

# Prevalence and risk factors for tobacco smoking among pre-adolescent Pacific children in New Zealand

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## ABSTRACT

**INTRODUCTION:** Pacific New Zealanders have a high prevalence of smoking, with many first smoking in their pre-adolescent years.

**AIM:** To identify risk factors for tobacco smoking among Pacific pre-adolescent intermediate school children.

**METHODS:** A cross-sectional survey of 2208 Pacific students aged between 10 and 13 years from four South Auckland intermediate schools who were asked about their smoking behaviour between the years 2007 and 2009.

**RESULTS:** The prevalence of Pacific ever-smokers (for 2007) in Year 7 was 15.0% (95% Confidence Interval [CI] 12.0%–18.3%) and Year 8, 23.0% (95% CI 19.5%–26.7%). Multivariate modelling showed the risk factors for ever-smoking were Cook Island ethnic group (OR 1.72; 95% CI 1.26–2.36, ref=Samoan), boys (OR 1.47; 95% CI 1.14–1.89), age (OR 1.65; 95% CI 1.36–2.00), exposure to smoking in a car within the previous seven days (OR 2.24; 95% CI 1.67–3.01), anyone smoking at home within the previous seven days (OR 1.52; 95% CI 1.12–2.04) and receiving more than \$NZ20 per week as pocket money/allowance (OR=1.91, 95% CI 1.23–2.96).

**DISCUSSION:** Parents control and therefore can modify identified risk factors for Pacific children's smoking initiation: exposure to smoking at home or in the car and the amount of weekly pocket money the child receives. Primary health care professionals should advise Pacific parents to make their homes and cars smokefree and to monitor their children's spending. This study also suggests a particular need for specific Cook Island smokefree promotion and cessation resources.

**KEYWORDS:** Adolescent; child; ethnic group; New Zealand; Pacific; smoking

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## Introduction

Tobacco smoking rates have been slowly declining since the 1970s in New Zealand.<sup>1,2</sup> This trend is also apparent for Pacific peoples (aged 15 years and over) resident in New Zealand, with the smoking prevalence in this group declining from 38% to 25% for the years 1990–2012/13 (compared to European New Zealander smoking prevalence of 15% for 2012/13).<sup>3,4</sup> By 2013, the smoking prevalence had dropped to 23% for Pacific peoples and 15% for all New Zealanders.<sup>5,6</sup>

Additionally, from 1999 to 2009, the prevalence of daily smoking in Pacific girls (aged 14–15 years) declined from 23% to 7.2% and for Pacific boys of the same age declined from 16.6% to 6%.<sup>7</sup> The gap between Pacific and European New Zealand adolescent prevalence of daily smoking halved over this decade.<sup>7</sup>

In 2006, Pacific peoples made up 6.9% (approximately 266 000 people including 110 000 children 14 years and under) of the New Zealand population. This is projected to increase to 9.6%

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by 2026.<sup>8,9</sup> Samoans made up the largest group (131 000), followed by Cook Islanders (58 000), Tongans (50 500) and Niueans (22 476).<sup>9</sup>

Pacific peoples (from Samoa, Tonga, the Cook Islands and Niue) started migrating to New Zealand in large numbers in the 1960s and 1970s, as a response to a labour shortage within New Zealand.<sup>9</sup> By the late 1980s, these jobs began to disappear as successive New Zealand governments embraced privatisation and free trade (known locally as 'Rogernomics').<sup>10</sup> By 1992, unemployment among Pacific people had soared to 26.1%—the highest among any ethnic group within New Zealand; Māori had a similar rate of 25.6%, while the European New Zealand rate was well under 10%.<sup>11</sup> Though the situation has improved in more recent years, the inequities persist, with unemployment for Pacific people in 2012 at 14.5% versus 6.6% nationally.<sup>12</sup> Pacific people also have lower median incomes than other New Zealanders (\$20,500 versus \$24,400 respectively), live in overcrowded houses (4.4 average people per household for Pacific people versus 2.7 for all New Zealanders), which encourages diseases such as rheumatic fever, tuberculosis, meningococcal disease and skin infections.<sup>13</sup>

It is well known that smoking is correlated to lower socioeconomic position<sup>14</sup>—which could go some way to explaining Pacific peoples' high smoking prevalence.

