

# Smoking and quitting characteristics of Aboriginal and Torres Strait Islander women of reproductive age: findings from the Which Way? study

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**The known:** National priorities to reduce smoking rates during pregnancy among Aboriginal and Torres Strait Islander women are in place, but little published evidence exists to inform strategies to address these priorities.

**The new:** Aboriginal and Torres Strait Islander women are making quit attempts and 36% have used nicotine replacement therapy and/or stop-smoking medications. Age, measures of nicotine dependence and remoteness are not associated with sustained quitting. Quitting suddenly, rather than reducing cigarette consumption, is associated with sustained abstinence.

**The implications:** Health providers should support all women to quit smoking, and should avoid relying on measures of dependence and advising reduction. Uptake of medications to support cessation can change over time. Access to a range of cessation options is important to address addiction and uphold sovereignty and self-determination of quitting.

Australia is recognised as a leader in tobacco control internationally,<sup>1</sup> but tobacco is responsible for over a third (37%) of all Aboriginal and Torres Strait Islander adult deaths.<sup>2</sup> Smoking is intrinsically linked to colonisation, racism and dispossession.<sup>3</sup> This includes the introduction of tobacco as an addictive commodity in lieu of wages and the provision of tobacco rations before Aboriginal and Torres Strait Islander peoples' engagement in the cash economy. National calls have been made for comprehensive approaches to support Aboriginal and Torres Strait Islander people to be smoke-free.<sup>4-7</sup> Currently, 40.2% of Aboriginal and Torres Strait Islander people smoke daily, 38.6% of Aboriginal and Torres Strait Islander females smoke daily,<sup>8</sup> and 43.0% of Aboriginal and Torres Strait Islander women smoke during pregnancy.<sup>9</sup>

Addressing smoking during pregnancy has been a key target in closing the gap in life expectancy for Aboriginal and Torres Strait Islander people. Smoking during pregnancy is the most significant modifiable risk factor for adverse pregnancy and long term health outcomes for mothers and their children.<sup>10</sup> Smoking during pregnancy is linked to a range of poor infant health outcomes, including increased risk of cleft lip and palate,<sup>11</sup> ectopic pregnancy,<sup>12</sup> fetal growth restriction and low birth weight,<sup>13</sup> preterm delivery,<sup>12</sup> spontaneous abortion (miscarriage),<sup>14</sup> and stillbirth and perinatal mortality.<sup>15,16</sup> Further, evidence links maternal smoking with later life outcomes for the child, including attention deficit hyperactivity disorder,<sup>17</sup> obesity,<sup>18</sup> asthma at age <2 years,<sup>19</sup> and diabetes.<sup>20</sup> Currently, out of every ten Aboriginal and Torres Strait Islander women who smoke, only one successfully quits during pregnancy.<sup>9</sup>

## Abstract

**Objective:** To describe smoking characteristics, quitting behaviour and other factors associated with longest quit attempt and the use of nicotine replacement therapy (NRT) and stop-smoking medication (SSM) in a population of Indigenous Australian women of reproductive age.

**Design, setting and participants:** A national cross-sectional survey of Aboriginal and Torres Strait Islander women aged 16–49 years who were smokers or ex-smokers was conducted online during the period July to October 2020.

**Main outcome measures:** Quitting experience: attempt to cut down, time since last quit attempt, longest period without smoking, attempt to cut down during last quit attempt, any use of NRT and/or SSM.

**Results:** Most of the 428 participating women (302 [70.6%]) reported using an Aboriginal health service. Younger women (16–20-year-olds) smoked fewer cigarettes daily (24/42 [57.1%], 0–5 cigarettes per day), waited longer to smoke after waking (20/42 [47.6%], > 60 minutes after waking), and were categorised as low smoking dependency compared with those aged 35 years and over. One-third of women (153 [35.7%]) had ever used NRT and/or SSM. A greater proportion of older women (35–49-year-olds) had sustained a quit attempt for years (62/149 [45.6%]) and reported trying NRT and/or SSM (78/149 [52.4%]) than women in younger age groups. Quitting suddenly rather than gradually was significantly associated with sustained abstinence (prevalence ratio, 1.27 [95% CI, 1.10–1.48]). Among women who had never used NRT or SSM, most (219/275 [79.6%]) reported reasons for this in the category of attitudes and beliefs. NRT and SSM use was also more likely among women who were confident talking to their doctor about quitting (odds ratio, 2.50 [95% CI, 1.23–5.10]) and those who received most of their information from a health professional (odds ratio, 1.71 [95% CI, 1.11–2.63]).

**Conclusion:** Aboriginal and Torres Strait Islander women want to quit smoking and are making attempts to quit. Quitting suddenly, rather than reducing cigarette consumption, is associated with increased sustained abstinence. Health providers can enable access and uptake of NRT and/or SSM and should recognise that NRT and/or SSM use may change over time. Consistent messaging, frequent offers of smoking cessation support, and access to a range of smoking cessation supports should be provided to Aboriginal and Torres Strait Islander women to enable them to be smoke-free.

Implementing appropriate supports for Aboriginal and Torres Strait Islander women of reproductive age to be smoke-free (to prevent uptake of smoking and promote smoking abstinence before, during and after pregnancy) is crucial for reducing rates of smoking during pregnancy and improving health outcomes for mothers and children. However, evidence on effective tobacco control that is specific to Aboriginal and Torres Strait Islander people (including pregnant women) is limited, and this has impeded clinical and public health practice.<sup>3,4,21</sup> The rates

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of smoking during pregnancy among Aboriginal and Torres Strait Islander women are decreasing, but there is substantial room for improvement.<sup>9</sup> Research has revealed high motivation to quit smoking, but also barriers including inconsistent health messaging and advice offered during pregnancy, including advice to reduce cigarette consumption and not specific advice to quit.<sup>22</sup>

Medications to support smoking cessation include nicotine replacement therapy (NRT), varenicline and bupropion. Use of evidence-based medications combined with behavioural counselling is effective to support quitting; use of medications improves the rate of successful quitting by up to 2.88 times.<sup>23</sup> The Royal Australian College of General Practitioners and Royal Australian and New Zealand College of Obstetricians and Gynaecologists recommend that, for those unable to quit during pregnancy with behavioural support alone, clinicians could offer NRT.<sup>24</sup>

However, research indicates that use of smoking cessation medication among Aboriginal and Torres Strait Islander smokers is lower than that for non-Indigenous smokers (NRT, 37% versus 59%; varenicline, 11% versus 29%; bupropion, 1% versus 2%).<sup>25,26</sup> Barriers to use of smoking cessation medications include, but are not limited to, cost.<sup>25</sup> As a result, NRT, bupropion and varenicline are subsidised through the Pharmaceutical Benefits Scheme (PBS). This includes the Closing the Gap PBS Co-payment Program and the Remote Area Aboriginal Health Service Program,<sup>27</sup> which offer two free courses of medications per year. Most Aboriginal community controlled health services (78%) report providing NRT at low or no cost,<sup>28</sup> and 74% of smokers report receiving NRT at low or no cost.<sup>27</sup> This is expected to improve accessibility and uptake.<sup>29</sup> However, there is limited evidence on how smoking cessation medications are being offered, accepted and used among Aboriginal and Torres Strait Islander women, including during pregnancy.

