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Antenatal depression symptoms in Pacific women: evidence from Growing Up in New Zealand

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ABSTRACT

INTRODUCTION: Pacific women in New Zealand (NZ) have higher rates of antenatal depression than women from other ethnic groups.

AIM: To identify factors that are significantly associated with depression symptoms in pregnant Pacific women living in NZ.

METHODS: Data were collected from 5657 pregnant women, 727 of whom identified their ethnicity as Pacific Island. Antenatal depression symptoms were measured using the Edinburgh Depression Scale with scores above 12 indicating elevated antenatal depression symptoms (ADS).

RESULTS: Pacific women had significantly higher rates of ADS than non-Pacific women, with 23% of pregnant Pacific women experiencing ADS. Factors associated with ADS for Pacific women included age <25 years, moderate to severe nausea during pregnancy, perceived stress, family stress and relationship conflict. Not seeing the importance of maintaining one's Pacific culture and traditions and negative feelings towards NZ culture were also significantly associated with ADS in Pacific women. One in three Pacific women aged <25 years experienced ADS. Pregnant Pacific women without a family general practitioner (GP) before their pregnancy were 4.5-fold more likely to experience ADS than non-Pacific women with a regular GP.

DISCUSSION: Further attention is required to providing appropriate primary health care for Pacific women of child-bearing age in NZ. Better screening processes and a greater understanding of effective antenatal support for Pacific women is recommended to respond to the multiple risk factors for antenatal depression among Pacific women.

KEYWORDS: Antenatal depression; Edinburgh Depression Scale; Pacific pregnant women; perinatal depression; primary healthcare

Introduction

Pacific peoples in New Zealand (NZ) are inequitably exposed to the determinants of health and illness, leading to more adverse health outcomes than people of other ethnic groups.[1,2] 'Pacific peoples' or 'Pacific women' is used in this research to describe people who self-prioritise a Pacific ethnicity. The NZ government has, on numerous occasions, committed to improve the health and access to health care of Pacific peoples in NZ.[3–6]

The prevalence of antenatal depression among pregnant women is 7–13%.[7–8] However, rates vary considerably between studies. This can be explained, in part, by the different measures used to detect depression[7] and differences in the underlying risk for depression among study participants.[9]

Implications of antenatal depression for women are increased risk of postnatal depression,[10] post-traumatic stress and psychiatric morbidity.[11] Negative effects of antenatal depression for child health include impaired child behavioural, cognitive and emotional development,[12–13] as well as intrauterine growth retardation,[14] lower Apgar scores, smaller head circumference and increased risk of infant mortality.[15] Antenatal depression is also associated with decreased rates of breastfeeding, which has further implications for child health and development.[16]

Although much is known about factors associated with antenatal depression internationally, there are relatively few such studies in NZ populations. In 2015, Waldie et al.[17] investigated factors associated with probable antenatal depression (defined as a total Edinburgh Depression Scale (EDS) score >12 during pregnancy) among the Growing Up in New Zealand cohort. Women of Pacific Island, Asian and 'other' ethnicities were more likely to experience probable antenatal depression. Other significant variables were perceived stress score, a diagnosis of anxiety both before and during pregnancy and a diagnosis of depression both before and during pregnancy.[17]

Ethnicity is often identified as a factor associated with increased symptoms of antenatal depression.[18] However, the sociocultural factors associated with ethnicity mediate this relationship and there is currently no evidence to suggest that there are genetic or biological factors associated with an ethnic group that cause depressive symptoms.[19–20] It is likely that the association between ethnicity and antenatal depression is due to inequitable exposure of different ethnic groups to determining factors,[18] including intimate partner violence and abuse,[18–21] history of depression,[22] low socioeconomic status and unplanned pregnancy.[21]