Most people (88%) who smoke as adults start smoking before the age of 18 years, and nearly all smokers (99%) by the age of 26.<sup>15</sup> Overall, many studies suggest that smoking prevention efforts should be directed to early to middle childhood and aimed at parents as well as children.<sup>16</sup> We also know that children can develop symptoms of nicotine dependence (or addiction) having only ever smoked one or two cigarettes in a week, and that this dependence is stronger for girls than boys.<sup>17,18</sup> This means that it is important to investigate the risk factors of 'ever-smoking' in children because this is the point of initiation into smoking, rather than 'daily smoking'.

The main risk factors for adolescents (an older age group than the present study) for taking up

smoking are: if their parent(s) or peers smoke;<sup>19</sup> binge drinking;<sup>20</sup> weekly 'pocket money' (allowance) above \$NZ20 per week;<sup>21</sup> and smoking exposure in cars.<sup>22</sup> An international paper on children aged 9–12 years in the Netherlands found there were no direct effects of environmental smoking (parental, peer or sibling smoking) on children's susceptibility to smoking, but that there were significant parental indirect effects via children's 'perceived safety of casual smoking' and 'cue-triggered wanting to smoke' (e.g. seeing somebody smoke, smelling cigarette smoke, or seeing an ashtray).<sup>23</sup>

Very little is known about the reasons why Pacific young people begin smoking and maintain smoking, and only limited data exist on the effectiveness of smoking interventions for Pacific people.<sup>24,25</sup> For these reasons, and because tobacco control is a child protection activity, we undertook analyses from a large study involving many young Pacific people. The aim was to identify risk factors for smoking amongst this population group.

## Methods

The study used data from Keeping Kids Smoke-free (KKS), a quasi-experimental study undertaken in Auckland from 2007 to 2009. The rationale, design and implementation for the trial are detailed elsewhere.<sup>16</sup> In brief, KKS involved four schools for children aged between 10 and 13 years in South Auckland, an urban area with a large Pacific population and socioeconomic deprivation. Two schools received the KKS intervention, while two schools were comparison sites. The intervention included a number of components: smoking cessation for parents; a DVD which starred celebrities urging parents to take practical steps to reduce their children's risk of smoking; and communication with retailers and controlled purchase operations to reduce tobacco sales to minors. There was also regular communication with parents on promotion of smokefree homes and cars.

For this analysis, we used only baseline data from the KKS study. Students in participating schools filled out questionnaires in English on PDAs (Personal Digital Assistants) and paper in

a designated classroom. This took about an hour per class. There were also trained assistants on hand with knowledge of Pacific languages to help students who had difficulty with English.

### Questionnaire

Ethnicity was determined by the student answering the question: *'Which ethnic group/s do you belong to? Tick the boxes that apply to you.'* They could choose from: Māori, Samoan, Tongan, Niuean, Cook Island Māori, Other Pacific Island, New Zealand European, Chinese, Indian, Other Asian, and Other. If the student chose any Pacific ethnicity they were coded as Pacific regardless of any other ethnicity they chose, including Māori. Ministry of Health Data Ethnicity protocols<sup>26</sup> were then used to further categorise participants into specific Pacific ethnicities. Specifically, the priority order that pertained to KKS was: Niuean (highest), Tongan, Cook Island, Samoan and Other Pacific Island (lowest).

An ever-smoker was determined by an affirmative response to the following question: *'Have you ever smoked a cigarette, even just a few puffs?'* Negative responders were classified as never-smokers. Data on gender, date of birth and whether the student was born in New Zealand were gathered from participants. Students were also asked *'Who was smoking around you in your home during the past seven days?'* If at least one person (father, mother, grandparent, other caregiver, older brother, older sister, other people, best friend, other cousin) smoked in the home, then this was categorised as reported exposure to smoking. Reported exposure to smoking in cars was categorised in the same way. The students were also asked: *'During the past seven days (one week), how much pocket money (\$ per week) did you get?'* Categories included: I did not get any pocket money; \$1–5; \$6–10; \$11–15; \$16–20; \$21–30; \$31–40; \$41–50; and over \$50. These categories were reduced to \$0, \$1–10, and \$20+ to simplify the analysis. Perceived parental permissiveness towards smoking was deduced by asking whether the participant agreed or disagreed with the following statement: *'My parents think it is OK for people under the age of 16 to smoke.'* There was also a 'Don't know' response category for this question.