The Which Way? project aims to improve care relating to smoking cessation by developing an Indigenous-led evidence base for smoking cessation to support Aboriginal and Torres Strait Islander women to be smoke-free during pregnancy and beyond.<sup>30</sup> In this article, we:

- describe Aboriginal and Torres Strait Islander women's smoking and quitting behaviour;
- explore concurrence between measures of nicotine dependence — specifically, relationships between Heaviness of Smoking Index (HSI) scores, frequency of urge to smoke (hereafter referred to as urge frequency), and strength of urge to smoke (hereafter referred to as urge strength);
- explore factors associated with longest successful quit attempt; and
- explore factors associated with use of cessation support medications (NRT, bupropion and varenicline).

## Methods

### Research team

The research methods and the research team members' world views have influence on: perspectives, values, and conduct of the Which Way? study; levels of engagement in the study; and interpretation of the study the findings.<sup>31,32</sup> The study was conceptualised and led by one of us (MK, Wiradjuri woman), in partnership with Aboriginal communities and women (HL,

SB). Our team brings together Aboriginal and Torres Strait Islander lived experience (MK, CC, HL, SB), Indigenous lived experience (RM), and expertise in Aboriginal health services (PH, HL, SB), Indigenous tobacco research (MK, CC, CH, RM) and epidemiology (CH, EB, AM, RM). Which Way? is co-owned and governed by Aboriginal partnering communities.<sup>30</sup> Aboriginal and Torres Strait Islander people were involved in all aspects of the study, from survey development through to manuscript writing and dissemination of the study findings. Which Way? used integrated knowledge translation embedding knowledge users to ensure Aboriginal and Torres Strait Islander community and health care delivery relevance, privileging Indigenous knowledge and scientific excellence.

### The Which Way? study

A cross-sectional survey targeting Aboriginal and Torres Strait Islander women of reproductive age (16–49 years) who were smokers or ex-smokers was conducted online during the period July to October 2020. The full survey is available online ([Supporting Information](#), Table 1).

Survey items were informed by previous publications (including a report on a national tobacco survey),<sup>33</sup> validated measures for smoking and quitting, and Aboriginal knowledge through Which Way? project partners (including female Aboriginal health workers). An iterative co-design process was used, in which one of us (MK, Aboriginal researcher) and Aboriginal community partners informed the survey item categories. The preliminary survey was then reviewed by the research team to establish face and content acceptability and validity, and later pilot tested for feasibility and acceptability with 15 Aboriginal women known to the research team.

### Sampling frame

The survey was promoted through social media using paid and organic advertisements and promoted by Aboriginal community partners. We acknowledge that Aboriginal and Torres Strait Islander people are avid users of social media, and this is commonly leveraged for health and community programs.<sup>34</sup> To our knowledge, using social media for research recruitment has not previously been undertaken with Aboriginal and Torres Strait Islander women of reproductive age in this context, but has been used in Australia and overseas in health research.<sup>35</sup>

### Demographics

Demographic variables that we collated from survey responses included Aboriginal and/or Torres Strait Islander status, age group (16–20, 21–34 or 35–49 years), number of children at home (none, 1–2, or 3 or more), use of an Aboriginal Health Service (yes or no), highest level of education (did not complete high school [up to Year 11], completed high school and/or currently studying, or completed post-school qualifications), remoteness (major city or regional/remote area), and socio-economic status (greatest, moderate or least area-level disadvantage). The latter two measures were derived from postcodes using the Australian Bureau of Statistics Australian Statistical Geography Standard Remoteness Structure (based on the Accessibility and Remoteness Index of Australia) and the Socio-Economic Indexes for Areas 2016 Index of Relative Socio-economic Disadvantage, respectively.

### Smoking status

Smoking status included current smoking status (current smoker or ex-smoker [any intensity]), smoking intensity in cigarettes per

day (CPD) (0–5, 6–10 or  $\geq 11$  CPD), HSI score,<sup>36,37</sup> urge frequency<sup>38</sup> and urge strength.<sup>39</sup> The HSI score was used to categorise participants at high or moderate dependency (combined owing to few participants) or low dependency.

### Quitting behaviour

Current smokers were asked whether they had tried to cut down in the previous month (yes or no). Current smokers and ex-smokers were asked about the duration of their longest quit attempt (categorised as unsustained [duration of hours or weeks] or sustained [duration of months or years]) and whether their last quit attempt was a sudden stop or a gradual cut down of cigarettes. Experiences of quitting were assessed based on definitions provided in previous publications.<sup>40–42</sup> Quitting suddenly can be understood as sudden or abrupt cessation of smoking, while quitting gradually refers to an attempt to quit smoking over a period (ie, reduce tobacco use or consumption, and then quit). Women were also asked about the amount of time since their last quit attempt, attempt to cut down in their last quit attempt and their use of stop-smoking medication (SSM).

We used two classifications of smoking status for all participants: current smoker versus ex-smoker, and daily/ex-daily smoker versus occasional/ex-occasional smoker. The first was used to understand differences in use of NRT and SSM by those who had successfully quit smoking, and the second was to explore whether NRT and SSM use differed between those who smoke daily and those who smoke less frequently. For current smokers, we also used the following indicators of nicotine dependence. This included smoking intensity (0–5, 6–10 or  $\geq 11$  CPD); time to first cigarette after waking ( $> 60$ , 31–60, 6–30 or  $\leq 5$  minutes), HSI score (low, moderate or heavy [calculated from smoking intensity and time to first cigarette after waking]),<sup>34</sup> urge frequency in the previous 24 hours (low or high), and urge strength (low or high).

