Knowledge and attitudes regarding smoking during pregnancy among Aboriginal and Torres Strait Islander women

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ABSTRACT

Objective: To identify factors associated with antenatal smoking and explore characteristics of smoking behaviour among pregnant Aboriginal and Torres Strait Islander women.

Design and setting: Cross-sectional study using interviewer-administered questionnaires of 145 pregnant Aboriginal and Torres Strait Islander women attending a health service in Far North Queensland between November 2005 and December 2006.

Main outcome measures: Prevalence of self-reported smoking; predictors and patterns of smoking in early pregnancy; and relationships between smoking and the prevalence of predisposing, enabling and reinforcing factors, including women's knowledge about and attitudes towards smoking and the risks involved.

Results: Of 145 women, 41% ($n = 60$) reported being daily or occasional smokers. Knowledge about harms of smoking was generally high. Women who were smokers had a significantly higher rate of smoking partners ($n = 36$) than women who were non-smokers ($n = 31$) (77% v 41%, $P < 0.001$). Level of daily stress was significantly higher among smokers than non-smokers ($P = 0.001$).

Conclusion: Shifted population norms among Aboriginal and Torres Strait Islanders are accompanied by a shift in the factors that can effectively differentiate between smokers and non-smokers within this population. Rather than the traditional, mainstream predictors of antenatal smoking, interventions with Aboriginal and Torres Strait Islander women should focus on the social environment, and the influences of social networks and partners on the behaviour of individuals.

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Psychosocial mediators such as history, relationships with mainstream services and connectedness may be key mediators of health for Indigenous Australians.[1] Cultural values, poor health, and low socioeconomic status[2] create a need for anti-smoking approaches to be tailored for Indigenous populations.[3] The high overall rate of smoking in these communities potentially normalises smoking for individuals.[4,5] Low literacy levels and high rates of misuse of other substances are also associated with low rates of smoking cessation.[6] Consequently, health services and health promotion programs should be specifically designed to meet the needs of this vulnerable population.

Although potential predictors of smoking behaviour during pregnancy have been extensively studied in other population groups,[7-10] limited research has examined the knowledge and attitudes related to smoking among pregnant Aboriginal and Torres Strait Islander women. Qualitative findings suggest that time-out from social pressures often acts as a more important factor in smoking behaviour than physiological addiction for Indigenous women.[11]

The PRECEDE–PROCEED model[12] has been used extensively in health research,[13,14] policy development[15,16] and analysis,[17,18] and for the construction of health promotion interventions. The model attempts to identify factors that predispose, enable and reinforce behaviours for individuals to engage in health-risk behaviours. These conceptual domains include cognitive and personality factors associated with beliefs, values, knowledge and self-confidence; demographic, environmental and social factors that function as barriers to, or facilitators of, behaviour change; and the elements of a social environment that provide positive or negative reinforcement for the behaviour of interest.

This study aimed to identify predisposing, enabling and reinforcing factors associated with smoking among pregnant Aboriginal and Torres Strait Islander women.

METHODS

Study design and participants

A cross-sectional study was undertaken with Aboriginal and Torres Strait Islander women aged 16 years and older who attended a major urban Aboriginal and Torres Strait Islander health service in Far North Queensland for antenatal care between November 2005 and December 2006. Exclusion criteria were current treatment of chemical dependency other than tobacco or alcohol, high-risk pregnancy requiring referral to other services for care, and florid mental illness. Recruitment was performed by a Torres Strait Islander project officer who provided an explanation of the study, obtained written consent from those who were willing to participate, and interviewed women to complete a questionnaire. Age, smoking status, ethnicity and gestational age were collected from medical records for non-participants and checked from this source for participants.

Ethics approval was granted from the University of Newcastle Human Research Ethics Committee, and the study was endorsed by the community-elected board of the health service.

Questionnaire development and contents

As there is very limited literature on antenatal smoking that is specific to Aboriginal and Torres Strait Islander populations,[19] the questionnaire items were adapted from evidence derived from non-indigenous populations. Knowledge and attitude items were modelled on data derived from an earlier study of Australian women who attended a public hospital antenatal clinic.[7,20] Items were examined for acceptability with a sample of antenatal Aboriginal and Torres Strait Islander women and staff members at the health service, and minor changes were made as a result. The questionnaire items were designed to incorporate each of the categories described in the PRECEDE–PROCEED model.