### WHAT GAP THIS FILLS

**What we already know:** Prevalence and risk factors for smoking among secondary school students (aged 13–17 years) in New Zealand are well-researched because of large, regular studies commissioned by Action on Smoking and Health (ASH) New Zealand and the New Zealand Ministry of Health.

**What this study adds:** Prevalence and risk factors for smoking among Pacific children (aged 10–13 years) are not well known. Identification of risk factors may help prevent smoking uptake by pre-adolescents.

For this paper, we calculated ever-smoking prevalence for Year 7 and Year 8 students in 2007 (which was the first year of the KKS study).

### Statistical analysis

We analysed the data using SAS version 9.2 (SAS Institute., Cary, NC, US). All tests were two-sided with significance set to  $\alpha=0.05$  and  $p<0.05$  considered statistically significant. Odds ratios (ORs) were estimated using logistic regression analyses.

Ethics approval was granted by the University of Auckland Human Participants Ethics Committee (Ref. 2006/416). Written consent for participation was obtained from the parents of the children who took part in the survey.

### Results

#### Demographics

The participation rate for the KKS study as a whole was 83%, with 5648 students approached at baseline and 4688 participating. This analysis was restricted to 2208 Pacific children who completed all the relevant questions. Table 1 shows the demographic characteristics of the 2208 students, categorised by whether they were ever-smokers or never-smokers. Almost three-quarters of students were aged 10–11 years, with the rest aged 12–13 years. Three-quarters of students were in Year 7 and about one-quarter in Year 8. There were slightly more girls in the study than boys. Nearly half of the Pacific cohort was Samoan. There were: 1026 (46.5%) Samoan; 429 (19.4%) Tongans; 412 (18.7%) Cook Island-

Table 1. Demographic characteristics of students, by smoking status (N=2208), showing count (%).

Demographic	Ever-smokers n=323 No. (%)	Never-smokers n=1885 No. (%)
<b>Age (years)</b>		
10–11	197 (61.0)	1418 (75.2)
12–13	126 (39.0)	467 (24.8)
<b>School Year</b>		
Year 7	200 (61.9)	1471 (78.0)
Year 8	123 (38.1)	414 (22.0)
<b>Gender</b>		
Female	147 (45.5)	1000 (53.1)
Male	176 (54.5)	885 (46.9)
<b>Ethnicity</b>		
Samoan	130 (40.2)	896 (47.5)
Cook Island	93 (28.8)	319 (16.9)
Tongan	71 (22.0)	358 (19.0)
Niuean	19 (5.9)	138 (7.3)
Other Pacific	10 (3.1)	174 (9.2)
Smoking exposure in car (in past 7 days)? Yes	182 (56.3)	538 (28.5)
Smoking exposure in home (in past 7 days)? Yes	197 (61.0)	706 (37.5)
<b>Pocket money received in the past 7 days</b>		
\$NZ0 (reference)	36 (11.1)	297 (15.8)
\$NZ1–10	122 (37.8)	916 (48.6)
\$NZ11–20	72 (22.3)	368 (19.5)
More than \$NZ20	93 (28.8)	304 (16.1)
Born in New Zealand (Yes)	272 (84.2)	1418 (75.2)
<b>Perceived parental pro-smoking attitude</b>		
No	237 (73.4)	1563 (83.0)
Yes	36 (11.2)	120 (6.4)
Don't know	49 (15.2)	201 (10.7)

ers; 157 (7.1%), Niueans; and Other Pacific 184 (8.3%). Most of the students were New Zealand born (76.5%). About a third of students (32.6%) reported someone had smoked in a car they were travelling in within the last seven days, while 40.9% of students reported people smoking in their home. Overall, 84.9% of students received some pocket money.

### Prevalence of ever-smoking

Table 2 shows the prevalence of Pacific students in Year 7 and Year 8 who reported having ever-

smoked at baseline in 2007. This sample was made up of a total of 1030 students consisting of 472 boys (45.8%) and 558 girls (54.2%). Cook Islanders had the highest prevalence followed by Tongan, Samoan, Niuean and Other Pacific.

Table 3 shows the multivariate odds ratios of ever-smoked with ethnicity, gender, age, anyone smoking in a car within seven days, anyone smoking at home within seven days, weekly pocket money, whether born in New Zealand and perceived parental permissive attitude towards smoking.