Apart from Growing Up in New Zealand, research that has examined the relationship between depression and Pacific peoples includes the Pacific Island Families (PIF) Study[23] and Te Rau Hinengaro – The NZ Mental Health Survey.[24] Results from these large studies have been used in government reports to highlight a growing concern for the mental health of Pacific peoples.[6,25,26] The PIF Study used the EDS to assess postnatal depression in 1376 NZ Pacific mothers when their children were 6 weeks old.[23] High rates of probable depression were found, ranging from 7.6% to 31% among different Pacific ethnicities, with an overall prevalence of 16%. Risk factors for postnatal depression included low Pacific Island acculturation (Pacific mothers reporting low cultural orientation towards Pacific culture, not valuing or retaining elements of Pacific culture), first birth, stress due to insufficient food, low household income, difficulty with transport, dissatisfaction with pregnancy, dissatisfaction with birth experience, dissatisfaction with baby's sleep patterns, dissatisfaction with partner relationship and dissatisfaction with their home.[23]

WHAT GAP THIS FILLS

What is already known: Pacific women in NZ have higher rates of antenatal depression than women from other ethnic groups. Antenatal depression is associated with an increased risk of maternal postnatal depression and post-traumatic stress, as well as impaired child behavioural, cognitive and emotional development, and decreased rates of breastfeeding.

What this research adds: Almost one in four pregnant Pacific women experience antenatal depression symptoms (ADS). One in three Pacific women aged <25 years experienced ADS. Pregnant Pacific women without a family general practitioner (GP) before their pregnancy were 4.5-fold more likely to experience ADS than non-Pacific women with a regular GP.

The PIF Study did not take prepregnancy or antenatal depression symptoms into account when exploring factors associated with postnatal depression in Pacific Peoples, and there is no literature addressing possible reasons for Pacific women in NZ experiencing high rates of antenatal depression as reported by Waldie et al.[17] The present study aimed to fill that gap in the hope that its findings can be used to contribute to the reduction of health inequities experienced by Pacific peoples.

Methods

General procedure

This research used data collected as part of the Growing Up in New Zealand study, specifically the data collected from pregnant women in the Antenatal Data Collection Wave in 2010. The only inclusion criteria for Growing Up in New Zealand was pregnant women with a due date between 25 April 2009 and 25 March 2010, and who lived, during late pregnancy, in the geographical area of Auckland, Waikato or Counties Manukau District Health Boards (DHBs).[27]

Ethics approval was obtained from the NZ Ministry of Health Northern Y Regional Ethics Committee (NTY//08/06/055). Written informed consent was obtained from all participants.

Measures

Antenatal depression symptoms: Symptoms of antenatal depression were measured using the EDS, a screening tool designed to screen for postnatal depression.[28] A cut-off score of ≥13 is used to indicate significant symptoms of antenatal depression, referred to as ADS. Although this is not considered a doctor diagnosis of antenatal depression, the ≥13 EPDS cut-off score has a sensitivity of 0.83 and specificity of 0.90 for clinical depression.[29]

Ethnicity: Participants were asked, '*Which ethnic group or groups do you belong to?*' and could identify as many ethnicities as they wanted. They were then asked, '*Which is your main ethnic group, which is the one you identify with most?*' This is known as self-prioritised ethnicity and identified 727 Samoan, Tongan, Cook Islands Māori, Niuean, Tokelauan, Fijian and Other Pacific women who were interviewed while pregnant.

For comparison, we used two ethnicity groups, namely 'European' and 'other', as an alternative to a generic 'non-Pacific' group. 'European' included women who self-prioritised European ethnicity and the 'other' category included all women who did not self-prioritise as Pacific or European. Asian women and Māori women were not considered separately in this study, but we acknowledge that they are important groups to consider with regard to antenatal depression.[17]

Other categorical variables: Other variables included in the analyses are listed in Table 1. Variables significantly associated with ADS in Pacific women at univariate level are in Table 2.

Continuous variables: At the antenatal interview women completed questions the following standardised rating scales.