All women were asked whether they feel confident talking to their doctor about quitting (reported as yes or no, with those who selected “not relevant” set as missing). Women were asked to select from a list of ten options of where they receive most of their information about smoking and quitting (with multiple responses allowed). Four separate variables were developed to categorise women based on whether they did, or did not, select each of the aggregated categories of health professionals, social marketing, word of mouth and online.

### Stop-smoking medication

The primary SSM outcome of interest was whether the women had ever used (versus never used) NRT and/or SSM. Types of NRT and SSM used and reasons for never using them were secondary outcomes of interest. Women were asked to select which types of medications they had used from a list of NRT and SSM options (with multiple responses allowed), and we report these individually and aggregated into four categories: NRT only, SSM only, both NRT and SSM, and neither NRT nor SSM. Women who had never used NRT or SSM were asked to select from a list of reasons for not using NRT or SSM (with multiple responses allowed). The five most selected reasons are reported individually within the full list, and we also report these aggregated into four categories: attitudes and beliefs, barriers, not quitting, and pregnancy.

### Statistical analysis

Analysis was conducted by an Indigenous-led statistical team with direction and oversight from the Which Way? governance committee, an Aboriginal and Torres Strait Islander governance

group. All analyses were conducted in Stata 16 (StataCorp). Demographic characteristics of women were quantified for the full sample. Distribution of smoking characteristics were quantified by remoteness groups (regional and remote areas combined due to small numbers) and age groups.  $\chi^2$  tests were used to test for differences between groups.

To explore concurrence between measures of nicotine dependence, the relationship between HSI score (low dependence versus moderate and high dependence combined), urge frequency and urge strength was assessed using the phi ( $\phi$ ) coefficient. Where estimated for two binary variables (as in the case here), this is equivalent to the Pearson correlation coefficient. A  $\phi$  coefficient of 0 indicates no relationship, 1 indicates a perfect positive relationship, and  $-1$  indicates a perfect negative relationship.

Associations between a priori selected demographic and smoking characteristics and sustained abstinence were examined. Characteristics selected were those conceptually thought to be linked to abstinence, restricted to available data, including quit method, use of Aboriginal health service, use of SSM, remoteness, HSI score, urge frequency and urge strength. The prevalence of sustained abstinence (ie, longest quit attempt lasting months or years) by each characteristic was calculated. Prevalence ratios (PRs) and 95% confidence intervals (CIs) for sustained abstinence by all characteristics were calculated using log binomial regression. Associations were run unadjusted and adjusted for age group and remoteness category.

Logistic regression was used to assess associations between demographic factors or characteristics and the use of NRT or SSM, reported as unadjusted odds ratios (ORs) (bivariate analysis) and 95% CIs. Logistic regression was also used to explore relationships between demographic variables, the types of NRT and SSM used, and reasons for never using them. An alpha level of 0.05 was the threshold for statistical significance (significance level), and a statistically significant relationship is reported where the  $P$  value is less than 0.05. For all analyses, data points with five or fewer responses are suppressed to protect confidentiality.

### Exclusion criteria

Participants were excluded from all analyses if they did not meet the inclusion criteria (self-identifying as an Aboriginal and/or Torres Strait Islander woman, aged 16–49 years, and a current or ex-smoker) or if their survey was incomplete.

### Ethics

The Which Way? study was developed by, and is co-owned with, Aboriginal communities in regional and urban New South Wales. The project upholds ethics principles of research with Aboriginal and Torres Strait Islander peoples in line with the National Health and Medical Research Council's *Guidelines for ethical conduct in Aboriginal and Torres Strait Islander health research*, the Aboriginal Health and Medical Research Council's *AH&MRC ethical guidelines: key principles (2020) V2.0* and the international CONSIDER statement. Ethics approvals were obtained from the Aboriginal Health and Medical Research Council (1603/19) and the University of Newcastle (H-2020-0092). All participants provided informed consent.

### Results

The survey was started by 865 individuals, of whom 607 were eligible. Of those eligible, 179 did not complete the survey,

**1 Demographic and smoking characteristics of participants included in the analysis (n = 428)**

	Number (percentage)*
<b>Age</b>	
16–20 years	61 (14.3%)
21–34 years	218 (50.9%)
35–49 years	149 (34.8%)
Mean ± SD age in years	30.5 ± 7.9
<b>Number of children</b>	
None	106 (24.8%)
1–2	178 (41.6%)
3 or more	144 (33.6%)
<b>Highest level of education</b>	
Up to year 9	46 (10.8%)
Year 10–11	115 (26.9%)
Year 12	85 (19.9%)
Current student at university/ TAFE or apprentice	84 (19.6%)
Trade certificate	44 (10.3%)
University degree	54 (12.6%)
<b>Remoteness</b>	
Urban	212 (49.5%)
Regional	187 (43.7%)
Remote	29 (6.8%)
<b>State or territory</b>	
New South Wales	191 (44.6%)
Queensland	112 (26.2%)
Western Australia	38 (8.9%)
Northern Territory	12 (2.8%)
Victoria	44 (10.3%)
South Australia	20 (4.7%)
Tasmania	6 (1.4%)
Australian Capital Territory	5 (1.2%)
<b>Aboriginal and Torres Strait Islander identity</b>	
Aboriginal	401 (93.7%)
Torres Strait Islander	8 (1.9%)
Aboriginal and Torres Strait Islander	19 (4.4%)
<b>Use of Aboriginal health service</b>	
Yes	302 (70.6%)
No	126 (29.4%)
<b>Smoking status</b>	
Current smoker, ≥ 1 CPD	215 (50.2%)
Current smoker, < 1 CPD	54 (12.6%)
Ex-smoker, ≥ 1 CPD	139 (32.5%)
Ex-smoker < 1 CPD	20 (4.7%)

Continues

**1 Demographic and smoking characteristics of participants included in the analysis (n = 428) (Continued)**

	Number (percentage)*
<b>Ever tried quitting</b>	
Yes	386 (90.2%)
No	42 (9.8%)
<b>Ever used NRT and/or SSM</b>	
Yes	153 (35.7%)
No	275 (64.3%)

\*Data are number (percentage) unless otherwise specified. CPD = cigarettes per day. NRT = nicotine replacement therapy. SD = standard deviation. SSM = stop-smoking medication. TAFE = Technical and Further Education. ◆

leaving 428 Aboriginal and Torres Strait Islander women who were included in the analyses. Demographic and smoking characteristics of those included are shown in [Box 1](#). Their mean age was 30.5 years, 49.5% resided in urban areas, 43.7% resided in regional areas, 44.6% resided in NSW, and 26.2% in Queensland. Most women (70.6%) reported using an Aboriginal health service, 62.9% were current smokers, and 90.2% had ever tried quitting.

