Review

Smoking in Pregnancy Among Indigenous Women in High-Income Countries: A Narrative Review

Gillian S. Gould PhD, MA, MBChB¹, Christi Patten PhD², Marewa Glover PhD³, Anette Kira PhD⁴, Harshani Jayasinghe B. BioSc, B.HlthSc (Hons)^{5,6}

¹School of Medicine and Public Health, University of Newcastle, Callaghan, New South Wales, Australia; ²Department of Psychiatry and Psychology, Mayo Clinic, Rochester, MN; ³School of Public Health, College of Health, Massey University, Auckland, New Zealand; ⁴Independent Researcher, Manawatu, New Zealand; ⁵University of Adelaide, Adelaide, South Australia, Australia; ⁶Basil Hetzel Institute for Translational Health Research, Adelaide, South Australia, Australia

Corresponding Author: Gillian S. Gould PhD, MA, MBChB, School of Medicine and Public Health, University of Newcastle, Callaghan, University Drive, New South Wales 2308, Australia. Telephone: 61-403-61-5563; Fax: 61-2-403-35692; E-mail: gillian.gould@newcastle.edu.au

Abstract

Introduction: Pregnant women in socioeconomically disadvantaged circumstances, such as Indigenous women, have a high prevalence of smoking. Tobacco smoking is the most significant reversible risk factor for the health of Indigenous pregnant women and their babies.

Methods: As researchers working in this specialized area, we conducted a narrative review of the literature on smoking among Indigenous pregnant women in the United States, Canada, New Zealand, and Australia. We summarize prevalence and factors influencing tobacco use, interventions, and evidence gaps for tobacco control and smoking cessation. Recommendations are made for future interventions, policy changes, and much-needed research.

Results: Common themes emerging across the four countries reveal opportunities for cross-cultural collaborative studies and trials. These include the social–normative use of tobacco as barriers to quitting in pregnancy and the need for evaluations of interventions at the family and community level. Socioeconomic disparities underscore the importance of enhancing the implementation and reach of strategies to prevent and reduce prenatal tobacco smoking among Indigenous women. Elders and community health care providers as role models for nontobacco use could be explored. Qualitative work is needed to understand the barriers and opportunities, such as cultural strengths supporting quitting tobacco to develop more effective approaches.

Conclusions: Although a high-priority group, there remains a dearth of research on Indigenous women's smoking in pregnancy. Studies have assessed knowledge and attitudes to smoking in pregnancy, and small feasibility studies and a few empirical trials have been conducted. Recommendations for promising culturally appropriate cessation interventions have been made. Larger trials are warranted.

Implications: Strategies to support quitting among pregnant Indigenous women need to be multifactorial and take account of the social determinants of smoking including historical antecedents, community norms, cultural strengths, and recognition of individual and community needs. Cross-country research collaborations have the potential to leverage funding, share expertise, and strengthen approaches to tackle an important and poorly attended health disparity that has a profound impact on the entire life course for Indigenous peoples.

Introduction

Tobacco smoking is a marker of and a pervasive cause of social and economic disadvantage.^{1,2} Globally tobacco smoking has complex links with the social determinants of health and thus has a high impact on populations suffering from health disparities. Smoking prevalence is often higher among pregnant women in disadvantaged circumstances,^{1,2} for example, among Indigenous women. There are over 300 Indigenous peoples in the world. This article focuses on Indigenous women from four high-income countries: the United States (USA), Canada, Australia, and New Zealand (NZ). The Indigenous women of these countries are disadvantaged in multiple ways, which has a historical basis in that they were colonized by Western nation-states.^{1,2} While the contexts for Indigenous women vary across these countries, colonization has resulted in inequitable access to education and health care; disproportionate exposure to environmental risks to health; discrimination in the workplace; disproportionately higher unemployment, along with over-representation among lower socioeconomic levels of society, being more likely to live in deprived areas, and higher incarceration rates.^{1,2} This disadvantaged context negatively impacts tobacco use and the ability to quit smoking among women.^{1,2}

Tobacco smoking is one of the most significant reversible risk factors for the health of Indigenous pregnant women and their babies.^{3,4} The adverse effects of cigarette smoking during pregnancy and after delivery on maternal, fetal, and infant health is well-documented.²⁻⁷ Babies and children exposed to the toxic effects of environmental and inter-uterine metabolites from tobacco smoke can experience prenatal and birthing risks, low birth weight, and ongoing developmental problems.^{2,3,5-8} Similarly, a number of studies report adverse health risks of prenatal smokeless tobacco (ST) use including increased risk for preterm birth, stillbirth, and low birth weight.⁹⁻¹³ Through prenatal exposure, children born to mothers who smoke are more likely to become smokers themselves¹⁴ and sustain chronic detriments, for example, increased asthma risks. Thus, a vicious cycle is established, with intergenerational impacts from tobacco smoking.¹⁵ These potential adverse health outcomes are especially relevant for populations with disproportionately high prevalence of tobacco use, including Indigenous peoples.¹⁴⁻¹⁶

Despite the identified need for research on strategies for decreasing smoking while pregnant among Indigenous women,¹⁷ very few interventional studies have focused on this population. A systematic review by Washio and Cassey¹⁸ identified only one study¹⁹ and we have identified four more.²⁰⁻²³ Other research has assessed knowledge and attitudes to smoking among pregnant Indigenous women.²⁴⁻²⁶ Literature reviews highlighted research gaps and opportunities in smoking in pregnancy among women in low- and middle-income countries.^{1,7} As a group of researchers working on smoking during pregnancy in Indigenous women over several continents, for this article, we collaborated to narratively review and describe what is currently known about tobacco use among Indigenous pregnant women for four high-income countries: the USA, Canada, NZ, and Australia. Indigenous population groups include US American Indian (AI) and Alaska Native (AN), Canadian First Nations, Australian Aboriginal and Torres Strait Islander (two distinct populations), and NZ Māori women. We summarize the evidence gaps for tobacco control and smoking cessation, make recommendations for interventions, policy changes and research, and outline common themes across contexts.