Perceived maternal stress was measured using the abbreviated (10-item) Perceived Stress Scale,[30] where a higher score indicates higher perceived stress with a maximum score of 40. This scale has established reliability and validity, with a Cronbachs reliability coefficient of 0.89.[31]

A nine-item Warmth and Hostility Scale[32] and a six-item conflict scale[33] were also completed by women, requiring them to think of a time in the past 4 weeks they and their partner had spent time talking or doing things together. The Warmth and Hostility scale is made up of a set of nine statements with a seven-point response scale ranging from 'all the time' to 'never' (eg act lovingly and affectionately towards each other). The Conflict scale used the same seven-point response scale to respond to six conflict-related statements (eg break things when arguing). These scales are derived from the Iowa Family Interaction Rating Scales, with proven reliability.[32]

The women also completed a six-item Family Stress scale, developed specifically for the Growing Up in New Zealand study. This comprised six

Table 1. List of categorical variables tested at the univariate level

Variable	Levels	Measure used and description
Age group (years)	≥25 <25	Originally categorised as <18, 18–25 and ≥25 years, but groups <18 and 18–25 years were very similar in analyses and group <18 years was very small Two groups with a cut-off of 25 years were used in the final analyses
Education	No secondary school qualification Secondary school, trade or diploma Bachelor's degree or higher	Highest level of education attained
Workforce participation	Employed or student Unemployed or not in workforce	Self-report
Household income (NZ$)	>70000 >30000–≤70000 ≤30000	Self-report
Relationship status	Married or civil union Cohabiting Dating or no relationship	Self-report
Dwelling type	Family ownership Private rental Public rental	Self-report
Household structure	Parent alone Two parents Parent(s) with extended family Parent(s) living with non-kin	Self-report
Prepregnancy health status	Good to excellent Fair to poor	Self-report Five-point Likert scale from 'excellent' to 'poor' from the SF-36 general health questionnaire
Prepregnancy depression	Yes No	Self-report Ever diagnosed with depression by a doctor before this pregnancy
Nausea in pregnancy	None or mild Moderate to severe	Self-report
Pre- and during pregnancy smoking patterns	Non-smoker Stopped smoking Continued smoking	Self-report
Other smoker in the same room	Yes No	'Does anyone currently (during pregnancy) regularly smoke in the same room as you?'
Alcohol consumption before pregnancy (drinks per week)	None or <1 1–3 4–19 ≥20	Self-report
Alcohol during pregnancy (drinks per week)	0–1 >1	Self-report
Deprivation Index	Low–medium High	NZ Deprivation Index[42]
Pregnancy planned	Yes No	Self-report
Current disability	Yes No	Disability survey[43] 'Do you currently have a disability that is long term, lasting 6 months or more?'
Exercise before pregnancy	Yes No	The International Physical Activity Questionnaire[44]

Table 1. (Continued)

Variable	Levels	Measure used and description
Exercise in first trimester	Yes No	The International Physical Activity Questionnaire[44]
Exercise after first trimester	Yes No	The International Physical Activity Questionnaire[44]
Born in NZ	Yes No	Self-report
Age at migration to NZ (years)	<18 ≥18	Self-report
Specific Pacific ethnicity	Samoan Cook Island Māori Tongan Niuean Other	Self-identified
Rurality groups	Urban area Rural area	
Parity	First born Subsequent	Self-report
LMC†	Yes No	Do you have an LMC?
Choice of LMC	Yes No	Did you have a choice of midwife or other LMC during this pregnancy?
Time to find an LMC (weeks)	<1 1–<13 ≥13	How long did it take you to find an LMC from the time you began looking?
Motor vehicle available for personal use	Always or sometimes No or do not drive	Self-report
Family doctor before pregnancy	Yes No	Did you have a family doctor or GP before you became pregnant?
Seen family doctor/GP since being pregnant	Yes No	Have you seen any family doctor or GP since you became pregnant?
Frequency of thinking about own ethnicity	Never to at least once a year At least once a month to once a week At least once a day to hour (constantly)	Self-report
Victim of ethnically motivated attack	Yes No	Self-report
Ever treated unfairly because of ethnicity in NZ by a health professional, in housing, in a job, in finance, in the justice system, in education?	Yes No	Self-report
Knowledge about Kiwi or NZ culture	Not very or not at all knowledgeable Somewhat knowledgeable Very or fairly knowledgeable	Self-report
Involved in Kiwi or NZ culture	Not very or not at all involved Somewhat involved Very or fairly involved	Self-report
Feelings towards NZ culture	Slightly or very negative feelings Neither positive or negative feelings Very or fairly positive feelings	Self-report
Associate with Kiwis or New Zealanders	Not often or almost never Sometimes Most of the time or often	Self-report

