish the types of social support, we cannot further examine if differences in types of social support might help explain the higher social support reported by Aboriginal women or the lack of association with PPD.

A meta-analysis linked anxiety during pregnancy and experiencing stressful life events during pregnancy to the development of PPD.[4] A dose-effect relation was found between the numbers of stressful life events experienced in the year prior to pregnancy and mean EPDS score. While we observed higher rates of stressful events among First Nations off-reserve, Métis, and Inuit women, higher rates of stressful events were only associated with a significant increase in the risk of developing PPD among non-Aboriginal and First Nations off-reserve women. A protective factor was observed among Métis women, which could not be examined among Inuit women as the data produced unreliable estimates (due in part to smaller cell counts).

Limitations

There are limitations to our study. We are limited in our analysis to examine women with PPD/no PPD among Inuit women (Table 3). Indeed, due to the small cell counts, the estimates produced were unreliable. Further, as the Inuit sample size was so small, we did not have adequate power to detect differences in outcomes/predictors where differences may actually exist. Variables were only included for analysis if they had a coefficient of variation less than 33.3%. Therefore, while the measures are considered good quality, some data in the Aboriginal sub-samples had larger variability than the non-Aboriginal sample. As this survey was conducted off-reserve due to operational reasons, the findings cannot be generalized to women residing on reserves. The MES is a rich source of maternal data for Canadian women; however, further details on culture and other indicators that are specific to First Nations off-reserve, Métis, and Inuit women were not collected, which would permit further analysis.

Conclusion

The prevalence of self-reported PPD was highest among Aboriginal women compared to non-Aboriginal women, although no statistical difference was found after adjusting for confounders. The information from this study can be used to further increase awareness of mental health indicators and predictors among Aboriginal women. Public health efforts should continue to include First Nation, Métis, and Inuit specific strategies to promote positive mental health within culturally holistic concepts of health and wellness. Our study highlights the importance of tailored screening and health promotion efforts for different cultures as the evidence indicates common predictors for PPD are not consistent for Inuit, Métis and First Nations off-reserve women.

Conflicts of interest

The authors have no conflicts of interest to disclose.

Authors' contributions and statement

CN devised the project, analyzed the data and wrote the first draft with input from all authors. KML and EKD contributed to the design of the project, provided input on data analysis, interpretation of data, and revised the manuscript after providing intellectual content and a critical review. VO provided editorial support and completed a critical review of the data. All authors discussed the results and provided comments on the manuscript.

The content and views expressed in this article are those of the authors and do not necessarily reflect those of the Government of Canada.

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