To assess predisposing factors associated with smoking, women were presented with a list of 12 adverse obstetric outcomes associated with antenatal smoking. Participants indicated whether or not they believed that smoking during pregnancy may increase the risk of each adverse outcome. Attitudes regarding antenatal smoking were assessed using five statements and a four-point Likert scale (responses ranging from "quite true" to "not at all true", as well as a "don't know"

1 Characteristics of Indigenous women attending a Far North Queensland health service for antenatal care, November 2005 to December 2006

	Participants ($n=145$)	Non-participants ($n=74$)	P
Age group (years)			0.90
⩽19	25 (17%)	10 (14%)	
20–24	43 (30%)	24 (32%)	
25–29	45 (31%)	23 (31%)	
⩾30	32 (22%)	17 (23%)	
Trimester*			0.07
First	64 (44%)	29 (39%)	
Second	65 (45%)	28 (38%)	
Third	16 (11%)	17 (23%)	
Smoking status†			<0.001
Smokers	60 (41%)	34 (54%)	
Non-smokers	85 (59%)	29 (46%)	
Ethnicity‡			0.25
Aboriginal	49 (34%)	28 (40%)	
Torres Strait Islander	77 (53%)	38 (54%)	
Both Aboriginal and Torres Strait Islander	18 (13%)	4 (6%)	

* First trimester = Weeks 1–12. Second trimester = Weeks 13–27. Third trimester = Weeks 28–40.
† Smoking status data were missing for 11 non-participants. ‡ Ethnicity data were missing for one participant and four non-participants. ◆

option). Enabling factors were addressed through demographic characteristics, ethnicity, source of income, education level, stress, and obstetric factors (gravidity and parity). The number of smokers with whom a woman lived, and the smoking status and ethnicity of her partner were included in the questionnaire to assess reinforcing factors.

Statistical analysis

We used χ^2 analysis to compare participant and non-participant characteristics. The number of correct knowledge items was summed to obtain a knowledge score. This score was then categorised to create a scale that would have some behavioural significance. Cut-points were chosen based on the spread of results to reflect three knowledge groupings that appeared in the data, to reflect knowledge levels within the study population. These were low (0–5 correct items), medium (6–9 correct items) and high (10–12 correct items). A non-parametric Mann–Whitney test was used to compare mean knowledge score among smokers and non-smokers.

The prevalence of smoking was calculated based on women's self-report as daily or occasional smokers. Characteristics of smokers and non-smokers were compared using the χ^2 test. Relationships between individual knowledge and attitudes items, including the knowledge score grouping, as well as between these items and other potential predictors of smoking were also assessed using χ^2 analyses. Backwards stepwise logistic regression was used to determine which factors were associated with antenatal smoking when adjusting for confounders. Variables with a P value of less than 0.25 in the initial univariate χ^2 tests were initially entered into the regression equation and were removed in a stepwise fashion if they had a P value of less than 0.1 on likelihood ratio tests.

A sample of 190 women would allow estimation of the prevalence of smoking with 95% confidence intervals within ± 7% and have 80% power, using a 5% significance level, to detect differences in characteristics between smokers and non-smokers of 20%, assuming a smoking prevalence of 50%. Based on an eligibility rate of 90%, and consent rate of 60%, it was necessary to approach 350 women, which was the number expected to attend the clinic over a 14-month period.

RESULTS

Of 277 women attending for antenatal care over the 14-month period, 234 (84%) were assessed for eligibility and 11 (5%) of these were ineligible: four had high-risk or unviable pregnancies, two were aged less than 16 years, and five were non-Indigenous. Of the 223 eligible, 145 (65%) consented to participate and completed the questionnaire. Demographic data were collected for 74 of the 78 non-participants (Box 1).

