

Smoking and vaping behaviours among 14 and 15-year-olds

Results from the 2018 Youth Insights
Survey

June 2020

Prepared for the Health Promotion Agency/Te Hiringa Hauora (HPA) by:

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KEY FINDINGS

This report presents key findings about smoking and vaping behaviours among Year 10 students aged 14 and 15-years-old using the Youth Insights Survey.

Smoking

We found that the proportion of students who were smoking cigarettes at least once a month (current smokers) in 2018 had not changed since 2016.

In 2018:

- Around 1 in 20 (5%) 14 and 15-year-olds smoked at least monthly (current smoker), unchanged from 2016 and down from 2012 (7%).
- Those more likely to be current smokers were:
 - Māori (2.5 times more likely) compared to non-Māori
 - Pasifika (2 times) compared to non-Pasifika
 - attending low decile schools¹ (2 times) compared to high decile schools.
- The most common source of cigarettes directly or indirectly was via someone else:
 - 41% of current smokers gave a person money to buy them.
 - 40% were given cigarettes by a friend or person their own age.

Vaping

We found that while the proportion of students who had tried e-cigarettes (vapes) increased between 2016 and 2018, the proportion of students vaping daily (daily vaper) remained low.

In 2018:

- 38% of students had tried vaping (ever vaper), up from 29% in 2016 and 20% in 2014.
- 1.9% of students were daily vapers, compared to 0.7% in 2014.
- 8% of students vaped at least monthly (current vapers), up from 3% in 2014. The increase in current vapers was seen across most demographics.
- Māori were two times more likely to be current vapers than non-Māori.
- Students' first vape most commonly came from social sources: current vapers were most likely to get their first vape from a friend (53%) or another family member besides their parents/caregivers (11%).
- The top reasons current vapers gave for vaping were they liked the flavours/taste and they enjoyed vaping with their friends (both 59%).

¹ School decile status was used as a proxy to measure each student's socio-economic status and was grouped for analysis: low (deciles 1 to 4), mid (deciles 5 to 7) and high (deciles 8 to 10).

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EXECUTIVE SUMMARY

BACKGROUND

There is substantial evidence that smoking tobacco (cigarettes) is harmful. Electronic cigarettes (known as e-cigarettes or vapes) are devices that heat liquids into an aerosol (vapour) which is inhaled into the lungs. E-cigarettes may or may not contain nicotine. The long-term consequences of vaping are currently unknown. However, nicotine can lead to elevated heart rate and blood pressure, slower circulation, rapid and shallow breathing, and nicotine addiction. Understanding trends in the prevalence of smoking and vaping is important for addressing any harm caused by them.