Table 1. (Continued)

Variable	Levels	Measure used and description
Important to maintain Kiwi or NZ culture	Not very or not at all important Somewhat important Very or fairly important	Self-report
Knowledge of own culture	Not very or not at all knowledgeable Somewhat knowledgeable Very or fairly knowledgeable	Self-report
Involved in own culture	Not very or not at all involved Somewhat involved Very or fairly involved	Self-report
Feelings towards own culture	Slightly or very negative feelings Neither positive or negative feelings Very or fairly positive feelings	Self-report
Associate with people from own culture	Not often or almost never Sometimes Most of the time or often	Self-report

GP, general practitioner LMC, Lead Maternity Carer NZ, New Zealand SF-36, 36-Item Short Form Health Survey
†An LMC is a health professional that coordinates the maternity care for a pregnant woman. It can be a womans GP, an independent midwife, a hospital midwife, an obstetrician or shared care between the GP and midwife.

Table 2. Frequency distributions and Chi-squared test results for sociodemographic variables across each ethnic groups

Variable	Pacific (n = 727)	European (n = 3168)	Other (n = 1762)	Pearson's χ^2
Age group (n = 5657)				198.171**
≥25 years	484 (66.6)	2754 (86.9)	1340 (76.0)	
<25 years	243 (33.4)	414 (13.1)	422 (24.0)	
Born in NZ (n = 5657)				658.069**
Yes	336 (46.2)	2528 (79.8)	837 (47.5)	
No	391 (53.8)	640 (20.2)	925 (52.5)	
Age at migration (n = 1952)				215.974**
≤10 years	84 (21.6)	154 (24.1)	51 (5.5)	
11–17 years	96 (24.7)	50 (7.8)	82 (8.9)	
≥18 years	209 (53.7)	434 (68.0)	792 (85.6)	
Education (n = 5646)				417.367**
No secondary school qualification	86 (11.9)	118 (3.7)	147 (8.4)	
Secondary school, trade, diploma	562 (77.7)	1494 (47.2)	983 (55.9)	
Bachelors degree or higher	75 (10.4)	1552 (49.1)	629 (35.8)	
Workforce participation (n = 5657)				293.505**
Employed or student	298 (41.0)	2270 (71.7)	979 (55.6)	
Unemployed or not in workforce	429 (59.0)	898 (28.3)	783 (44.4)	
Household income (n = 4809)				517.864**
>70 000 NZ$	180 (33.7)	2091 (72.8)	658 (46.9)	
>30 000–≤70 000 NZ$	242 (45.3)	667 (23.2)	523 (37.3)	
≤30 000	112 (21.0)	114 (4.0)	222 (15.8)	
Rurality groups (n = 5657)				156.923**
Urban area	723 (99.4)	2810 (88.7)	1700 (96.5)	
Rural area	< 10 (< 1)	358 (11.3)	62 (3.5)	
Relationship status (n = 5644)				112.869**
Married or civil union	395 (54.6)	2105 (66.5)	1072 (61.1)	
Cohabiting	200 (27.6)	867 (27.4)	496 (28.3)	
Dating or no relationship	129 (17.8)	193 (6.1)	187 (10.7)	

Unless indicated otherwise, data are given as *n* (%). **$P \leq 0.01$. NZ, New Zealand

questions about sources of stress in the family, with a four-point response scale ranging from 'not at all stressful' to 'highly stressful' (eg to what extent do you worry about family members getting along?). A higher score reflected a higher level of family stress.

A six-item family support scale was also used, developed specifically for use in Growing Up in New Zealand but based on the sources of family support identified by Dunst et al.[34] Women were asked to report on sources of family support they expected to have available, and how helpful they expected each source to be, once their baby was born. A similar six-item external support scale[34] was used, this time asking mothers what sources of external support (eg general practitioner (GP), books, internet) they expected to have available, and how helpful they expected each source to be, once their baby was born. A higher score in both the Family Support and External Support scales reflects higher expected helpfulness.