Age and ethnicity were similar for participants and non-participants. A larger proportion of non-participants were in their third trimester of pregnancy than participants. There was a significantly smaller proportion of non-smokers among non-participants relative to participants (46% v 59%, $P<0.001$; Box 1). The mean age of the study population was similar to that of the broader population of Aboriginal and Torres Strait Islander mothers (25.1 years and 24.8 years, respectively), and both these populations were substantially younger than non-Indigenous Australian mothers (mean age, 29.7 years). The fertility rate of the study population was 3.0 babies per woman, compared with 2.1 babies per woman for the broader population of Aboriginal and Torres Strait Islander mothers and a substantially lower rate of 1.76 babies per woman for all Australian women.[21]

Predisposing factors: knowledge and attitudes regarding smoking during pregnancy

The average number of adverse outcomes that women thought could be increased by smoking was 9.2 of the 12 presented. Higher knowledge groupings were associated with completion of tertiary education ($P=0.048$) and the belief that stopping smoking would be healthy for the baby ($P=0.024$). Lower knowledge groupings were associated with others smoking inside the house ($P=0.010$), the belief that having a small baby is a good thing or responding "don't know" to this item ($P=0.026$), and the belief that light smoking will not cause harm to an unborn baby ($P=0.016$). No significant associations between individual knowledge items and smoking status were detected (Box 2). Agreeing with the statement "if you are exposed to a lot of smoke from other people you may as well keep smoking yourself" was more common among Aboriginal participants ($P=0.03$) and smokers ($P=0.005$, Box 2).

Prevalence of smoking during pregnancy

Forty-one per cent of participants ($n=60$) reported being daily or occasional smokers. Relative to non-smokers, smokers had significantly more smokers in the home ($P=0.006$), were more likely to have a partner who smoked ($P<0.001$, Box 3), and were less likely to report low levels of daily stress ($P<0.001$).

Enabling and reinforcing factors for smoking

No significant relationships were found between enabling factors and women's smoking status (Box 3). However, at the univariate level, significant relationships were found between some reinforcing factors and women's smoking status. The number of smokers in the household ($P=0.01$) and having a smoking part-

2 Knowledge and attitudes regarding antenatal smoking among Indigenous women attending a Far North Queensland health service for antenatal care, November 2005 to December 2006

	Smokers* ($n = 59$)†	Non-smokers* ($n = 85$)	P
Knowledge			
Damage to the placenta (the sac that provides air and food to the baby when it is growing inside you)	47 (80%)	69 (81%)	0.82
Spontaneous abortion or miscarriage (losing the baby)	43 (73%)	63 (74%)	0.87
Having a caesarean section	27 (46%)	40 (47%)	0.88
Baby being born too soon (premature birth)	53 (90%)	78 (92%)	0.69
Low birthweight	54 (92%)	78 (92%)	0.96
Slower physical and mental growth of the baby	52 (88%)	71 (84%)	0.44
Breathing problems and sickness in the infant	58 (98%)	81 (95%)	0.33
Lower intelligence when the baby grows up	46 (78%)	64 (75%)	0.71
Problems with breastfeeding	40 (68%)	69 (81%)	0.07
Cot death (sudden infant death syndrome)	40 (68%)	56 (66%)	0.81
Mother getting diabetes	40 (68%)	44 (52%)	0.06
Mother having high blood pressure and increased heart rate	53 (90%)	73 (86%)	0.48
Mean knowledge score (SD)	9.2 (2.7)	9.2 (2.7)	0.86
Attitudes			
It's good to have a smaller baby	1 (2%)	4 (5%)	0.33
It's highly unlikely that my baby will be unhealthy	26 (45%)‡	32 (38%)	0.39
Light smoking does not cause harm to unborn babies	10 (17%)	13 (15%)	0.79
Stopping smoking increases the chance of having a healthy baby	57 (97%)	82 (96%)	0.96
If you are exposed to a lot of smoke from other people you might as well keep smoking yourself	21 (36%)	13 (15%)	0.005

* Data represent women who responded yes or maybe to each item and are number (%) unless otherwise indicated. † Data were missing for one participant. ‡ Additional missing response. ◆

ner ($P < 0.001$, Box 3) were significantly associated with smoking. The latter remained significant in logistic regression analysis.

When asked whether they had experienced any of a suite of stressful events in the past 12 months, 35% of women cited problems with their current partner, 37% referred to issues within their immediate family, and 21% cited financial concerns as a cause of stress (data not shown); however, experiencing such an event was not associated with smoking during pregnancy. Significant differences were found in the levels of stress between smokers and non-smokers (41% of smokers had high or very high levels of daily stress compared with 14% of non-smokers, $P = 0.001$; Box 3).