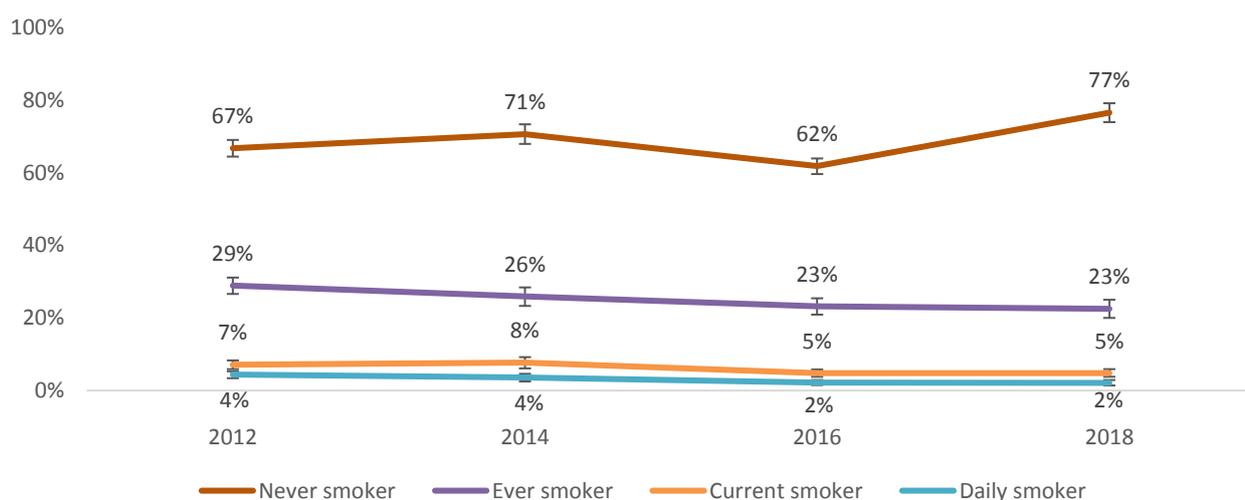
METHODS

The Youth Insights Survey (YIS) is a nationally representative, self-reported and paper-based survey of Year 10 students conducted every two years since 2006. Using data from the 2012, 2014, 2016, and 2018 YIS, the current study shows trends in smoking and vaping among 14 and 15-year-olds in New Zealand. The study also explored access to cigarettes and vapes, reasons for vaping, and contents of last vape. In the 2018 YIS, there were 2,689 participants aged 14 to 15-years-old.

Monthly smoking rates decrease from 2012

Between 2012 and 2018, the current smoking rate (smoked at least monthly) decreased from 7% to 5% for 14 and 15-year-olds (see Figure 1).

Figure 1: Proportion of 14 and 15-year-olds by smoking status, 2012 to 2018



Base= All respondents aged 14 and 15-years-old

Notes: Current smoker includes daily smokers; ever smoker includes current and daily smokers

Never and ever smoker do not sum to 100 percent due to the inclusion of non-response in the analyses

Females (8% in 2012 to 5% in 2018) and Māori (16% to 10%) reported the greatest reductions in their current smoking rates.

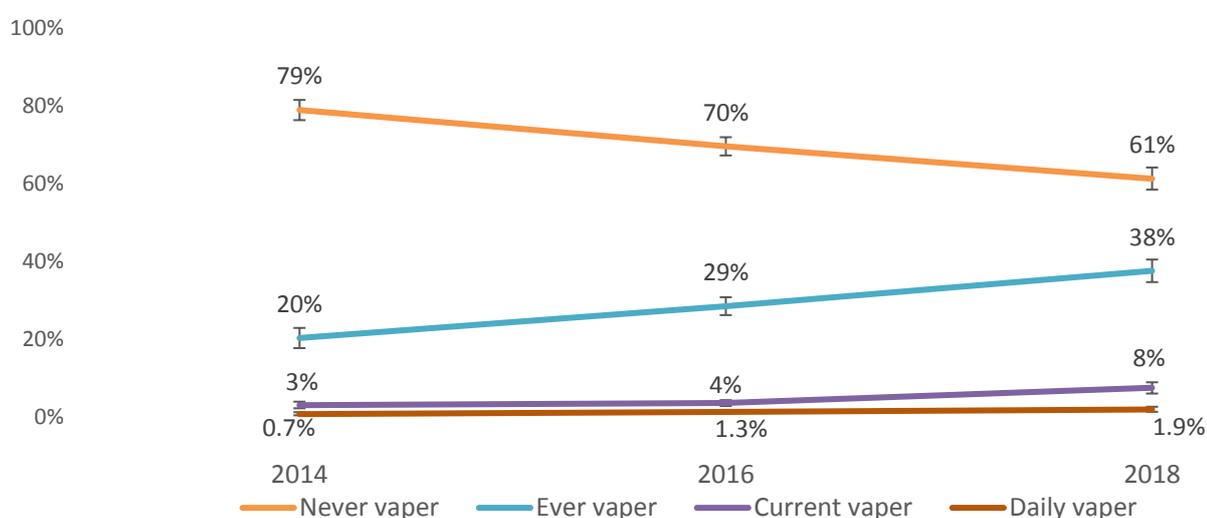
In 2018, those more likely to be current smokers were:

- Māori (2.5 times more likely) compared to non-Māori
- Pasifika (2 times) compared to non-Pasifika
- attending low decile schools (2 times) compared to those attending high decile schools.

More students trying vaping but daily vaping still low

Between 2014 and 2018, the current vaping rate (vaped at least monthly) increased from 3% to 8% (see Figure 2). This increase was seen across many subgroups, including both genders, Māori and NZ European/Other ethnicity groups, and low and mid school decile groups. Daily vaping has remained low, increasing from 0.7% to 1.9% between 2014 and 2018.

Figure 2: Proportion of 14 and 15-year-olds by vaping status, 2014 to 2018



Base= All respondents aged 14 and 15-years-old

Note: Current vaper includes daily vapers; ever vaper includes current and daily vapers

Never and ever vaper do not sum to 100 percent due to the inclusion of non-response in the analyses

Māori were more likely to be current vapers than non-Māori in 2018 after adjusting for demographics.