Methods

In this narrative review,²⁷ the following databases were used to identify literature: PubMed, Medline, PreMedline, Prevline, psychINFO, Cochrane Database of Systematic Reviews, ASSIA, ERIC, LISA, and CINAHL. No date restriction was put on the search. Key words were indigenous, women, female, pregnancy, childbearing, tobacco use, tobacco smoking, cigarette smoking, smoking cessation, interventions, American Indian, Alaska Native, First Nations, Australian Aboriginal, Torres Strait Islander, and Māori. A total of 142 articles were identified comprising both the literature reviews and the empirical articles, including those known to authors. Each author first reviewed literature relevant to her respective country. Collectively the authors then summarized the results descriptively for themes relevant to prevalence and factors of tobacco use, factors associated with tobacco use, tobacco cessation interventions, and research gaps and opportunities across the four countries.

Prevalence and Factors Associated With Tobacco Use

Cigarette Smoking

High prevalence of maternal smoking during pregnancy and postpartum and exposure of infants and children to second-hand smoke (SHS) are persistent health concerns that contribute to health disparities between all Indigenous and non-Indigenous peoples. Prevalence of tobacco smoking for Indigenous women in each country is shown in Table 1, along with either the general population or non-Indigenous (white female) comparator.

In 2014, the highest prevalence of cigarette smoking in the USA population was reported among AI/AN people (32%) and multiracial persons (25%) compared with white (22%), black (21%), Hispanic (16%), or Asian (13%) adults.⁴¹ Data were aggregated for AI/AN women as often done in national surveys. Similarly, in Canada, Aboriginal women are about two to three times more likely to smoke during pregnancy than non-Aboriginal women.⁴²⁻⁴⁴ However, there are wide variations in prevalence of prenatal smoking among Aboriginal communities and territories (Table 1). Between 2001 and 2008, there was little reduction in smoking prevalence among Australian Indigenous pregnant women, which had been static around 50–52% nationally.⁴⁵ In the State with the largest proportion of Aboriginal people at 31%, New South Wales, the relative risk for smoking in the Aboriginal population increased over a 17-year period from 1996 (three times higher) to 2014 (six times higher).^{46,47} New South Wales Health aims to reduce the smoking prevalence of Indigenous pregnant women by 2% per annum to reach equity of 4% prevalence by 2033.⁴⁸ This will require a reduction in smoking prevalence in pregnant Indigenous women at three times the proportion observed from 1996 to 2012. Moreover, smoking prevalence among NZ Māori women is highest through the childbearing years.³⁹ Smoking among Māori women while pregnant was 68% in 1991, 55% in 1997, and 34% in 2007, and these proportions are much higher when compared with all NZ women: 33%, 25%, and 11%, respectively.¹⁵ Therefore, the prevalence of smoking during pregnancy is a significant public health issue among the Indigenous female population groups included in this narrative review.

ST Use

The use of ST during pregnancy has not been reported among Canadian First Nations or NZ Māori women. Indigenous Australian

Table 1. Comparative Prevalence of Smoking Among Indigenous Women in High-Income Countries of USA, Canada, Australia, and New Zealand

Country	Majority and minority population	Prevalence of smoking (overall population)	Smoking during pregnancy	Daily smoking	Persons who reported smoking ≥100 cigarettes during their lifetime and who, at the time of interview, reported any smoking
USA	White	18.2% (≥18 y) ²⁸	14.3% (Age unknown) ¹⁶	x	✓
	American Indian/Alaskan Native	29.2% (≥18 y) ²⁸	26% (Age unknown) ¹⁶		
Canada	Non-Aboriginal Canadians	20.5% (≥15 y) [Male 23.4%, Female 17.6%] ²⁹	22.2% (≥15 y) ³⁰	✓	x
	Metis	36.8% (≥15 y) [Male 39.5%, Female 34.2%] ²⁹	Data not available		
	First Nations	40.1% (≥15 y) [Male 41.1%, Female 39.1%] ²⁹	18–90% (≥15 y) ^{30–33}		
	Inuit	49% (≥15 y) [Male 49.1%, Female 48.9%] ²⁹	83% (≥18 y) ³⁴		
Australia	Non-Indigenous Australian	12.8% (≥15 y) [Male 14%, Female 11%] ^{35,36}	13% (≥15 y) ^{4,37}	✓	x
	Aboriginal and Torres Strait Islanders	42% (≥15 y) [Male 43%, Female 39%] ^{35,36}	48% (≥15 y) ^{4,37}		
New Zealand	New Zealand European	16% (≥15 y) [Male 19%, Female 16%] ¹¹⁵	13.9% (Women of childbearing age) ³⁸	✓	x
	Māori	35.5% (≥15 y) [Male 30.5%, Female 40.0%] ¹¹⁵	34% ^{35,39,40}		