A Neighbourhood Integration Scale with proven reliability was used (Cronbach's $\alpha = 0.85$).[35] This scale has 10 questions with a five-point response scale ranging from 'strongly disagree' to 'strongly agree' (eg 'my neighbours treat me with respect'). The scores were used as a continuous variable for analysis, with higher scores relating to stronger feelings of neighbourhood integration.

Maternal height and prepregnancy weight were self-reported, and prepregnancy body mass index (BMI) was calculated (weight (kg) divided by height squared (m^2)), with BMI ≥25 kg/m^2 defined as overweight and ≥30 kg/m^2 defined as obese.[36]

Continuous variables significantly associated with ADS in Pacific women, univariably, are given in Table 3.

Table 3. Univariate associations with antenatal depression symptoms (ADS) status for statistically significant variables

Variable	No ADS (n = 556)	ADS (n = 171)	Pearson's χ^2
Age group (n = 727)			19.535**
≥25	394 (81.4)	90 (18.6)	
<25	162 (66.7)	81 (33.3)	
Education (n = 723)			10.273**
No secondary school qualification	55 (64.0)	31 (36.0)	
Secondary school, trade or diploma	436 (77.6)	126 (22.4)	
Bachelors degree or higher	63 (84.0)	12 (16.0)	
Workforce participation (n = 727)			8.188**
Employed or student	244 (81.9)	54 (18.1)	
Unemployed or not in workforce	312 (72.7)	117 (27.3)	
Relationship status (n = 724)			9.307**
Married or civil union	320 (81.0)	75 (19.0)	
Cohabiting	144 (72.0)	56 (28.0)	
Dating or no relationship	91 (70.5)	38 (29.5)	
Dwelling type (n = 709)			10.483**
Family ownership	188 (83.6)	37 (16.4)	
Private rental	215 (74.9)	72 (25.1)	
Public rental	139 (70.6)	58 (29.4)	
Household structure (n = 727)			10.639*
Parent alone	28 (80.0)	<10 (20.0)	
Two parents	197 (82.8)	41 (17.2)	
Parent(s) with extended family	319 (73.5)	115 (26.5)	
Parent(s) living with non-kin	12 (60.0)	<10 (40.0)	

Table 3. (Continued)

Variable	No ADS (n = 556)	ADS (n = 171)	Pearson's χ^2
Household crowding (n = 725)			6.686*
Low	44 (91.7)	<10 (8.3)	
Medium to high	289 (75.7)	93 (24.3)	
Prepregnancy health status (n = 726)			13.779**
Good to excellent	464 (79.3)	121 (20.7)	
Fair to poor	91 (64.5)	50 (35.5)	
Prepregnancy depression (n = 724)			6.302*
Yes	31 (62.0)	19 (38.0)	
No	523 (77.6)	151 (22.4)	
Nausea in pregnancy (n = 727)			8.464**
None or mild	308 (80.8)	73 (19.2)	
Moderate to severe	248 (71.7)	98 (28.3)	
Pre- or during pregnancy smoking patterns (n = 723)			15.542**
Non-smoker	394 (80.1)	98 (19.9)	
Stopped smoking	101 (73.7)	36 (26.3)	
Continued smoking	58 (61.7)	36 (38.3)	
Other smoker in the same room (n = 727)			5.083*
Yes	56 (66.7)	28 (33.3)	
No	500 (77.8)	143 (22.2)	
Alcohol consumption before pregnancy () (n = 727)			21.302**
None or <1 drinks per week	348 (80.7)	83 (19.3)	
1–3 drinks per week	93 (73.2)	34 (26.8)	
4–19 drinks per week	108 (71.5)	43 (28.5)	
≥20 drinks per week	<10 (38.9)	11 (61.1)	
Alcohol during pregnancy (n = 726)			8.760**
≤1 drink per week	478 (78.5)	131 (21.5)	
>1 drinks per week	77 (65.8)	40 (34.2)	
Feelings towards NZ culture (n = 725)			6.810*
Slightly or very negative feelings	<10 (44.4)	<10 (55.6)	
Neither positive or negative feelings	95 (72.5)	36 (27.5)	
Very or fairly positive feelings	455 (77.8)	130 (22.2)	
Important to maintain own cultures/traditions (n = 727)			8.866*
Not very or not at all important	22 (71.0)	<10 (29.0)	
Somewhat important	44 (62.9)	26 (37.1)	
Very or fairly important	490 (78.3)	136 (21.7)	
Family doctor before pregnancy (n = 727)			13.353**
Yes	527 (78.1)	148 (21.9)	
No	29 (55.8)	23 (44.2)	