Vaping status closely aligns with smoking status

Current smokers had the highest vaping rates: 13% of current smokers vaped daily, 30% vaped at least weekly, and 43% vaped at least monthly. Ex or experimental smokers had the next highest vaping rates and never smokers had the lowest vaping rates.

Social sources of cigarettes and vapes were common

Among the 5% of current smokers:

- 41% reported getting their cigarettes by giving a person money to buy them,
- 40% were given them by a friend or person their own age, and
- 30% bought them from a friend or person their own age.

Meanwhile, among 8% of current vapers:

- 53% got their first vape from a friend,
- 11% got it from a family member other than their parent or caregiver, and
- 6% got it from their parent or caregiver.

Flavours and friends are top reasons for vaping

The two top reasons current vapers gave for vaping were they liked the flavours/taste and they enjoyed vaping with their friends (both 59%²). This was followed by those who liked to perform tricks with their vape (53%).

Vaping sweet flavours are most common

Around 7 in 10 ever vapers (68%) used only a sweet flavour in their last vape. This was followed by students who didn't know what flavour they used (11%).

DISCUSSION

The current findings provide an overview of smoking and vaping behaviours among 14 and 15-year-olds in New Zealand. While smoking prevalence has decreased over time, there has been an increase in vaping prevalence. Both smoking and vaping prevalence are higher among certain subgroups, suggesting that public health messages could be tailored to these groups. Ongoing monitoring of smoking and vaping is required to see if these behaviours in young people change over time.

² Multiple answers could be chosen for this question so percentages do not sum to 100 percent.

GLOSSARY

General abbreviations

ASH	Action for Smokefree 2025
HPA	Health Promotion Agency/Te Hiringa Hauora
SES	Socio-economic status
YIS	Youth Insights Survey

Statistical notations and definitions

Base	The base is who was included in the analysis.
n	Sample size
Ninety-five percent confidence intervals (95% CI)	95% CI are used to represent the sample error for estimates. A 95% CI means that if repeated samples were taken and the 95% CI was computed for each sample, 95% of the intervals would contain the true value.
p -value	The p value for a statistical test is the probability of getting the observed test result (or a more extreme result), if there is really no difference. The usual convention of interpreting test results with p values below 5% as statistically significant was followed.
R	Reference group is a group to which an individual or another group is compared.
RR	Relative Risk (or Risk Ratio) is a ratio of the probability of an event occurring in the exposed group versus the probability of the event occurring in the non-exposed group. Values of RR can be interpreted as follows: <ul style="list-style-type: none">• $RR = 1$ means that exposure does not affect the event• $RR < 1$ means that the risk of the event is decreased by the exposure• $RR > 1$ means that the risk of the event is increased by the exposure
Never smokers	Responded 'no' when asked if they had ever smoked cigarettes or tobacco.
Ever smokers	Responded 'yes' when asked if they had ever smoked cigarettes or tobacco.
Ex or experimental smokers	Reported smoking less often than once a month.
Current smokers	Reported smoking at least once a month or more often; includes daily smokers.
Daily smokers	Reported smoking at least once a day.
Never vapers	Responded 'no' when asked if they had ever vaped.
Ever vapers	Responded 'yes' when asked if they had ever vaped.
Ex or experimental vapers	Reported vaping less often than once a month.
Current vapers	Reported vaping at least once a month or more often; includes daily vapers.
Daily vapers	Reported vaping at least once a day.
Sweet combined vaping flavour	Included fruit, candy, dessert, sweet flavour combination, and sports or energy drink.
Other combined vaping flavour	Included savoury snack or meal, alcoholic drink, coffee or tea, and something else.

1. INTRODUCTION

1.1 WHAT WE KNOW

Smoking cigarettes is harmful, and can cause severe illness and death (Banks et al., 2015). The health effects include short-term respiratory and non-respiratory effects, addiction to nicotine, and the associated risk of other drug use (National Center for Chronic Disease Prevention and Health Promotion [NCCDPHP] (US) Office on Smoking and Health, 2012). Use of nicotine can lead to elevated heart rate and blood pressure, slower circulation, rapid and shallow breathing, and addiction (Mishra et al., 2015). Nicotine addiction can cause irritability, nausea, headaches, and anxiety (NCCDPHP, 2012). Early onset of smoking is associated with daily smoking and lifetime nicotine dependence (Hu, Davies, & Kandel, 2006).