Smoking and quitting characteristics of women residing in urban areas and women residing in regional and remote areas were generally similar. Among current smokers, those in regional and remote areas reported low urge frequency (62.0%) more often than those in urban areas (43.2%). About one-third of women (30.1%) in regional and remote areas reported having ever used SSM, compared with 41.5% of women in urban areas ([Supporting Information](#), Table 2).

Among women who smoked, younger women (aged 16–20 years) tended to smoke fewer cigarettes daily (57.1% smoked 0–5 CPD) and older women (aged 35–49 years) tended to smoke more cigarettes daily (48.2% smoked ≥ 11 CPD) ([Box 2](#)). A higher proportion of younger women (47.6%) than older women (14.5%) reported waiting over 60 minutes after waking to smoke. These findings coincide with greater proportions of women in the two younger age groups classified as having a low HSI score (61.9% of those aged 16–20 years, 41.0% of those aged 21–34 years) compared with older women (22.9% of those aged 35–49 years). In addition, more older women reported ever trying SSMs (52.4%) than younger women (11.5%). Of women who made a quit attempt, greater proportions of women in the two older age groups had sustained the attempt for years (45.6% and 38.8% in those aged 35–49 years and 21–34 years, respectively) compared with younger women.

Moderate positive relationships were found between HSI categories and urge frequency ( $\phi = 0.38$ ) and HSI categories and urge strength ( $\phi = 0.30$ ), while a strong relationship was found between urge frequency and urge strength ( $\phi = 0.64$ ). However, some discrepancies in categorisation of women existed; 32.7% of women with low dependence based on HSI score had high urge strength (9.6%), high urge frequency (7.7%), or both (15.4%); 50.3% of women with moderate or high dependency based on HSI score had low urge strength (12.7%), low urge frequency (5.5%), or both (32.1%) ([Supporting Information](#), Table 3).

Our analysis of associations with sustained abstinence is shown in [Box 3](#). Quitting suddenly, rather than gradually, was significantly associated with sustained abstinence after adjusting for age and remoteness (PR, 1.27 [95% CI, 1.10–1.48]).

## 2 Smoking characteristics of participants included in the analysis, by age group (n = 428)

	Number (percentage)		
Current smokers only (n = 269)	16–20 years (n = 42)	21–34 years (n = 144)	35–49 years (n = 83)
Smoking intensity*			
0–5 CPD	24 (57.1%)	48 (33.3%)	15 (18.1%)
6–10 CPD	12 (28.6%)	52 (36.1%)	28 (33.7%)
≥ 11 CPD	6 (14.3%)	44 (30.6%)	40 (48.2%)
Time to first cigarette after waking*			
> 60 minutes	20 (47.6%)	40 (27.8%)	12 (14.5%)
31–60 minutes	7 (16.7%)	24 (16.7%)	17 (20.5%)
6–30 minutes	9 (21.4%)	55 (38.2%)	29 (34.9%)
≤ 5 minutes	6 (14.3%)	25 (17.4%)	25 (30.1%)
Heaviness of Smoking Index score*			
Low	26 (61.9%)	59 (41.0%)	19 (22.9%)
Moderate	16 (38.1%)	62 (43.1%)	45 (54.2%)
High	0	23 (16.0%)	19 (22.9%)
Types of smoking products used (multi-selection)			
Factory-rolled cigarettes	27 (64.3%)	99 (68.8%)	67 (80.7%)
Roll-your-own cigarettes*	23 (54.8%)	65 (45.1%)	27 (32.5%)
E-cigarettes/other	7 (16.7%)	11 (7.6%)	8 (9.6%)
Urge frequency in last 24 hours			
Low	24 (57.1%)	78 (54.2%)	40 (48.2%)
High	18 (42.9%)	66 (45.8%)	43 (51.8%)
Urge strength in last 24 hours			
Low	30 (71.4%)	77 (53.5%)	45 (54.2%)
High	12 (28.6%)	67 (46.5%)	38 (45.8%)
Attempted to cut down in last month			
Yes	29 (69.0%)	93 (64.6%)	52 (62.7%)
No	13 (31.0%)	51 (35.4%)	31 (37.3%)
<b>Current smokers and ex-smokers (n = 428)</b>	<b>16–20 years (n = 61)</b>	<b>21–34 years (n = 218)</b>	<b>35–49 years (n = 149)</b>
Use of NRT and/or SSM*			
Yes	7 (11.5%)	68 (31.2%)	78 (52.3%)
No	54 (88.5%)	150 (68.8%)	71 (47.7%)
Time since last quit attempt*			
Days	8 (13.1%)	30 (13.8%)	11 (7.4%)
Weeks	15 (24.6%)	37 (17.0%)	18 (12.1%)
Months	27 (44.3%)	133 (61.0%)	107 (71.8%)
Never	11 (18.0%)	18 (8.3%)	13 (8.7%)
Longest period of not smoking (n = 381)*†			
Years	< 5‡	76 (38.8%)	62 (45.6%)
Months	22 (44.9%)	55 (28.1%)	43 (31.6%)
Weeks	10 (20.4%)	27 (13.8%)	10 (7.4%)
Days	13 (26.5%)	28 (14.3%)	19 (14.0%)
Hours	< 5‡	10 (5.1%)	< 5‡
Method used in last quit attempt (n = 386)†			
Stopped suddenly	34 (68.0%)	114 (57.0%)	82 (60.3%)
Cut down gradually	16 (32.0%)	86 (43.0%)	54 (39.7%)

\* Statistically significant difference between groups ( $P < 0.05$ ). † For those who had attempted to quit. ‡ Fewer than five responses; data suppressed to protect confidentiality. CPD = cigarettes per day. NRT = nicotine replacement therapy. SSM = stop-smoking medication. ◆

**3 Prevalence and prevalence ratios of sustained abstinence (longest quit attempt of months or years) by demographic and smoking characteristics for included participants who had attempted to quit**