women mostly smoke cigarettes, although some ST use was reported in Central Australia and the Northern Territory and also observed in a few women during pregnancy.^{49,50} In the USA, the use of ST was not reported among AI women during pregnancy. Somewhat unique to USA AN women is the use of ST during pregnancy, particularly in some rural regions of Alaska.^{3,51} In one study, the prevalence of cigarette smoking, ST, and any tobacco use during pregnancy was 26%, 17%, and 41% for AN women compared with 15%, 0.4%, and 16% for white women, respectively.⁵² The highest proportion of prenatal ST use (56–60%) was observed for AN females residing in rural southwest Alaska (Y-K Delta region).^{52–54} Among 832 AN women from the Y-K Delta region, 48% used tobacco in the 3 months before pregnancy, 79% reported prenatal tobacco use, and 70% used tobacco postpartum.⁵⁵ The increase in prenatal tobacco use was largely accounted for by an increase in ST use from before pregnancy (from 14% to 60%; $p < .001$). Of the 432 women reporting no use of tobacco 3 months prior to pregnancy, 324 (75%) reported use during pregnancy, of which 78% used ST.⁵⁵ Iqmik, a mixture of tobacco leaves and fungus ash, is a common form of ST used by women during pregnancy in some rural regions of Alaska.⁵⁶ The addition of free (unionized) nicotine available for absorption⁴⁴ and the levels of carcinogens.^{57,58} Maternal and neonatal serum cotinine concentrations are significantly higher for mothers who used Iqmik compared with those using other forms of tobacco.⁵⁶ There are no published data to explain ST uptake among pregnant AN women: studies in the Y-K Delta region and in Anchorage, Alaska are currently assessing reasons for ST use during pregnancy.

Traditional/Ceremonial Use of Tobacco

The tobacco plant (*Nicotiana*) was indigenous to the Americas. There were many species that were used in a variety of traditional ways by the North American Indigenous people. Canadian First Nation and other Aboriginal peoples used tobacco traditionally in ceremonies, cultural rituals, and prayer for thousands of years.^{59,60} It was used for a variety of medicinal purposes and its ceremonial use had powerful spiritual meaning. Tobacco was also used for religious and ceremonial reasons among AI women.⁶¹ However, among AN pregnant women and other AN people, tobacco products were not used for ceremonial or religious reasons.^{54,56,62} Aboriginal peoples in Australia had *pituri* a native plant from the same family as *Nicotiana* (cured leaves of the shrub *Duboisia hopwoodii* of the Solanaceae family) and which also contained nicotine. Pituri was chewed or used ceremonially, prior to colonization.⁶³ Early types of tobacco for chewing and smoking was first introduced in to Northern Australia, through trade with the Macassans over 300 years ago, although this did not penetrate to Aboriginal communities in southeastern Australia.⁶⁴ Tobacco became incorporated into ceremony for the Yolgnu nation and persists today as the Tobacco or Ngarali song.⁶⁵ The act of smoking was novel to NZ when it was introduced by early whalers, explorers, and missionaries in the late 1700s and early 1800s (see Associations Between Tobacco Use, Colonization and Dispossession section).⁶⁶

Associations Between Tobacco Use, Colonization and Dispossession

Cigarette smoking and exposure to SHS in some, but not all, Aboriginal communities is influenced by historical and ongoing colonization.^{67–69} Tobacco smoking in Australian Aboriginal and

Torres Strait Islander peoples has been associated with colonization and dispossession⁷⁰, the “stolen generation” (children who were taken forcibly from parents)⁷¹, and racism.⁷² Aboriginal and Torres Strait Islander peoples were historically given rations on missions or paid in tobacco for work. Sometimes addiction to tobacco was deliberately fostered to subdue resistance.⁷³ Unfortunately, perhaps as a result of these factors, today “tobacco isn’t always perceived by community members to be a high priority.”⁷⁴ In NZ, tobacco was an early item of trade with Māori to buy land and win favor. Gifts of tobacco were given to the tribal leaders who signed The Treaty of Waitangi that enabled the British to establish a government.⁶⁶ Māori women were equally encouraged to use tobacco (whereas at that time European women were not), which is one of the reasons why Māori smoking prevalence rates reached such high levels and have stayed disproportionately higher than Europeans ever since.