Table 2. Prevalence of Pacific students in Year 7 and Year 8 who reported having ever-smoked at baseline in 2007, by Pacific ethnic group

	Year 7			Year 8		
	No. of ever-smokers	Total	Prevalence (95% CI)	No. of ever-smokers	Total	Prevalence (95% CI)
<b>Samoan</b>	28	226	12.4% (8.6–17.2%)	52	254	20.5% (15.8–25.8%)
<b>Cook Island</b>	26	99	26.3% (18.3–35.6%)	34	99	34.3% (25.5–44.1%)
<b>Tongan</b>	15	98	15.3% (9.2–23.5%)	26	92	28.3% (19.8–38.1%)
<b>Niuean</b>	4	39	10.3% (3.3–22.9%)	7	45	15.6% (7.1–28.4%)
<b>Other Pacific</b>	*	32	*	4	46	8.7% (2.8–19.7%)
<b>Total</b>	74	494	15.0% (12.0–18.3%)	123	536	23.0% (19.5–26.7%)

CI Confidence interval

\* Data omitted if less than 4 per cell

Table 3. Multivariate odds ratios at baseline of having ever-smoked (n=2208) versus never-smoked

Variable	Multivariate OR	95% CI	Wald $\chi^2$	p-value
<b>Ethnicity</b>				
<b>Cook Island</b>	1.72	1.26–2.36	11.6	<0.0001
<b>Tongan</b>	1.31	0.94–1.82	2.6	0.11
<b>Niuean</b>	0.77	0.45–1.32	0.88	0.35
<b>Other Pacific</b>	0.52	0.26–1.03	3.5	0.06
<b>Samoan (reference)</b>	1.00			
<b>Gender</b>				
<b>Male</b>	1.47	1.14–1.89	8.8	0.003
<b>Female (reference)</b>	1.00			
<b>Age (years)</b>	1.65	1.36–2.00	25.9	<0.0001
<b>Smoking exposure in car? Yes</b>	2.24	1.67–3.01	28.4	<0.0001
<b>No (reference)</b>	1.00			
<b>Smoking exposure in home? Yes</b>	1.52	1.12–2.04	7.4	0.0007
<b>No (reference)</b>	1.00			
<b>Pocket money (weekly)</b>				
<b>\$NZ0 (reference)</b>	1.00			
<b>\$NZ1–10</b>	1.03	0.69–1.56	0.02	0.87
<b>\$NZ11–20</b>	1.24	0.79–1.94	0.85	0.36
<b>More than \$NZ20</b>	1.91	1.23–2.96	8.3	0.004
<b>Born in New Zealand?</b>				
<b>Yes</b>	1.38	0.98–1.94	3.3	0.07
<b>No</b>	1.00			
<b>Perceived parental permissive attitude toward smoking</b>				
<b>No (reference)</b>	1.00			
<b>Yes</b>	1.49	0.97–2.27	3.4	0.07
<b>Don't know</b>	1.39	0.97–1.99	3.1	0.08

OR Odds ratio

CI Confidence interval

Cook Islanders were significantly more likely to have ever-smoked compared to Samoans (OR 1.72), while boys were 1.47 times more likely to have ever-smoked than girls. Other significant variables were: older age, smoking exposure in a car within the previous seven days, smoking exposure in the home within the previous seven days, and receiving more than \$20 pocket money a week.

### Discussion

Factors that increased the likelihood of a student ever-smoking were: Cook Islands ethnicity, being a boy, smoking exposure at home or in a car, and receiving at least \$20 pocket money per week. Cook Islanders had the highest prevalence of ever-smokers for 2007, whether in Year 7 or Year 8.