Independent predictors of smoking during pregnancy

Logistic regression revealed three variables that were associated with an increased risk of smoking during pregnancy: having a smoking partner, having an Aboriginal partner, and a high level of daily stress (Box 4). The only variable identified as an independent indicator of smoking status with a statistically significant likelihood ratio, after controlling for other variables, was having a smoking partner.

DISCUSSION

We found that having a smoking partner, having an Aboriginal partner and high levels of stress are associated with an increased risk of smoking during pregnancy for Aboriginal and Torres Strait Islander women. These social factors may be effective targets for smoking cessation interventions within this population. Due to shifted population norms among Aboriginal and Torres Strait Islander Australians, factors used to predict smoking in non-indigenous populations are not effective for Indigenous Australians. Socioeconomic status,[22] age,[23] parity and gravidity,[24] have been identified as important predictors of continued smoking during pregnancy among non-indigenous groups. Although this study only had sufficient power to detect very large differences, it is feasible that the demographic characteristics and high population rate of smoking may differentiate Aboriginal and Torres Strait Islander women to such an extent that a different set of markers is required to predict smoking status.

A high level of general knowledge regarding the risks associated with smoking during pregnancy was apparent among both smokers and non-smokers. This is consistent with previous studies reporting good general knowledge but lack of awareness about specific risks for an unborn child and specific benefits of quitting.[11,25] Attitudes regarding smoking and the health of the woman's baby, however, contradicted the apparent level of knowledge — significantly more smokers than non-smokers believed that "if you are exposed to a lot of smoke from other people you might as well keep smoking yourself".

This negativity towards quitting in the presence of passive smoke emphasises the significant role of the social environment in reinforcing smoking behaviour. A qualitative study of pregnant Indigenous women in Perth found that women commonly referred to smoking as normal, a stress release, a low health priority and a social experience, and commented that it was difficult to quit because they were surrounded by smoking from their family and household members.[11] In the social context of high smoking rates and large numbers of adults per household, smoking may offer an opportunity to alleviate stress, acting as a social lubricant in "time-out, yarning, and sharing with others".[11] This provides a critical target for intervention in antenatal smoking; in order to help women to quit, it seems that consideration of and involvement with the social context in which women live are essential. However, although the social environment contains several barriers to changing smoking behaviour, the high prevalence of low socioeconomic status, young maternal age, and multiparity in the Indigenous Australian population decreases the statistical capacity for such factors to distinguish between smokers and non-smokers within this group.

The partner's smoking status, number of smokers in the home, and ethnicity of the current partner were more important indica-

3 Enabling and reinforcing factors for smoking in Indigenous women attending a Far North Queensland health service for antenatal care, November 2005 to December 2006

	Smokers* ($n = 60$)	Non-smokers* ($n = 85$)	*P*
Enabling factors			
Ethnicity			0.18
Aboriginal	20 (33%)	29 (35%)	
Torres Strait Islander	29 (48%)	48 (57%)	
Both Aboriginal and Torres Strait Islander	11 (18%)	7 (8%)	
Age group (years)			0.94
⩽ 19	12 (20%)	13 (15%)	
20–24	9 (15%)	13 (15%)	
25–29	27 (45%)	39 (46%)	
⩾ 30	12 (20%)	20 (24%)	
Source of income			0.52
Social security	49 (82%)	63 (74%)	
Own work or partner's work	11 (18%)	22 (26%)	
Education level			0.11
Less than Year 10	8 (13%)	4 (5%)	
Year 10 to Year 12	25 (42%)	30 (36%)	
Tertiary education	27 (45%)	49 (59%)	
Trimester			0.43
First (Weeks 1–12)	23 (38%)	41 (48%)	
Second (Weeks 13–27)	31 (52%)	34 (40%)	
Third (Weeks 28–40)	6 (10%)	10 (12%)	
Gravidity			0.42
Primigravidas	13 (22%)	27 (32%)	
2	13 (22%)	18 (21%)	
⩾ 3	33 (56%)	40 (47%)	
Parity			0.39
Primiparous	14 (23%)	29 (38%)	
1	14 (23%)	20 (26%)	
⩾ 2	32 (53%)	27 (36%)	
Reinforcing factors			
Others smoke in the home at any time	20 (38%)	12 (24%)	0.11
Others smoke in the car	15 (30%)	11 (23%)	0.43
Partner who smokes†	36 (77%)	31 (41%)	< 0.001
More than two smokers in the home	18 (30%)	14 (16%)	0.046
Ethnicity of partner			0.09
Non-Indigenous	7 (12%)	13 (15%)	
Aboriginal	19 (33%)	13 (15%)	
Torres Strait Islander	25 (44%)	39 (46%)	
Both Aboriginal and Torres Strait Islander	6 (11%)	20 (24%)	
Level of daily stress			0.001
Low or very low	10 (17%)	34 (40%)	
Moderate	25 (42%)	39 (46%)	
High or very high	24 (41%)	12 (14%)	
Distressing event in previous 12 months	51 (85%)	63 (74%)	0.10