Unless indicated otherwise, data are given as *n* (%). *$P \leq 0.05$ **$P \leq 0.01$. NZ, New Zealand
†As defined by an Edinburgh Depression Scale score of ≥13.

Data analysis

IBM SPSS Statistics version 22.0 was used to carry out the quantitative data analysis. Chi-squared tests for independence were used to determine univariate associations between depression status and other variables. *t*-Tests were used when the items were continuous. Binary logistic regression was used to test multivariate associations between ADS and other factors. Only variables that were found to be significantly associated with ADS at $\alpha = 0.01$ in

Table 4. Comparison of perceived stress, conflict, warmth and hostility, family stress and neighbourhood integration for Pacific mother s with and without antenatal depression symptoms (ADS)

Variable	No ADS (*n* = 556)	ADS (*n* = 171)	*t*
Perceived stress score†	14.11 ± 5.78	21.47 ± 4.88	–16.497**
Conflict‡	37.90 ± 4.33	34.18 ± 6.91	6.277**
Warmth and hostility§	48.43 ± 7.06	43.55 ± 8.58	6.393**
Family stress††	11.75 ± 4.63	14.38 ± 4.72	–6.480**
Neighbourhood integration‡‡	34.58 ± 5.14	32.99 ± 5.48	3.479**

Unless indicated otherwise, data are given as the mean ± s.d. **P ≤ 0.01
†Higher scores relate to higher perceived stress.
‡Higher scores relate to less conflict in the relationship.
§Higher scores relate to more warmth and less hostility in relationship.
††Higher scores relate to higher family stress.
‡‡Higher scores relate to greater neighbourhood integrati on.

Chi-squared analyses were used as covariates in the logistic regression analysis. Statistical significance in the logistic regression was assumed at $\alpha = 0.01$.

Results

The sample comprised 5657 women who were interviewed while pregnant. Of these, 56% were of self-prioritised European ethnicity, 12.9% were self-prioritised Pacific ethnicity and 31.1% were from other ethnic groups. These three groups were significantly different according to a range of key sociodemographic variables, as indicated in Table 4.

Samoan (42.8%) and Tongan (28.6%) women made the biggest contribution to the sample of 727 Pacific women in this study, followed by Cook Islands Māori (17.2%) women and Niuean women (6.6%). A small number of Tokelauan, Fijian and other Pacific peoples made up the rest of the sample. This is a similar profile to the total Pacific population in NZ.[37]

ADS in Pacific women

As reported by Waldie et al.,[17] Pacific women had significantly higher levels of ADS than European and Other women 23% of Pacific women had ADS, compared with 14.2% of Other women and 7.9% of European women ($X^2_{Yates}(4, n = 5657) = 151.428$, $P \leq 0.01$). However, European women had the highest proportion of doctor-diagnosed depression before pregnancy (22.4%) and Pacific women had the lowest (6.9%; $X^2_{Yates}(2, n = 5653) = 136.287$, $P \leq 0.01$).

Factors associated with ADS in Pacific women (univariate analysis)

Variables significantly associated with ADS in pregnant Pacific women at the univariate level are presented in Table 2.

Sociodemographic factors: Age group, education, workforce participation, household income and relationship status were significantly associated with ADS, but being born in NZ, age at migration, deprivation and rurality were not. No significant association was found between ADS and specific Pacific ethnicity.