Socioeconomic Factors Impacting Tobacco Use

Smoking during pregnancy across all four countries is associated with younger age, lower levels of education, poverty, single marital status, parity, lack of community resources, geographic isolation, illicit drug use, and spouse/partner smoking.^{16,31,41,43,67–69,72,75} Moreover, perceived stress and depression are higher among Aboriginal women than non-Aboriginal women and studies pointed to a range of stressors influencing cigarette smoking including income.⁷⁶ Also, reasons for smoking among pregnant Aboriginal women include not being appropriately educated about the harms of smoking during pregnancy and the use of smoking as a way to deal with stress and anxiety.^{24,25,77} For example, qualitative work among USA AN women indicated that Iqmiq and commercial chewing is perceived as safer to use during pregnancy than cigarette smoking, and there is a low level of knowledge about adverse health effects of ST use.^{19,62}

Prenatal care delivered to Aboriginal women is poorer than care delivered to non-Aboriginal women across the four countries.^{16,41,44} For example, compared with European women, Māori women are less likely to engage a Lead Maternity Carer within the recommended time: Maori OR = 0.59 (95% CI 0.44–0.80).⁷⁵ Aboriginal women may experience stigma and discrimination around their tobacco use in pregnancy, which limits the use of prenatal care and assistance with tobacco cessation. For example, factors contributing to inadequate prenatal care for Canadian First Nations women include not only geographic distance to care and lack of transportation but also importantly their prior negative experiences and discrimination, fear of being judged for smoking, and fear of the health care system.^{32,78} Because smoking cessation interventions are often delivered in a health care setting, Canadian Aboriginal women therefore may receive less cessation support.⁷⁸ Kennison⁷⁹ found that pressure from outside sources including health care workers could actually reduce the likelihood of smoking cessation, as the stigma associated with smoking during pregnancy may lead women to conceal their behavior when cessation attempts are unsuccessful. This deterrent may be exacerbated for Aboriginal women who already report barriers to accessing prenatal care including stigma, discrimination, and lack of cultural understanding.⁷⁸

Tobacco Use as a Socio-Normative Behavior in Aboriginal Communities

Commercial non-ceremonial tobacco products have achieved deep penetration into Indigenous communities in these four high-income countries over generations. The use of tobacco became embedded as a cultural norm with intergenerational transmission and

influence.^{62,73,80–83} Intergenerational transmission of smoking, resulting in higher rates of smoking initiation among Indigenous children occurs at disproportionately higher rates because of the high prevalence of smoking among Indigenous parents and caregivers.⁸³ For example, Māori women were introduced to tobacco over 150 years ago resulting in a majority of parents smoking. Smoking became entwined with everyday practices eventually appearing to be part of the culture. So many Māori smoked, with prevalence reaching as high as 70% by 1962, that it became the norm.⁸²

Smoking has been cited as a way to maintain and strengthen kinship bonds and social relationships and to enhance social cohesiveness. The high prevalence of smoking in Aboriginal communities generally is associated with a higher likelihood of women experiencing environmental cues for smoking.⁸⁴ Particularly salient are family members, partners, and friends who smoke: thus, avoiding being around tobacco smoke can lead to a woman experiencing a sense of isolation in pregnancy.^{24,25} The ingrained norm of smoking has undermined the success of cessation interventions among pregnant Aboriginal women.⁸⁵ In an ongoing qualitative study, pregnant Aboriginal women report a lack of interest from health professionals in aiding them to quit, a lack of access to services, and a lack of follow up (G. S. Gould et al unpublished data, 2016). Unsupported by health professionals, women may experience low confidence and optimism about quitting smoking.⁸⁶ Some women may not think it worthwhile to quit smoking, if others are still smoking around them.²⁴ Unfortunately, there are few role models for nontobacco use.^{24,25} Tobacco-free elders and community health care providers are perceived as a potential credible message source for tobacco cessation.⁶²

There are few data on barriers to quitting or strengths (opportunities) for tobacco cessation among Aboriginal women. In the USA, among AN women, the health and welfare of the children is a community priority and important reason for quitting during pregnancy.⁶² The potential normative influences of tobacco use in pregnancy, or other cultural or psychosocial reasons to use tobacco, have not been reported for AI women.^{3,87,88} Likewise, studies have shown that many Australian Aboriginal and Torres Strait Islander pregnant smokers are motivated to quit smoking or cut down their consumption of cigarettes to protect their baby as a natural response to becoming pregnant.^{24,25,77} Moreover, potent individual and cultural facilitators for quitting include the protective attitudes of Aboriginal and Torres Strait Islander women, guilt about smoking, and their esteem of positive role models who have quit tobacco.^{24,25} Aboriginal mothers report being conscious about not smoking around newborn babies, and Aboriginal community members are starting to challenge each other not to smoke in the presence of children.^{24,89} Reducing smoking during pregnancy was identified as urgent by a Māori Affairs Select Committee Inquiry into the consequences of tobacco use for Māori peoples.⁸⁴

Tobacco Cessation Interventions

It is important that smoking cessation services respond to the needs of Indigenous pregnant women for smoking cessation and their increased motivation to quit that often accompanies pregnancy.¹ In pregnancy, Indigenous women report that they perceive their smoking risks and their role differently.²⁴

Several smoking cessation interventions have been shown to be effective for women who smoke during pregnancy.^{90–93} These comprise cognitive and behavioral techniques, and the use of nicotine

replacement therapy (NRT), for example, NRT patches and oral forms such as gum and lozenges, and financial incentives.^{90,94,95} A Cochrane review of 77 trials (1976–2012) comprising over 22 000 women found a significant increase in smoking abstinence in late pregnancy with individual-based behavioral counseling interventions compared with usual care (RR 1.44, 95% CI 1.19–1.75).⁹³ NRT increases cessation in late pregnancy by 40%.⁹³ These interventions however were trialed among the general population of women who smoke during pregnancy. They have not effectively been translated for use with pregnant Indigenous smokers.⁹² Moreover, there is growing consensus that tobacco control approaches at the population level are needed to enhance reach to underserved women and efficacy for reducing tobacco use in pregnancy.^{16,91,92}

A systematic review of the literature to inform policy directions for smoking cessation and tobacco prevention in Indigenous populations found only two randomized controlled trials for smoking cessation specially tailored for Indigenous women.⁹⁶ However, neither of the two studies found any significant benefits in favor of the use of the intervention.