In New Zealand, cigarette smoking is one of the leading health risk factors, accounting for 5,000 deaths every year (Ministry of Health, 2019a). The smoking rates among New Zealand adolescents aged 14 and 15-years-old has continued to decline since 1999. According to the 2018 ASH Year 10 Snapshot of around 30,000 students, 5% of 14 and 15-year-olds reported smoking at least once a month (current smokers), and 1.9% reported smoking daily (daily smokers). Māori and Pasifika aged 14 and 15-years-old had disproportionately higher smoking rates (Action for Smokefree 2025 [ASH], 2018a). Understanding the trends in smoking prevalence among adolescents is important to address the resulting harm.

In recent years, there has been a rapid expansion internationally in the prevalence of electronic cigarette use. Electronic cigarettes (also known as e-cigarettes or vapes) refer to battery-powered devices that heat a liquid (commonly referred to as e-liquid) into an aerosol (vapour) which the user inhales (Vaping Facts, 2019). They may or may not contain nicotine. Research shows that e-cigarette aerosol contains very few toxic chemicals when compared to traditional cigarettes (Bals et al., 2019). While the long-term consequences of vaping are currently unknown, there is general agreement that it is much less harmful than smoking traditional cigarettes (McNeill, Brose, Calder, Bauld, & Robson, 2018)

In the 2018 ASH data, around 33% of New Zealand 14 and 15-year-olds reported ever trying vaping, 4% reported vaping at least once a week and 1.8% reported vaping daily. Those who smoked were over 4 times more likely to have tried vaping (ASH, 2018b). Internationally, there have been many studies that found that the common reasons for vaping among adolescents were curiosity, flavours and peer influences (Kong, Morean, Cavallo, Camenga, & Krishnan-Sarin, 2014; Tsai et al., 2018). Research found that adolescents were more likely to vape sweet flavours (Soneji, Knutzen, & Villanti, 2019). There is evidence that adolescents who vape non-traditional cigarette flavours (e.g. candy, fruit, buttery) are more likely to continue vaping than those who vape traditional cigarette flavours such as tobacco, menthol, or flavourless (Leventhal et al., 2019). However, not much is known about vaping patterns among adolescents in New Zealand, particularly in terms of reasons for vaping and contents of their vape. Identifying subgroups of adolescent vapers and reasons for vaping is important to help understand how to prevent their uptake of vaping.

In New Zealand, the minimum legal age to purchase tobacco cigarettes is 18 years (Ministry of Health, 2020). Despite this, in the 2018 ASH Snapshot data, 5% of 14 and 15-year olds reported smoking at least once a month. It is also an offense in New Zealand to sell vaping products containing nicotine derived from tobacco to those under 18 years (HPA, 2019). The 2018 ASH data showed that 4% of 14 and 15-year-olds reported vaping at least once a week (ASH, 2018b). A better understanding on where adolescents are accessing cigarettes and vapes is needed.

Previous research in New Zealand showed that social sources of cigarettes from friends and peers are common for 14 and 15-year-olds (White 2013 and 2015). Internationally, there is evidence that the most common sources of vapes for adolescents were peers, family members, and retail stores (Baker et al., 2019; Kong, Morean, Cavallo, Camenga, & Krishnan-Sarin, 2017; Jessica K Pepper, Coats, Nonnemaker, & Loomis, 2018). To the authors' knowledge, there haven't been any studies that investigated the sources of vapes among New Zealand adolescents.

1.2 RESEARCH OBJECTIVES

The current study explored smoking and vaping behaviours among a nationally representative sample of 14 to 15-year-olds in New Zealand. The study aimed to examine:

- smoking prevalence by gender, ethnicity, and school decile status
- vaping prevalence by gender, ethnicity, school decile status, and smoking status
- trends in the prevalence of smoking and vaping over time
- reasons for vaping among those who vaped at least once a month
- contents of their vape and flavours used among those who have ever tried vaping
- their usual source of cigarettes and source of their first vape.