Physical environment: Dwelling type, crowding and household structure were significantly associated with ADS. Neighbourhood integration was significantly reduced in women with ADS.

Relationships: Pacific women with ADS had lower warmth and hostility relationship scores, lower relationship conflict scores (and therefore more conflict in their relationship) and higher family stress scores than women without ADS. Not considering it important to maintain their own cultures and traditions and slightly or very negative feelings towards NZ culture were significantly associated with ADS in Pacific women. No significant associations were found between ADS and being a victim of an ethnically motivated attack, or ethnic discrimination in any setting (health professional, housing, justice system, finance). There was no significant association between ADS and family support or external support in Pacific women.

Lifestyle: Smoking before and during pregnancy, others smoking in the same room and alcohol consumption before and during pregnancy were significantly associated with ADS.

Maternal health: There were significant associations between three maternal health variables and ADS in Pacific women: fair to poor self-reported prepregnancy health status, self-reported doctor-diagnosed prepregnancy depression and moderate to severe nausea during pregnancy. Other measures of maternal health (long-term disability, whether the pregnancy was planned, health issues before pregnancy

and prepregnancy BMI) were not significantly associated with ADS in Pacific women. Pregnant Pacific women with ADS had significantly higher perceived stress scores than women without ADS (see Table 3). Having a Lead Maternity Carer (LMC), having a choice of LMC and the length of time it took to find an LMC were not associated with ADS in Pacific women. Having a regular GP before pregnancy was significantly negatively associated with ADS in Pacific women, but not ADS in European or Other women. Seeing a GP since becoming pregnant was not associated with ADS.

Predicting ADS in Pacific women (multivariate analysis)

Hierarchical binary logistic regression was performed using only variables significantly associated with ADS in univariable analyses at $\alpha = 0.01$. Variables were added in a hierarchical manner, with variables that were not significant removed at each step. Results from the final logistics regression are presented in Table 5.

Variables that remained significantly associated with ADS in the final model were: GP before pregnancy ($P \leq 0.01$), age group ($P = 0.001$), nausea during pregnancy ($P \leq 0.01$), perceived stress ($P \leq 0.001$), relationship conflict ($P = 0.001$) and family stress ($P \leq 0.05$).

Further analyses found that around one in three pregnant Pacific women aged <25 years experienced ADS, compared with one in six pregnant European women aged <25 years ($X^2_{Yates}(2, n = 1079) = 26.339$, $P \leq 0.001$).

Pregnant Pacific women without a GP before pregnancy were 4.5-fold more likely to experience ADS than non-Pacific women who had a regular GP before pregnancy ($P < 0.001$). However, Pacific women were significantly more likely to have a regular GP before pregnancy (92.8%) than European (90.7%) and Other women (85.8% $X^2_{Yates}(2, n = 5657) = 39.787$, $P \leq 0.001$).

Discussion

The findings of this study build on previous research with this cohort[17] and provide new in-depth understanding of potential factors contributing to higher rates of ADS in NZ Pacific women compared with women of other ethnic groups. The Pacific women in this study were significantly different from European and Other women, based on a range of sociodemographic characteristics. Factors significantly and independently associated with ADS in Pacific women were not having a regular family GP before pregnancy, age <25 years, moderate to severe nausea in pregnancy, high perceived stress and high family stress. Low conflict in their relationship was protective against symptoms of antenatal depression.

These findings reflect a different profile for Pacific ADS compared with the overall Growing Up in New Zealand cohort. Waldie et al.[17] previously found that ethnicity, anxiety, depression before and during pregnancy and perceived stress were independently associated with ADS. In the present study there was no relationship between anxiety or prepregnancy depression and ADS in Pacific women.