	Number (percentage) with sustained abstinence	Unadjusted sustained abstinence PR (95% CI)	Adjusted sustained abstinence PR (95% CI)*
<b>Current smokers and ex-smokers (n = 381)</b>			
Method used in last quit attempt <sup>†</sup>			
Cut down gradually	90/151 (59.6%)	1 (Ref)	1 (Ref)
Stopped suddenly	171/230 (74.3%)	1.25 (1.07–1.45)	1.27 (1.10–1.48)
Use of Aboriginal health services			
No	77/109 (70.6%)	1 (Ref)	1 (Ref)
Yes	184/272 (67.6%)	0.96 (0.83–1.11)	0.93 (0.81–1.07)
Use of NRT and/or SSM			
No	155/233 (66.5%)	1 (Ref)	1 (Ref)
Yes	106/148 (71.6%)	1.08 (0.94–1.23)	1.02 (0.89–1.17)
Remoteness			
Urban	134/189 (70.9%)	1 (Ref)	1 (Ref)
Regional	109/166 (65.7%)	0.93 (0.80–1.07)	0.95 (0.83–1.09) <sup>‡</sup>
Remote	18/26 (69.2%)	0.98 (0.74–1.28)	1.04 (0.81–1.34) <sup>‡</sup>
<b>Current smokers only (n = 231)</b>			
Heaviness of Smoking Index score			
High	23/38 (60.5%)	1 (Ref)	1 (Ref)
Moderate	49/101 (48.5%)	0.80 (0.58–1.11)	0.83 (0.60–1.14)
Low	53/92 (57.6%)	0.95 (0.70–1.30)	1.04 (0.76–1.42)
Urge frequency in last 24 hours			
High	59/110 (53.6%)	1 (Ref)	1 (Ref)
Low	66/121 (54.5%)	1.02 (0.80–1.29)	1.05 (0.83–1.34)
Urge strength in last 24 hours			
High	56/101 (55.4%)	1 (Ref)	1 (Ref)
Low	69/130 (53.1%)	0.96 (0.75–1.21)	1.00 (0.79–1.26)

\* Adjusted for age group and remoteness unless otherwise specified. † Statistically significant ( $P < 0.05$ ). ‡ Adjusted for age group only. NRT = nicotine replacement therapy. PR = prevalence ratio. Ref = reference category. SSM = stop-smoking medication. ◆

Use of Aboriginal health services, use of NRT and/or SSM, remoteness of residence, HSI score, urge frequency and urge strength were not associated with length of abstinence.

**Use of cessation aids and associated factors**

Over one-third of women had ever used NRT and/or SSM (35.7%) (Box 1), and there was variation in NRT and SSM use across different demographics (Box 4). NRT and SSM use was significantly more likely in the two older age groups compared with the youngest age group (21–34 years: OR, 3.50 [95% CI, 1.51–8.08]; 35–49 years: OR, 8.47 [3.62–19.84]), and less likely in women residing in regional and remote areas compared with those residing in major cities (OR, 0.61 [95% CI, 0.41–0.90]), but there were no other significant demographic predictors of NRT and SSM use (Box 5). Similar proportions of women had used products across the broad NRT and SSM categories (14.5% [62/428] NRT only, 8.6% [37/428] SSM only, 12.6% [54/428] both NRT and SSM) (Box 6). The most used products were nicotine patches (23.1% [99/428]), varenicline (20.1% [86/428]) and nicotine gum (10.7% [46/428]). The median number of NRT and SSM

types used by women who had ever used these products was 2 (interquartile range, 1).

Among those who had never used NRT or SSM, the most frequently reported reasons were in the category of attitudes and beliefs, with 79.6% of women in this group (219/275) selecting a reason in this category (Box 6). People living in regional and remote areas were significantly less likely to select a reason in this category than those living in urban areas (OR, 0.50 [95% CI, 0.27–0.94]). Women in older age groups were significantly less likely to select a reason in the barriers category than those aged < 21 years (21–34 years: OR, 0.51 [95% CI, 0.27–0.96]); 35–49 years: OR, 0.41 [95% CI, 0.20–0.86]), as were those in the moderate disadvantage category compared with those in the greatest disadvantage category (OR, 0.50 [95% CI, 0.29–0.88]). Those who were least disadvantaged were more likely to say they were not ready to quit or that NRT was not relevant to them (OR, 2.61 [1.06–6.44]).

The five most frequently selected individual reasons for not using NRT or SSM were: wanting to quit on my own without help (31.6% [87/275]); cost (27.3% [75/275]); prefer not to use

#### 4 Use of NRT and/or SSM in different demographic characteristic categories

	Number/total (percentage) who had ever used NRT and/ or SSM ( <i>n</i> = 153)
Age	
16–20 years	7 (4.6%)
21–34 years	68 (44.4%)
35–49 years	78 (51.0%)
Number of children	
None	33 (21.6%)
1–2	64 (41.8%)
3 or more	56 (36.6%)
Use of Aboriginal health service	
No	39 (25.5%)
Yes	114 (74.5%)
Highest level of education	
Did not complete high school	64 (41.8%)
Completed high school and/or currently studying	52 (34.0%)
Completed tertiary education/other post-school qualifications	37 (24.2%)
Remoteness	
Major cities	88 (57.5%)
Regional/remote	65 (42.5%)
Socio-economic status	
Greatest area-level disadvantage	76 (50.0%)
Moderate area-level disadvantage	57 (37.5%)
Least area-level disadvantage	19 (12.5%)

NRT = nicotine replacement therapy. SSM = stop-smoking medication. ♦

medicines (26.9% [74/275]); concerns about side effects (20.0% [55/275]); and think it's better to quit cold turkey (19.6% [54/275]). Women who had three or more children at home were significantly less likely to select that they wanted to quit on their own, without help (OR, 0.40 [95% CI, 0.20–0.79]). No other differences by demographic characteristics were identified in the top five reasons.