* Percentages are based on the number of responses for each item (as there were some missing responses for some items) and column percentages do not all total 100% because of rounding. † Data for women with current partner (22 women did not report having a current partner). ◆

tors of smoking behaviour than predisposing factors (knowledge and attitudes regarding antenatal smoking) or enabling factors. Although social factors have been shown to be predictive in other populations and are increasingly being recognised as key determinants of smoking and targets for intervention,[26] the low socioeconomic status, multiple demographic risk factors, and high population smoking rates, may render these factors particularly salient among Aboriginal and Torres Strait Islander women.

Indigenous health literature is rife with examples of social, emotional and economic hardship. In this context, women may recognise the health risks of smoking for both themselves and their children, but rely on smoking as a coping tool and a "resource for caring for their children".[27] Women and Aboriginal health workers have commented on the stressors and difficult life circumstances that affect their attitudes to their own health,[11] and stressful life events have been described as key barriers in attempts to quit smoking for Indigenous people.[28] Rather than solely targeting smoking, it may be important to also address the sources of stress within the social environment, and equip women with coping strategies to better manage their circumstances.

There were several limitations of this study. First, it is possible that the social desirability of smoking cessation and presentation of the questions by a respected Torres Strait Islander health worker may have led to an overestimation of the knowledge level of the women. The use of a prompted list of items regarding the risks associated with smoking may not be the most appropriate approach to generating these data. Alternative techniques, such as asking women to nominate any risks known to them, may avoid the potential influence of the presented items. Second, fewer women visited the clinic for antenatal care during the recruitment period than expected, resulting in fewer than expected participants, hence the power of the study to detect differences in characteristics between smokers and non-smokers was reduced — the study only had adequate power to detect differences of about 23% between groups. Third, a large number of variables were examined, for which there was good rationale for inclusion, hence the large number of tests performed increased the possibility of a statistically significant association occurring by chance alone.

Rather than the traditional, mainstream predictors of antenatal smoking, interventions with Aboriginal and Torres Strait

4 Logistic regression model of predictors of antenatal smoking in Indigenous women

Variable	No. of women within each response category: Smokers ($n = 60$)	Non-smokers ($n = 85$)	Total	Percentage of women within each response category who are smokers	Odds ratio (95% CI)	*P*
Smoking status of partner						< 0.001
Smoker	36	31	67	54%	4.4 (1.7–11.28)	
Non-smoker	24	54	78	31%	—	
Ethnicity of partner						0.04
Non-Indigenous*	7	13	20	35%	—	
Aboriginal	19	13	32	59%	0.19 (0.05–0.83)	
Torres Strait Islander	25	39	64	39%	0.87 (0.24–3.12)	
Both Aboriginal and Torres Strait Islander	6	20	26	23%	0.90 (0.17–4.86)	
Level of daily stress						0.09
Low or very low*	10	34	44	23%	—	
Moderate	25	39	64	39%	0.49 (0.17–1.46)	
High or very high	24	12	36	67%	0.26 (0.08–0.89)	

* Reference group. ◆

Islander women should focus on the social environment, and the influences of social networks and partners on the behaviour of individuals. Although parallels do exist between Indigenous and non-Indigenous groups, key differences and low rates of success from previous smoking cessation intervention efforts in Indigenous communities[19] suggest a need for specifically tailored intervention programs. The most appropriate approach to tackling the antenatal smoking issue should involve components targeted towards the individuals who influence and provide support to women. By involving women's social networks in intervention efforts, there is potential to affect not only antenatal smoking rates, but smoking rates in the population overall, and challenge the normality and acceptability of smoking in the Aboriginal and Torres Strait Islander community.

COMPETING INTERESTS

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