2. METHODS

2.1 SURVEY

The 2018 YIS used a two-stage cluster sample design, where first schools were randomly selected and then classes were selected within the school. Participants selected responses using a self-reported and paper-based questionnaire. The survey collected information on smoking-related knowledge, attitudes, behaviour, and their responses to tobacco control initiatives. It also collected data on vaping and other health-related behaviours, lifestyles, activities, and social connectedness to family and friends.

Data from the 2012, 2014 and 2016 YIS were used to compare results over time with the 2018 YIS. For each survey year, the content of the questionnaire was reviewed and updated to see if it is still relevant and fit for purpose. Some of the variation of estimated prevalence between survey years could potentially be from changes in the questionnaire.

A full description of the methodologies and questionnaires can be found on the HPA website (Health Promotion Agency/Te Hīringa Hauora, 2019a). The ethical approval for YIS was granted from the Ministry of Health's Multiregional Ethics Group in 2007 and since then from the Health and Disability Ethics Committee on an annual basis (Number MEC/07/10/141).

2.2 VARIABLES

2.2.2 Socio-demographic variables

Outcome measures³ were analysed by gender, prioritised and total response ethnicity group, and school decile group. Some were also analysed by smoking status.

- Participants were given three options for gender: male, female, and other. Students who gave an invalid (missing; $n = 2$) or 'other' response ($n = 30$) were assigned the weight of a male or female using proportional random allocation since the Ministry of Education data only records gender as male or female (for the purpose of weighting only).
- Prioritised ethnicity groups involved each participant being allocated to a single ethnic group, based on the ethnicities they have identified with, in the prioritisation order of Māori, Pasifika, Asian, and NZ European/Other.
- Total response ethnicity groups involved each participant being allocated to all ethnic groups that they have identified with.
- School decile status is used to measure each student's socio-economic status (SES), and was obtained from the Ministry of Education (2019). These deciles have been grouped for analyses into: low (deciles 1 to 4), mid (deciles 5 to 7) and high (deciles 8 to 10).
- Smoking status, defined in the outcome measures section, classifies participants into current smokers, ex or experimental smokers, and never smokers.

2.3 ANALYSIS

Analyses were performed using STATA version 15.0. To represent the New Zealand Year 10 population, responses were weighted for each survey year according to the gender and ethnicity distribution of Year 10 students in New Zealand (Ministry of Education, 2018).

Only students aged 14 and 15-years-old were included in the analyses. We applied replicated weights using Jackknife (Rao & Wu, 1988; Shao & Tu, 1995) since the YIS is a complex survey design. Responses were considered for descriptive statistics and were broken down by demographic factors: gender, ethnicity, and school decile groups. 'Other' gender and 'private/partnership' schools are taken into account in all analysis, but they are not reported on due to small sample size.

³ Please see Appendix B for the list of questions and variables used in this report.

We performed a series of multinomial logistic regressions to check the likelihood of the outcome measures of interest occurring given the specific values for the demographic groups. Only significant differences ($p < .05$) between groups were reported. The figures include error bars representing the 95% confidence intervals. The figures indicate the sample size for that particular question ('base').

The unweighted and weighted sample characteristics for the 2018 YIS are outlined in Table 1.

Table 1: 2018 YIS sample characteristics

Demographics	<i>n</i>	Percentage (unweighted)	Percentage (weighted)
Total	2,689	100	100
Gender			
Female	1,308	48.6	48.6
Male	1,354	50.4	50.4
Other ^a	27	1.0	1.0
Ethnicity (prioritised)			
Māori	624	23.2	24.2
Pasifika	237	8.8	9.9
Asian	364	13.5	11.5
NZ European/Other	1,464	54.4	54.5
Māori vs non-Māori ^b			
Māori	624	23.2	24.2
Non-Māori	2,065	76.8	75.8
Pasifika vs non-Pasifika ^b			
Pasifika	337	12.5	13.6
Non-Pasifika	2,352	87.5	86.4
School decile group			
Low decile	675	25.1	25.5
Mid decile	961	35.7	35.3
High decile	1,031	38.3	38.4
Private/partnership schools	22	0.82	0.8

Note:

- a. Refer to 2.2.2 Socio-demographic variables for weighting method of 'Other' response
- b. Total response measure of ethnicity