USA

The US Public Health Service (USPHS) guidelines recommend brief cessation counseling based on the “5As” model (ask, advise, assess, assist, and arrange) along with provision of pregnancy-specific self-help materials as the standard of care for pregnant women in the USA.^{92,94,95} Interventions based on the 5As targeting different ethnic groups such as African Americans and low-income prenatal patients have also been effective.⁹⁰ The 5As are supported and used by Indian Health Service clinics, and pharmacists and providers are certified across tribal organizations. However, it was estimated that even universal implementation of best practice clinic-based interventions would not substantially reduce smoking prevalence among US pregnant women because of generally low reach to underserved women.^{97,98}

Reducing tobacco use among AN pregnant women and children was identified as a key community priority.⁶² To address this need, a successful tobacco control community-academic research partnership was developed and has been sustained over the past 15 years.^{62,88} However aside from one pilot study,¹⁹ prenatal cessation interventions have not been otherwise evaluated for AI or AN women.^{87,90}

In the one pilot study conducted among AN women, an individual-based intervention delivered at the first prenatal visit based on the USPHS guidelines^{90,95} was culturally adapted through qualitative work.¹⁹ It consisted of face-to-face counseling at the first visit, a video, cessation guide, and four telephone counseling sessions. Prenatal care providers referred women who were potentially eligible to the study. However, the major reason for lack of referral to the study was gestational age of not less than 24 weeks. Thus, the intervention had poor reach to pregnant women. Among those eligible, only 12% participated. Key reasons for nonparticipation were lack of time as many women needed to make the flight back to their village and perceived stigma of attending the clinical cessation program to enroll. Among the 35 women who participated, the biochemically confirmed tobacco abstinence at 36-week gestation was 6% for the control group and 0% for the intervention group. Feedback obtained from the women was that they desired more objective feedback on how tobacco harms their baby. However, results are tempered by the small sample, which may have been biased with respect to seeking prenatal care before the third trimester and motivation to quit at study entry.

An ongoing project in a rural region of Western Alaska (Y-K Delta region) has developed a social marketing campaign targeting the entire community, not just pregnant women.⁸⁸ Local female elders will deliver the intervention. This approach has been found to be effective for cancer prevention and control efforts among AI/AN women.^{99,100} Another current project in Anchorage Alaska provides feedback to women from urine cotinine testing about their infant's likely exposure to a tobacco-specific nitrosamine and carcinogen, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol as a motivator to quit tobacco in pregnancy.¹⁰¹ Both of these studies are assessing reasons and motivators for using tobacco in pregnancy, along with barriers and individual and cultural strengths for cessation. These studies will provide important information that will be used to guide future interventions.

Canada

Supporting women's tobacco cessation efforts and protecting children from SHS exposure are priorities of First Nations and other Canadian Aboriginal communities.^{85,102,103} Concern for the children is an important motivator to reduce smoking and SHS exposure among pregnant women and other community members.^{60,104} Community-level investment in maternal and infant health and well-being is recognized as foundational to social well-being and cultural continuity.¹⁰⁵

Unfortunately, there is a dearth of evaluated programs that have been developed specifically for First Nation or other Canadian Aboriginal pregnant women. Some efforts have been made to integrate cessation counseling into prenatal care, through culturally relevant informational campaigns.¹ A total of 281 women participated in an evaluation of the program, of which 39% self-reported a reduction in smoking and 16% quit.¹ However, barriers to accessing prenatal care limited the reach of this intervention. Heaman and Chalmers found that access to cessation programs may be limited by language and literacy level of materials used and because the programs are not culturally appropriate or focus exclusively on the individual in contrast to the Aboriginal holistic approach of involving the family, community, and environment.⁴³ For many communities, being “culturally sensitive” also includes respecting tobacco's sacred role and clearly distinguishing between manufactured tobacco use and ceremonial use.¹⁰⁶

A Canadian qualitative study conducted in-depth interviews with providers and other health professionals (key informants) along with pregnant and postpartum women to examine the cessation needs of women, barriers to the provision and uptake of cessation support, and directions for prenatal clinical service provision and programming.¹⁰⁷ Key barriers reported were access/accessibility issues and geographical features presented additional challenges to provision/uptake of interventions, as did the lack of resources tailored to Aboriginal women.¹⁰⁷ To address engagement and accessibility issues, participants recommended the provision of incentives, transportation, childcare, and meals/snacks; adoption of women-centered, harm reduction, and stigma reduction approaches; and promotion of programs through local venues. Thus, culture-based prenatal outreach and support systems are needed, designed to address the particular vulnerabilities of Canadian Aboriginal pregnant women.^{33,108,109}