## The high rates of smoking amongst Cook Islanders suggest that there is the need for targeted, Cook Island-specific, smokefree resources and cessation support

The National Year 10 (Action on Smoking and Health) ASH Snapshot Survey, conducted annually since 1999<sup>7</sup> is one New Zealand study that collects data on adolescents and smoking. The survey included Pacific ethnicities and by deduction found the prevalence for ever-smoking in 14–15-year-olds in 2008–09 was: Samoan 39.6%, Cook Island 58.2%, Tongan 51.4%, Niuean 52.5% and Other Pacific 42.7% (deduced by 1–‘never smoked’ and averaged over boys and girls). The prevalence rates found in the current study are much lower, which is expected given the younger age group of the KKS students. It seems that once a Pacific cohort reaches 14–15 years old, their trajectory of ever-smoked prevalence climbs toward 50% (there is strong New Zealand evidence for continuity of smoking experimentation in pre-adolescents to smoking in adolescents),<sup>27</sup> and by adulthood is 62%.<sup>3</sup>

### Risk factors for ever-smoking

Cook Island pre-adolescents were more likely to initiate smoking than other Pacific pre-adoles-

cents. This behaviour appears to translate into smoking in adulthood as Cook Islanders have the highest prevalence of smokers among the main Pacific ethnic groups.<sup>3</sup> It is unclear why this is so. It may be due to the higher acculturation of Cook Islanders compared to other Pacific ethnic groups in New Zealand; all Cook Islanders are automatically New Zealand citizens (as are Niueans), but not Tongans or Samoans. The effect of acculturation on smoking prevalence is considered modest<sup>28</sup> and comes with the caveat as Tautolo et al. have noted: ‘having a strong affinity with traditional culture is not, in itself, a protective factor against smoking’.<sup>28</sup> Alternatively, the higher prevalence may be a reflection of liberal tobacco control laws in the Cook Islands compared to New Zealand, rather than acculturation. That being said, Māori pre-adolescents have even higher rates of smoking than Pacific children,<sup>2</sup> yet are subject to the same New Zealand tobacco control laws. The high rates of smoking amongst Cook Islanders suggest that there is the need for targeted, Cook Island-specific, smokefree resources and cessation support.

Pacific boys aged 11–13 years were more likely to initiate smoking than girls, but by 14–15 years of age more Pacific girls than boys reported having ever-smoked, with Cook Island girls having the highest percentage of ever-smokers compared to the other Pacific groups.<sup>7</sup> Again, projecting these figures into adulthood may partly account for why Cook Islanders have high smoking rates, which may also reflect the stronger maternal effect on adolescent smoking than the paternal effect.<sup>29</sup>

### Pocket money

An important risk factor for ever-smoking was receiving over \$NZ20 per week pocket money. This is consistent with previous New Zealand research.<sup>21,30,31</sup> For example, a New Zealand study found in a large cross-section of 14–15-year-olds that increased amounts of pocket money was associated with higher smoking risk and that this was independent of socioeconomic status.<sup>21</sup>

Given that a packet of cigarettes costs between \$NZ15 and \$21.60 per pack of 20 cigarettes, it is not surprising that the amount of pocket money has to be at the high end to encourage smoking uptake. In New Zealand, it is illegal to supply ciga-

rettes (whether commercially or socially) to a person under 18 years.<sup>32</sup> This being the case, where do pre-adolescents get their cigarettes? Most appear to get them from friends or family.<sup>33</sup> Parents should be encouraged to monitor the pocket money given to their children to dissuade spending on tobacco.

### *Attitude of parents to smoking*

Perceived parental attitude towards their children's smoking was not found to be a statistically significant factor in the present study. However, the direction of the odds ratio suggests that liberal parental attitudes towards smoking might be a risk factor for pre-adolescent ever-smoking, as shown in other studies.<sup>34,35</sup>

### Strengths and limitations

This is the first New Zealand study to our knowledge to look at 10–13-year-old Pacific children's smoking status. The KSS study recruited large numbers of Pacific pre-adolescents, sufficient to enable analyses by Pacific ethnic groups, though the numbers of Niueans and Other Pacific participants were very small.

However, there are a number of limitations. Firstly, because of the cross-sectional design of the study, the findings need to be interpreted with caution; causality cannot be inferred from the risk factors. Secondly, the questionnaire was self-reported and therefore subject to recall bias. Thirdly, the perceived parental attitude toward smoking reported by the children is just that, a perception, and may not necessarily reflect the true attitude of the parents.

### Final comments

Parents control and therefore can modify risk factors for Pacific children's smoking initiation: exposure to smoke at home or in the car and the amount of weekly pocket money the child is given. Primary health care professionals need to advise Pacific parents to make their homes and cars smokefree and to monitor their children's spending. This study also found that, on the basis of smoking rates, there is a particular need for specific Cook Island smokefree promotion and cessation resources.

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**COMPETING INTERESTS**

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