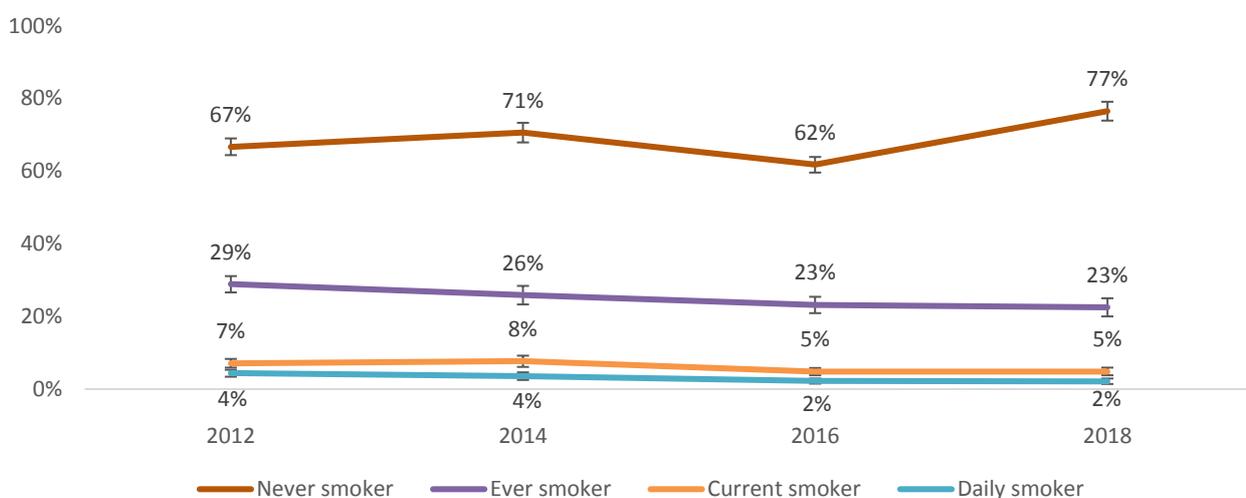
3. FINDINGS

3.1 PREVALENCE AND FREQUENCY OF SMOKING

3.1.1 Monthly and daily smoking rates down from 2012

Fewer than a quarter of 14 and 15-year-olds (23%) had ever smoked in 2018, down from 29% in 2012 (see Figure 1). Ex or experimental smokers (had tried smoking in the past but did not smoke in the last month) decreased from 21% to 17% between 2012 and 2018. Current smokers (smoked at least monthly) declined from 7% to 5% and daily smoking decreased from 4% to 2%.

Figure 1: Proportion of 14 and 15-year-olds by smoking status, 2012 to 2018



Base= All respondents aged 14 and 15-years old

Note: Current smoker includes daily smokers; ever smoker includes current and daily smokers

Never and ever smoker do not sum to 100 percent due to the inclusion of non-response in the analyses

Females (8% in 2012 to 5% in 2018) and Māori (16% to 10%) reported the greatest reductions in smoking. Female Māori reported the highest smoking rates from 2012 through to 2018; they also reported the largest reductions in current smoking (18% to 11%). Table 2 in Appendix A shows the proportion of 14 and 15-year-old current smokers by demographics from 2012 to 2018.

In 2018, those most likely to be current smokers after adjusting for demographics were (see Table 3 in Appendix A):

- Māori (2.5 times more likely) compared to non-Māori,
- Pasifika (2 times) compared to non-Pasifika, and
- students attending low decile schools (2 times) compared to those attending high decile schools.