Australia

For over a decade, Australian Indigenous communities have called for culturally appropriate antismoking messages. A qualitative

report of Australian Indigenous views of the National Tobacco Campaigns in 1999 showed Indigenous Australians had preferences for targeted campaigns and locally developed programs.¹¹⁰ In 2000, a report commissioned by the Australian Medical Association proposed a range of approaches for tobacco control messages and cessation.¹¹¹ Pre-2010 antitobacco messages for Indigenous smokers relied mostly on the generic National Tobacco Campaigns, although there were some earlier targeted campaigns, such as the “Beyond the Big Smoke” program in Western Australia from 2008. In 2010, a targeted national “Break The Chain” campaign started and was followed soon after by national and regional funding for targeted campaigns through the Indigenous Tobacco Control Initiative (2011) and Tackling Indigenous Smoking programs (2012).^{35,112}

Social marketing through TV advertisements has had a mixed response among Australian Indigenous pregnant women. Some women find the negative images in the National Tobacco Campaigns too threatening and avoid watching them, and advertisements have been reported to prompt further smoking.²⁵ The targeted “Break The Chain” campaign has been favorably received¹¹³ and more recently the “Quit For You, Quit for Two” campaign targets Aboriginal and Torres Strait Islander pregnant smokers.¹¹⁴ However, existing antitobacco messages were reported to lack salience for Aboriginal pregnant women in one recent study as the messages did not match with their lived experience.²⁵ Aboriginal and Torres Strait Islander women believe it should be their choice whether they quit or not and do not like to be “told what to do.”^{24,25} A respectful, nonjudgmental stance needs to be maintained by health professionals.¹¹⁵

A randomized controlled trial by Eades et al. from 2005 to 2009, conducted in Aboriginal Medical Services, found no difference between the intervention group (intensive counseling and NRT) and standard care.²⁰ However, there were several implementation problems within this trial: for example, contamination between study arms (women were recruited alternate weeks at the same services, but later not separated); poor buy in from health professionals; and women were required to have repeated quit attempts before NRT was offered, with significant levels of attrition between the unassisted attempts.^{20,116,117} Although the sample size was too small to show a significant difference between conditions, an absolute increase of 6% in quit rate appeared to be feasible for those receiving the more intensive intervention.²⁰

A pilot feasibility study of a comprehensive intervention targeted Australian Aboriginal pregnant women including financial incentives to quit smoking demonstrated some promising results.²³ Of the 22 pregnant Aboriginal women who completed the program, 42% ($n = 8$) were able to remain abstinent into late pregnancy (confirmed by expired air carbon monoxide). However, a roundtable consensus conducted at a national Indigenous research unit, the Lowitja Institute, agreed that contingent financial incentives should not be further explored for Aboriginal and Torres Strait Islander pregnant women until routine smoking cessation approaches had been evaluated.¹¹⁸

A review conducted by Gould et al. in 2013 investigating knowledge and views about maternal tobacco smoking and barriers to cessation in Indigenous Australian women found that Indigenous women may need a comprehensive approach that is culturally tailored, educates women about the harms of smoking during pregnancy, and also considers the environmental context.²⁵ It was emphasized that interventions need to de-normalize smoking within Indigenous communities.²⁵ Passey et al. explored the views of Indigenous Australian pregnant women and antenatal

care providers, revealing that both current smokers and providers thought that the most effective strategy to target smoking was to involve the family.²⁶ Family involvement was emphasized owing to the importance that is placed on family interactions and connections in Australian Indigenous communities.

The significance of community health professionals in influencing behavior has also been highlighted as a key strategy that needs to be further developed to aid smoking cessation in Aboriginal and Torres Strait Islander pregnant women.¹⁷ Other reviews have found that the women themselves believe support from health professionals would be helpful at aiding their quit attempts.⁹⁶ Although the 5As approach is generally recommended in pregnancy as a basis for brief interventions, a recent study shows that few Australian clinicians (including those working in health settings that serve Indigenous Australians) go further than “asking” or giving “advice” to pregnant women who smoke.¹¹⁹ Clinicians seldom offer the recommended comprehensive smoking cessation care to pregnant women who smoke. Current strategies are focused on providing support and training for providers to provide comprehensive evidence-based care to Indigenous women in pregnancy, for example, “Yarning about Quitting” and “Quit for New Life” programs in New South Wales, and there are plans to trial a national health professional training program through webinar training.¹²⁰

New Zealand

The primary driver of reduction of smoking while pregnant among Māori women will be reduced smoking prevalence among Māori women of childbearing years.⁴⁰ Requiring 90% of pregnant women (who identify as smokers at the time of confirmation of pregnancy in general practice or booking with a Lead Maternity Carer) to be provided with brief advice and support to quit as a reportable Health Target contributed to reductions in smoking prevalence among pregnant women over the last 20 years.⁴⁰ Other contributors are population-wide strategies including extension of smoke-free environments in NZ to all workplaces, including bars, clubs, and restaurants; the implementation of smoke-free prisons and ongoing mass media campaigns advertising the free Quitline service; and advertising designed to de-normalize smoking to discourage initiation.