There were several factors related to smoking characteristics and quitting behaviour that were significantly associated with NRT and SSM use (Box 5). Occasional and ex-occasional smokers were significantly less likely to have used NRT and/or SSM (OR, 0.20 [95% CI, 0.10–0.42]) compared with daily and ex-daily smokers. Those who smoked more frequently and those with higher levels of nicotine dependence were more likely to have ever used NRT or SSM (6–10 CPD: OR, 2.52 [95% CI, 1.23–5.18]; ≥ 11 CPD: OR, 7.47 [95% CI, 3.67–15.18]; time to first cigarette after waking 6–30 minutes: OR, 2.99 [95% CI, 1.46–6.11], and time to first cigarette after waking ≤ 5 minutes: OR, 4.78 [95% CI, 2.18–10.48]; moderate HSI score: OR, 2.44 [95% CI, 1.34–4.46]; heavy HSI: OR, 8.82 [95% CI, 3.92–19.83]; high urge frequency: OR, 2.08 [95% CI, 1.25–3.44]). Those who had tried to cut down gradually

in their last quit attempt were more likely to have ever used NRT and/or SSM than those who had tried to stop smoking suddenly (OR, 3.04 [95% CI, 1.98–4.65]). NRT and SSM use was also more likely among women who were confident talking to their doctor about quitting (OR, 2.50 [95% CI, 1.23–5.10]) and who received most of their information from a health professional (OR, 1.71 [95% CI, 1.11–2.63]).

## Discussion

Which Way? is among the first Indigenous-led and governed studies centred on reporting on smoking and quitting behaviour among Aboriginal and Torres Strait Islander women across diverse nation groups as a national sample, and exploring associations with sustained abstinence and use of cessation medications. Social media was used to recruit participants to complete a community-developed online survey, which had a high completion rate (70.5%). This suggests that conducting this type of research is feasible and acceptable, especially considering that the survey was rolled out during the coronavirus 2019 (COVID-19) pandemic and taking into account the safety of potential participants.

## Smoking and quitting behaviour

Our study has shown that Aboriginal and Torres Strait Islander women of reproductive age are making quit attempts and are successfully quitting. Suddenly quitting, rather than reducing, was associated with sustained abstinence. Smoking characteristics and quitting behaviour were similar for women residing in urban and regional areas, coinciding with evidence on the wider Aboriginal and Torres Strait Islander community.<sup>43</sup> Over 60% of women reported making a quit attempt in the past month, with 70.9% of women in urban areas and 65.7% of women in regional areas maintaining cessation for months or years. Younger women smoked fewer cigarettes per day and delayed the first cigarette of the day compared with older women. Older women reported greater sustained quit attempts and more use of cessation aids. Some of the differences reported by age are likely to reflect differences in smoking behaviour across the life course.<sup>44</sup>

These findings are consistent with the vast majority of Aboriginal and Torres Strait Islander smokers wanting to quit, wishing they never took up smoking, and making quit attempts.<sup>45</sup> For many women, pregnancy motivates a change in tobacco use,<sup>46,47</sup> including frequent quit attempts.<sup>22</sup> Previous and current interventions are providing Aboriginal and Torres Strait Islander women with cessation aids and supports during pregnancy,<sup>40,48–50</sup> which may have influenced the results among older women.

Maternal care has been identified as the optimal setting to support Aboriginal and Torres Strait Islander women to quit during pregnancy.<sup>51</sup> However, “proportionate universalism” needs to be considered, whereby maternal care and general tobacco control is accompanied by additional measures for priority settings and populations. Specifically, appropriately resourced, holistic, women-centred smoking cessation care, including relevant supports to reduce uptake and prevent relapse, is required. This should include Aboriginal health service leadership in developing appropriate supports and resources. Over 70% of Aboriginal and Torres Strait Islander women reported Aboriginal health services as their preferred service provider.<sup>52</sup> These services should be resourced

## 5 Analysis of factors associated with use of NRT and/or SSM

	Number/total (percentage) who had ever used NRT and/or SSM	Odds ratio (95% CI) for ever using NRT and/or SSM
<b>Demographic factors (current smokers and ex-smokers; n = 428)</b>		
Age		
16–20 years	7/61 (11.5%)	1 (Ref)
21–34 years	68/218 (31.2%)	3.50 (1.51–8.08)*
35–49 years	78/149 (52.3%)	8.47 (3.62–19.84)*
Number of children		
None	33/106 (31.1%)	1 (Ref)
1–2	64/178 (36.0%)	1.24 (0.74–2.07)
3 or more	56/144 (38.9%)	1.41 (0.83–2.39)
Use of Aboriginal health service		
No	39/126 (31.0%)	1 (Ref)
Yes	114/302 (37.7%)	1.35 (0.87–2.11)
Highest level of education		
Did not complete high school	64/161 (39.8%)	1 (Ref)
Completed high school and/or currently studying	52/169 (30.8%)	0.67 (0.43–1.06)
Completed tertiary education/other post-school qualifications	37/98 (37.8%)	0.92 (0.55–1.54)
Remoteness		
Major cities	88/212 (41.5%)	1 (Ref)
Regional/remote	65/216 (30.1%)	0.61 (0.41–0.90)*
Socio-economic status		
Greatest area-level disadvantage	76/211 (36.0%)	1 (Ref)
Moderate area-level disadvantage	57/149 (38.3%)	1.1 (0.71–1.70)
Least area-level disadvantage	19/65 (29.2%)	0.73 (0.40–1.34)
<b>Smoking characteristics and quitting behaviour (current smokers and ex-smokers; n = 428)</b>		
Smoking status		
Current smoker	97/269 (36.1%)	1 (Ref)
Ex-smoker	56/159 (35.2%)	0.96 (0.64–1.45)
Smoking status		
Daily/ex-daily	144/354 (40.7%)	1 (Ref)
Occasional/ex-occasional	9/74 (12.2%)	0.20 (0.10–0.42)*
Longest period of not smoking <sup>†</sup>		
Unsustained attempt (hours or weeks)	44/125 (35.2%)	1 (Ref)
Sustained abstinence (months or years)	106/261 (40.6%)	1.26 (0.81–1.96)
Method used in last quit attempt		
Stopped suddenly	65/230 (28.3%)	1 (Ref)
Cut down gradually	85/156 (54.5%)	3.04 (1.98–4.65)*
Confident talking to doctor about quitting		
No	11/50 (22.0%)	1 (Ref)
Yes	110/266 (41.4%)	2.50 (1.23–5.10)*