Some risk factors for ADS commonly identified in the literature were not confirmed in this research. Unplanned pregnancy, a key risk factor for postnatal depression in Pacific women,[23] was not a significant risk factor for ADS in Pacific women

Table 5. Binary logistic regression evaluating the associations between antenatal depression symptoms and sociodemographic, physical environment, relationship, lifestyle and maternal health variables

Variable	*B* (s.e.)	OR	95% CI	Wald
Family doctor/GP before pregnancy				
Yes	–	–	–	–
No	1.099 (0.420)	3	1.317–6.834	6.841**
Nausea in pregnancy				
None or mild	–	–	–	–
Moderate to severe	0.633 (0.232)	1.883	1.195–2.965	7.453**
Age group (years)				
≥25	–	–	–	–
<25	0.770 (0.239)	2.16	1.352–3.449	10.394**
Perceived stress score	0.247 (0.027)	1.28	1.213–1.351	81.178**
Conflict	–0.069 (0.021)	0.934	0.895–0.974	10.216**
Family stress	0.056 (0.026)	1.057	1.005–1.113	4.662*

Note: –2LL = 465.93; $R^2 = 0.30$ (Cox and Snell), 0.45 (Nagelkerke) Model $X^2_{(7)} = 227.487$, $P \leq 0.001$. *$P \leq 0.05$ **$P \leq 0.01$. OR, odds ratio; CI, confidence interval; GP, general practitioner

in this study, despite almost two-thirds of pregnancies in the Pacific sample being unplanned. Birth country and age at migration to NZ, both key risk factors for general mental illness among Pacific peoples in NZ,[24] were also not found to be significant risk factors for ADS in this study. Further, although Tongan women had significantly higher rates of postnatal depression according to the PIF Study,[23] and in general it is recognised that there are flaws in treating Pacific peoples as a homogeneous ethnic group,[38] the present research found no significant differences in ADS according to specific Pacific ethnic groups.

In this study all factors significantly associated with ADS for Pacific women were also significant for European women, except for having a regular GP before pregnancy. This relationship is a clear standout because of its considerable odds ratio (3.0) and because it is specific to Pacific women. Pacific women were shown to have the highest rates of having a regular GP, but women who did not have a GP had very high rates of ADS (44%). This study suggests that primary health care is working for Pacific women who have access to it, protecting them from ADS. However, there is a group of vulnerable, high-risk Pacific women who do not have that access to care but are in real need of it. This finding could, instead, be an indication of other causal factors that are related to having a regular GP. For example, women who had a slightly or very negative view of NZ culture were at higher risk of ADS and are therefore possibly less trusting of, or engaged in, NZ institutions, such as health-care providers. If this is the case, addressing sociocultural factors related to ADS may better address ADS than simply improving enrolment with a regular GP. Therefore, there are clear implications for policy in terms of primary health care for Pacific women.

In this study, Pacific women had the lowest rates of self-reported doctor-diagnosed depression before pregnancy (6.9%) and European women had the highest (22.4%). This may be because Pacific women do not disclose symptoms of depression to their doctor, either through lack of self-awareness or limited confidence and trust in their doctor, because doctors do not recognise the signs of depression in Pacific women or question the women about their psychological wellbeing, or because Pacific women are not visiting a doctor about their concerns. This may also reflect difficulties in accessing primary care, low acceptability of care and fear associated with disclosing symptoms of mental illness.[39]

Limitations and strengths

This study has some limitations. The cross-sectional nature of this analysis means inferences of relationship are made tentatively and with no directionality. In addition, this studys focus on Pacific women meant the final sample size was much smaller than the entire Growing Up in New Zealand cohort, and some statistical analyses may have been limited by the reduced power. Nonetheless, compared with contemporary research, our sample of pregnant Pacific women is large and sufficiently diverse.

Strengths of this research include the use of a standardised and validated tool for detecting ADS. The sample of Pacific women is also a strength because of its size, and the findings are broadly generalisable to the contemporary NZ population. The diversity of variables considered in this research is also a strength.

Implications

Factors that appear to be specific to Pacific NZ women and independently, significantly associated with ADS can inform the way health professionals identify high-risk pregnant women. Several trials have targeted interventions towards women at risk for postnatal depression, and this has been shown to be more beneficial and feasible than interventions targeted at all pregnant women.[40–41] Building a risk profile for ADS in Pacific women with a complementary screening tool may be an important starting point.

Competing interests

The authors declare that there are no conflicts of interest.

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