Government-funded smoking cessation programs in NZ only began in 2000. One of the first, Aukati Kai Paipa, targeted pregnant Māori women who smoked and their whānau (family). Unfortunately, only 3% of the participants enrolled during the first 2 years of the pilot program were pregnant.¹²¹ A range of other programs have since been developed, though few have been properly evaluated. A recent feasibility study testing the appeal of retail vouchers versus choice of product packs suggested that incentives, in particular a choice of products, might be effective as an addition to usual care to increase smoking cessation among pregnant Māori women.²¹ A further feasibility study found that Māori community health workers could successfully identify pregnant Māori women who smoked and offer cessation advice.¹²² The Ministry of Health and a number of District Health Boards have subsequently funded a variety of stop smoking incentive programs for pregnant Māori and Pacific Island women. Some programs enabling midwives in the provision of cessation support are also being trialed, for example, routine screening of smoking status using exhaled carbon monoxide monitors.¹²³ Northland DHB specifically trialed the establishment of an alliance to improve cross-service collaboration and referral of pregnant women who smoked to cessation services.¹²⁴ A further program tested provision of a midwife enabler

to train and encourage midwives to provide improved cessation support and referral.¹²⁵

In 2012, a best practice framework for dedicated pregnancy smoking cessation services was designed for the Ministry of Health.⁴⁰ The framework identified sector adherence to the Stages of Change model, which classifies people who smoke according to their “readiness to quit,” as a barrier to effective cessation support for pregnant women.⁴⁰ The Stages of Change model is contrary to the approach recommended in the New Zealand Guidelines for Smoking Cessation which requires all health care providers to Ask every client about smoking status, provide Brief advice to quit and refer to or provide Cessation support (ABC pathway).¹²⁶ The Stages of Change model also prohibits understanding and application of an approach that addresses the urgency of smoking when pregnant.⁴⁰

Gaps and Opportunities for Further Research

The United States

There is a large gap and much to be learned about motivators for tobacco use in pregnancy along with barriers and individual and cultural strengths for quitting among AI and AN women. There is a need for evidence-based, multilevel, tobacco cessation interventions to be tested in RCTs among AI and AN pregnant women to advance the science and reduce health disparities in these communities. Only one published study evaluated an intervention for AN women,⁵ and none have been reported for AI pregnant women. The one pilot study done in AN women suggested that an individual-based approach may not be effective and studies targeting the family and entire community might have greater impact.¹⁹ Incentives are effective for reducing smoking in pregnancy generally, but this research has not been evaluated for acceptability or efficacy among AI or AN women.⁹² In addition, no research has examined the use of pharmacotherapy for tobacco cessation during pregnancy in AI or AN women or interventions specifically for women using ST.⁹²

A key area for future research is to maximize public health efforts to reach AI/AN teens and women of reproductive age before they are pregnant. Tong et al. suggest that to further reduce prenatal smoking prevalence in USA, tobacco control efforts focused on preventing initiation and increasing smoking cessation before a woman becomes pregnant are needed.⁴¹ In particular, culturally appropriate tobacco control interventions should be integrated into reproductive health settings to reach younger AI/AN women. Targeted preconception interventions have been found to be effective for other substance use among women.¹²⁷ By targeting AI/AN women before conception, this approach could have downstream effects on preventing tobacco use among AI/AN children.^{1,128}

Canada

Targeted interventions need to be evaluated that address both the social reality and cultural context of Canadian Aboriginal women along with access issues.¹⁰⁹ Community programs that address maternal smoking as a community health issue rather than as an exclusively maternal or fetal issue may also be successful. For many Aboriginal peoples, birth is considered a community event that is celebrated and is perceived to strengthen the web of relationships between extended families and the local natural environment.^{129,130}

There is also a potential role for elders to support Aboriginal women's efforts to reduce smoking.^{33,108} Varcoe et al. conducted a qualitative study to examine the interpersonal and system influences on smoking practices and exposure to cigarette smoke that place

young pregnant and parenting First Nations women and their children at risk and to develop meaningful strategies to support tobacco reduction.⁸⁵ Focus groups and interviews with six First Nations rural reserve villages (ranging in population size from 480 to 2000) indicated that elders would be credible and influential sources for health promotion and tobacco reduction in their communities who could serve as role models and teach cultural traditions.⁸⁵ Although some elders smoked, and some expressed doubt about their potential for influence, success stories regarding tobacco control were routinely linked to elders, and community members expressed hope that elders could provide further leadership.⁸⁵ Participants thought that drawing on elders as a source of leadership in relation to smoking and exposure to SHS would not only be culturally appropriate but also would be congruent with how the community understood the causes of smoking including loss of traditions (cultural erosion), underemployment, and boredom.⁸⁵

Australia

Tobacco-related research is a nation-wide health priority for Indigenous health, given the high proportion of Aboriginal and Torres Strait Islander women who continue to smoke during pregnancy.^{35,131} The lack of effective interventions available for this subgroup means that there is a severe impediment on the development and implementation of evidence-based informed policy and practice guidelines.⁹² There is an urgent need for methodologically rigorous studies to test innovative approaches to address this problem.⁹² Novel ways to engage and educate not only pregnant smokers but all Aboriginal and Torres Strait Islander women of childbearing age are warranted. Education is not sufficient on its own; it needs to be coupled with support services such as the use of health professionals, provision of NRT, and counseling.²⁵ Qualitative investigations to date suggest that antitobacco messages need to be relevant and be tailored to Indigenous women's experiences, with a focus on quitting processes and support efficacy (including individual, group, and family involvement) and should capitalize on the positive changes occurring in smoke-free homes.^{24,132} Several systemic barriers have been highlighted in Australia: these include a lack of subsidized oral forms of NRT (which are recommended as the safest option in pregnancy), lack of knowledge, confidence and skill in health providers, and caring for pregnant Indigenous women.^{119,133} There is a lack of specificity of guidelines to the Indigenous context in pregnancy, although Gould et al. recently published a pragmatic guide, based on an ABCD model (Ask/Assess; Brief Advice; Cessation support; Discuss the psychosocial context).¹¹⁵ Little is known about attitudes of providers and clients to NRT, although research is currently underway in this area.¹³³ Incentives appear to be a promising area worthy of further exploration, given the successes achieved internationally,^{134,135} but there appears to be a reluctance to support research trialing financial incentives among Indigenous Australians.¹¹⁸