Continues



## 5 Analysis of factors associated with use of NRT and/or SSM (Continued)

	Number/total (percentage) who had ever used NRT and/or SSM	Odds ratio (95% CI) for ever using NRT and/or SSM
Sources of most information about smoking and quitting (multi-selection)		
Health professionals		
Not selected	42/150 (28.0%)	1 (Ref)
Selected	111/278 (39.9%)	1.71 (1.11–2.63)*
Social marketing		
Not selected	98/258 (38.0%)	1 (Ref)
Selected	55/170 (32.4%)	0.78 (0.52–1.17)
Word of mouth		
Not selected	108/278 (38.8%)	1 (Ref)
Selected	45/150 (30.0%)	0.67 (0.44–1.03)
Online		
Not selected	118/327 (36.1%)	1
Selected	35/101 (34.7%)	0.94 (0.59–1.50)
<b>Smoking characteristics and quitting behaviour (current smokers only; n = 269)</b>		
Smoking intensity		
0–5 CPD	14/87 (16.1%)	1 (Ref)
6–10 CPD	30/92 (32.6%)	2.52 (1.23–5.18)*
≥ 11 CPD	53/90 (58.9%)	7.47 (3.67–15.18)*
Time to first cigarette after waking		
> 60 minutes	14/72 (19.4%)	1 (Ref)
31–60 minutes	14/48 (29.2%)	1.71 (0.73–4.00)
6–30 minutes	39/93 (41.9%)	2.99 (1.46–6.11)*
≤ 5 minutes	30/56 (53.6%)	4.78 (2.18–10.48)*
Heaviness of Smoking Index score		
Low	21/104 (20.2%)	1 (Ref)
Moderate	47/123 (38.2%)	2.44 (1.34–4.46)*
Heavy	29/42 (69.0%)	8.82 (3.92–19.83)*
Urge frequency in last 24 hours		
Low	40/142 (28.2%)	1 (Ref)
High	57/127 (44.9%)	2.08 (1.25–3.44)*
Urge strength in last 24 hours		
Low	48/152 (31.6%)	1 (Ref)
High	49/117 (41.9%)	1.56 (0.95–2.58)
Attempted to cut down in last month		
No	34/95 (35.8%)	1 (Ref)
Yes	63/174 (36.2%)	1.02 (0.60–1.71)

\* Statistically significant ( $P < 0.05$ ). † For those who had attempted to quit. CPD = cigarettes per day. NRT = nicotine replacement therapy. Ref = reference category. SSM = stop-smoking medication. ◆

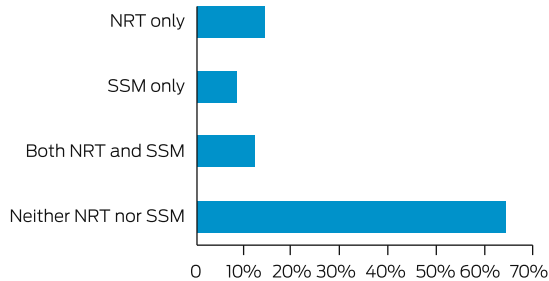
appropriately to offer tailored supports for Aboriginal and Torres Strait Islander women to be smoke-free before, during and after pregnancy.

Research has detailed health professionals advising Aboriginal and Torres Strait Islander women to reduce tobacco use, rather than quit.<sup>22</sup> Our study found a statistically significant association

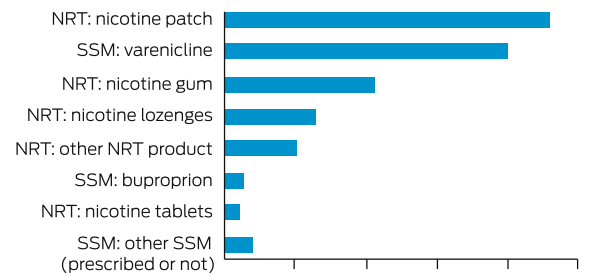
between sudden quitting and sustained abstinence. These findings support the call for health providers to advise quitting, rather than reducing consumption.<sup>41</sup> Previous research has shown that maternal health staff lack the confidence to advise quitting,<sup>53</sup> which could be influencing the continued high rates of tobacco use during pregnancy.

## 6 Use of NRT and/or SSM and reasons for not using cessation aids\*

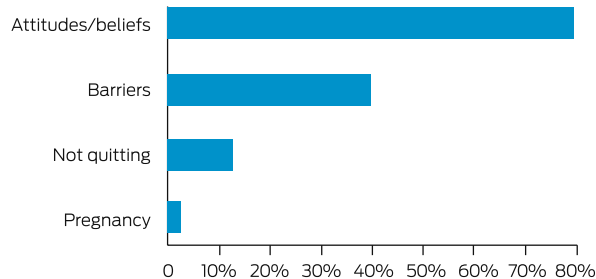
Proportion of women who had or had not used NRT and/or SSM  
(of all participants included in analysis;  $n = 428$ )



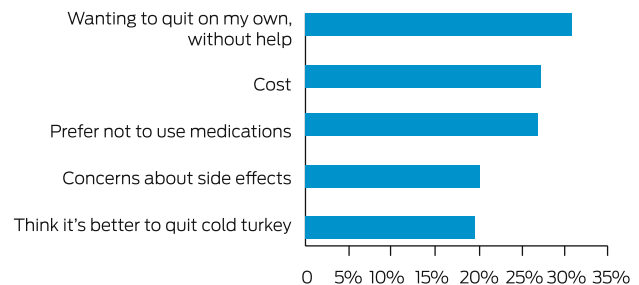
Proportion of women who had tried each type of NRT or SSM  
(of all participants included in analysis;  $n = 428$ )



Four categories of reasons for not using cessation aids  
(of those who had not used them;  $n = 275$ )



Top five reasons for not using cessation aids  
(of those who had not used them;  $n = 275$ )



NRT = nicotine replacement therapy. SSM = stop-smoking medication. \* Multiple reasons were allowed.

Although HSI score, urge frequency and urge strength are reported as predictors of abstinence in the general population,<sup>38,39,54</sup> our research has shown that there was variance in categorical measures in our study population (such as low HSI scores among women with high urge strength and/or high urge frequency) and that urge frequency and urge strength were not predictors of abstinence. Similarly, previous research with Aboriginal and Torres Strait Islander smokers has shown that previous quit attempts, frequent quit attempts and dependence are not associated with sustained abstinence.<sup>55</sup> However, dependence measures have been shown to be associated with wanting to quit.<sup>56</sup> Encouragingly, these results indicate that Aboriginal and Torres Strait Islander women can and will quit at any stage. Identifying nicotine dependence or a specific stage of behaviour change is not essential when offering support to quit; rather, planning a quit date and offering evidence-based support can lead to successful smoke-free outcomes.

### Use of cessation aids and associated factors

Women across demographic groups used and were interested in using NRT and SSM, including women of different ages, levels of disadvantage, geographical contexts and numbers of children. Just over one-third of women had ever tried using NRT and/or SSM, in line with evidence in the wider Aboriginal and Torres Strait Islander community, in which use of these products is lower than in the general population.<sup>25</sup> Nicotine patches (23.1%), varenicline (20.1%) and nicotine gum (10.7%) were most commonly used. PBS subsidies are likely to have affected these results by improving access to NRT and SSM.

We found that women who smoked more frequently and those who were more nicotine dependent were more likely to have ever used NRT and/or SSM, in line with the recommended practice of offering NRT or SSM to women reporting higher nicotine dependence and not to lower level smokers. We also found that women were significantly more likely to have used NRT and/or SSM if they had tried to quit gradually, rather than suddenly. It is unclear whether women are being advised to use NRT or SSM to quit and/or reduce cigarette smoking. Suddenly quitting may be more effective than gradually reducing consumption as a cessation method.<sup>57</sup>

Of the women in our study who had never used NRT or SSM, most reported attitudes and beliefs as the primary reason (80.0%). Many women in our study reported wanting to quit on their own and "cold turkey" due to concerns about adverse effects of medications and a preference to not use medications, as seen in qualitative research.<sup>22,58</sup> However, those with multiple children at home were significantly less likely to want to quit on their own or without help.

The Which Way? study found that any past use of NRT or SSM was more likely among older, heavier smokers, partly due to opportunities to access NRT and SSM over time (exposure-response relationship), suggesting that access schemes may mostly be reaching those with greater need. However, NRT and SSM use is lower in Aboriginal and Torres Strait Islander populations than in the broader Australian population, presenting an opportunity to improve access and use among Aboriginal and Torres Strait Islander women, which would help address racialised inequities in smoking prevalence. Consistent messages from health professionals are recommended to increase the uptake of and motivation to use NRT and SSM to quit successfully during

pregnancy.<sup>39,59,60</sup> Overseas evidence among smokers highlights safety- and efficacy-related misinformation, with the majority of smokers reporting that they would start using NRT or SSM if they were provided information to address their medication-related doubts and misconceptions.<sup>60</sup> Our study found that confidence in talking to health professionals and receiving information from a health professional increased the likelihood of using NRT or SSM. This evidence highlights the opportunity to increase support, including offering NRT and SSM, and the important role of health providers in fostering smoke-free behaviour. This is consistent with the National Preventive Health Strategy commitment to eliminating smoking during pregnancy to provide newborns with the best chance to have a healthy start to life.

Many people quit cold turkey, without help from anyone else.<sup>61</sup> However, there are many people who want to stop smoking but require support.<sup>23</sup> Coupled with support and counselling, NRT and SSM may help people to quit successfully. Ultimately, sovereignty and self-determination in the approach to quitting is of utmost importance, and this is reflected in the use of smoking cessation aids. Health providers should be aware that client interest and uptake in cessation aids may change over time, including subsequent pregnancies. This aligns with cessation guidelines which state “The choice of therapy is based on clinical suitability and patient preference”.<sup>62</sup>

In successfully supporting Aboriginal and Torres Strait Islander smokers to quit, it is valuable to understand coloniality and the ongoing effects of colonisation on tobacco use.<sup>3</sup> This evidence helps to contextualise and better understand the Aboriginal and Torres Strait Islander tobacco use epidemic, which requires continuation and extension of the suite of comprehensive tobacco reduction programs and policies used in Australia.<sup>62</sup> This includes urgently required work to support the development and implementation of meaningful cessation support services, to accelerate reductions in tobacco use during pregnancy and tobacco-related morbidity and mortality. While smoking cessation appears to be a priority — as outlined in the National Preventive Health Strategy and the imminent new Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan — such strategies need to be adequately resourced, for a sustained period, and informed by the strongest available evidence. Comprehensive and multi-faceted support strategies are required and, consistent with the WHO Framework Convention on Tobacco Control, should be embedded within the health care system to promote smoke-free behaviour.

### Limitations

This study is not population representative and involved various challenges, such as the sensitive nature of the survey topic, the stigma associated with smoking and pregnancy, and the lengthy period needed to collect original data on Aboriginal and Torres Strait Islander women smoking during pregnancy. This study built rapport and generated important evidence on smoking and quitting among Aboriginal and Torres Strait Islander women of reproductive age, building on previous work by other authors.<sup>63</sup> National Aboriginal and Torres Strait Islander studies that uphold Indigenous data sovereignty principles, such as *Mayi Kuwayu*, report a 2.3% response rate, with the highest number of respondents being over 50 years of age,<sup>64</sup> reflecting some of the challenges of meaningfully undertaking research in Aboriginal and Torres Strait Islander contexts. We recognise that NSW and Queensland respondents are most represented in the sample, somewhat reflective of the population distribution. However, work is

required in remote areas of Australia to better understand the unique experiences in these settings. We also acknowledge that access to social media and connectivity affects the sample. Aboriginal community partners suggested this approach given the rapid uptake of digital technologies, and recognising COVID-19 restrictions and the need to keep participants and communities as safe as possible. Acknowledging the hard-to-reach population, this study provides evidence that a community-developed online survey promoted through social media can be an appropriate method to reach the community.

### Conclusion

We found that Aboriginal and Torres Strait Islander women across urban, regional and remote settings are making quit attempts and are successfully quitting. We also found that suddenly quitting rather than reducing smoking was associated with sustained abstinence. Services should systematically support all women to quit and avoid relying on measures of dependence to trigger an offer of support. Women smoking fewer cigarettes with lower urge strength and lower urge frequency are no more likely to sustain abstinence than women reporting higher dependency. Smoking cessation care should uphold sovereignty and self-determination of quitting and provide consistent health education and messaging on cessation options, acknowledging that interest and uptake may change over time. Cessation supports need to be embedded within the health care system. Although use of an Aboriginal health service did not predict quit duration, given that they are the preferred health provider for many Aboriginal and Torres Strait Islander women, there is an opportunity for these services to be better resourced to develop and embed appropriate cessation supports accessible through a wide range of services for all women. Ongoing research is required to measure and accelerate effectiveness of sustainable smoking cessation supports, helping to foster an environment in which Aboriginal and Torres Strait Islander people can thrive.

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## Supporting Information

Additional Supporting Information is included with the online version of this article.