New Zealand

By Māori for Māori approaches that give women something of value to them, such as an incentive¹³³ or Aunty support,¹²⁰ or some feedback, such as an exhaled carbon monoxide reading⁴⁰ appear promising and are worthy of further improvement and testing. Approaches that are nonjudgmental also need further development.¹¹⁸ Recently, Māori women have been using electronic cigarettes to quit smoking and have called for removal of a ban on the import for sale of nicotine for use in electronic cigarettes.¹³⁶ There have also been anecdotal reports of Māori pregnant women

using electronic cigarettes to help them stop smoking. A trial of vaping among pregnant women in the United Kingdom is underway.¹³⁷ Such a trial among pregnant Māori women would be worthwhile but securing funding to research reduction of maternal Māori smoking has been very difficult. Emerging research on the cumulative psychologically harmful effects of racism and marginalization could help to explain the persistence of high-smoking prevalence among Indigenous pregnant women as racism and marginalization are drivers to smoke.¹³⁸ Research could explore discrimination experienced by Māori pregnant women with view to informing policy to address social determinants of smoking.

Strengths and Limitations

A strength of this review was the contribution of researchers from four different countries who are all active in maternal Indigenous research. Their combined contemporary knowledge provides a unique perspective. There are several limitations to this review. Firstly, it was not intended to be a systematic review of the literature. We did not analyze the data or methods used in published papers that were reviewed, we did not include unpublished work, and we did not include ongoing trials “in progress” or funded, other than those conducted by the authorship team. These factors may limit representativeness of our literature review with respect to available works in progress or unpublished data.²⁷ It was difficult locating equivalent smoking prevalence statistics across countries, as sometimes it was unclear at what time smoking status was assessed during pregnancy and there was a lack of standardization of reporting. Where possible the most updated figures were used. Not all Indigenous people have been colonized or had a similar experience of colonization, therefore the findings cannot be generalized to other Indigenous peoples.

Summary and Opportunities for Cross-cultural Collaborative Studies and Trials

Prior reviews focused on tobacco use in pregnancy among women from low- to middle-income countries.^{1,7} In many Western nation-states of Australia, NZ, Canada, and USA, Indigenous women have a high-smoking prevalence, at several times, the proportion in the general population. This narrative review underscores these disparities and highlights the importance of enhancing the implementation and reach of strategies to prevent and reduce prenatal tobacco use (smoking and ST use) among Indigenous women.

Common themes emerged across the four countries suggesting that collaborative studies and trials would be worth pursuing. These include the social–normative use of tobacco and perceived stigma of tobacco use during pregnancy as barriers to quitting in pregnancy. Socioeconomic disparities underscore the importance of enhancing the implementation and reach of strategies to prevent and reduce prenatal tobacco smoking among Indigenous women.

Qualitative work is needed to further understand barriers and opportunities such as cultural strengths for quitting tobacco use that may inform development of unique approaches.¹³⁹ In addition, there is a need for evaluations of interventions at the family and community level. Moreover, the use of elders and community health care providers could be explored as role models for nontobacco use. Although not highly prevalent across the four countries, the use of ST should be monitored in pregnancy, along with electronic cigarettes (e-cigarettes)^{140,141}, and other emerging products.^{51,142} For example,

in Australia, general practitioners rarely ask pregnant women about other forms of nicotine or tobacco use (G. S. Gould et al., unpublished data, 2016).¹⁴³

As this work evolves, the different countries and cultures can learn from what works and apply different strategies as appropriate to clinical practices and tobacco control research partnerships. This review also highlights potential opportunities for cross-cultural collaborative studies and trials, for example, testing how family or community-level interventions are efficacious across populations of Indigenous women.

This narrative review explored commonalities and differences among a high-priority group of Indigenous women who smoke in pregnancy. Strategies to support quitting in these underserved populations need to be multifactorial, take account of the social determinants of smoking including historical antecedents, community norms, cultural strengths, and recognition of individual and community needs. Cross-country research collaborations have the potential to leverage funding, share expertise, and strengthen approaches to tackle a most important health disparity that has a profound impact on the entire life course for Indigenous peoples.

Funding

National Cancer Institute, grant R01 CA164533 (CP); National Health and Medical Research Council Early Career Fellowship APP1092028 (GSG).

Declaration of Interests

None declared.

Acknowledgments

This manuscript was approved by the Yukon-Kuskokwim Health Corporation, Southcentral Foundation Board of Directors, and the Alaska Native Tribal Health Consortium Health Research Review Committee.

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