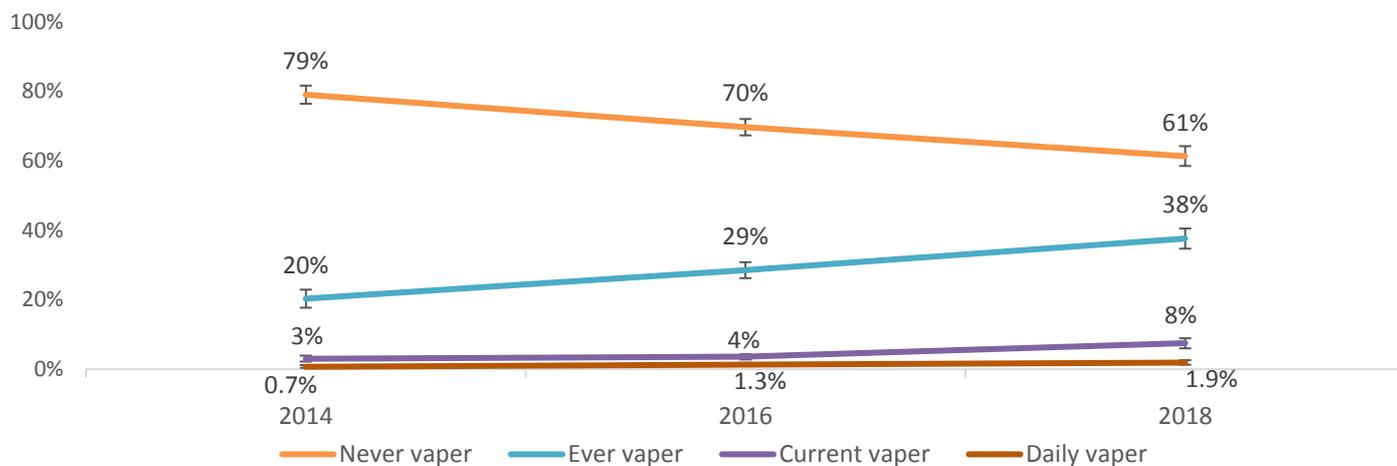
3.2 PREVALENCE AND FREQUENCY OF VAPING

3.2.1 Current vaping rates doubled but daily vaping still low

Two in five 14 and 15-year-olds (38%) have ever vaped, almost doubling since 2014 (see Figure 2). Almost one third of students (30%) were ex or experimental vapers (had tried vaping in the past but did not vape in the last month), up from 17% in 2014. Current vapers (vaped at least monthly)

also increased to 8% in 2018, up from 3% in 2014. The daily vaping was still low at 1.9% in 2018, up from 0.7% in 2014.

Figure 2: Proportion of 14 and 15-year-olds by vaping status, 2014 to 2018



Base= All respondents aged 14 and 15-years-old
Note: Current vaper includes daily vapers; ever vaper includes current and daily vapers.
Never and ever vaper do not sum to 100 percent due to the inclusion of non-response in the analyses.

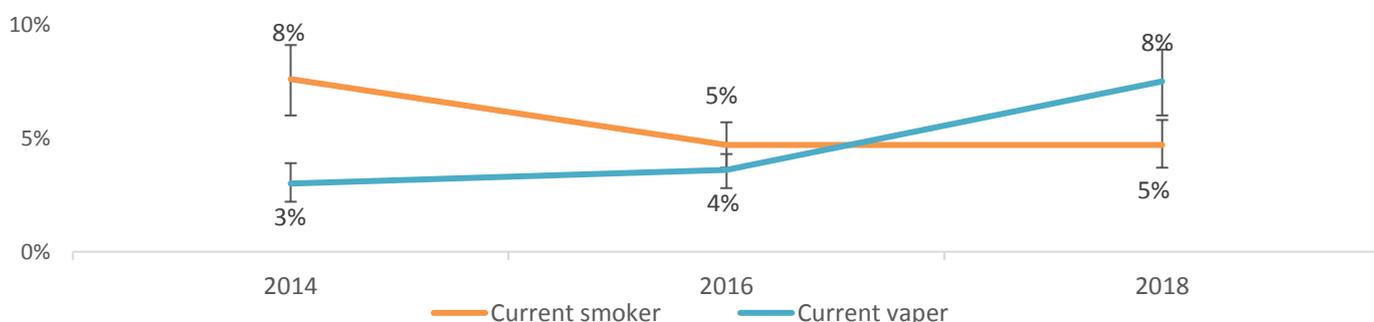
The two-fold increase in current vapers between 2014 and 2018 was seen across many subgroups, including both genders, Māori and NZ European/Other ethnicity groups, both low and mid school decile groups, and all smoking groups. Table 3 in Appendix A shows the proportion of 14 and 15-year-old current vapers by demographics from 2014 to 2018.

3.3 RELATIONSHIP BETWEEN SMOKING AND VAPING TRENDS

3.3.1 Current vapers increase while current smokers decrease

While the proportion of current smokers has declined over time (8% in 2014 to 5% in 2018), the proportion of current vapers has risen (3% in 2014 to 8% in 2018; see Figure 3). The current vaping rate in 2018 was the same as the current smoking rate in 2014.

Figure 3: Proportion of 14 and 15-year-old current smokers and current vapers, 2014 to 2018



Base= All respondents aged 14 and 15-years-old

However, both the proportion of students who vaped daily and the proportion of students who smoked daily remain around 2%.

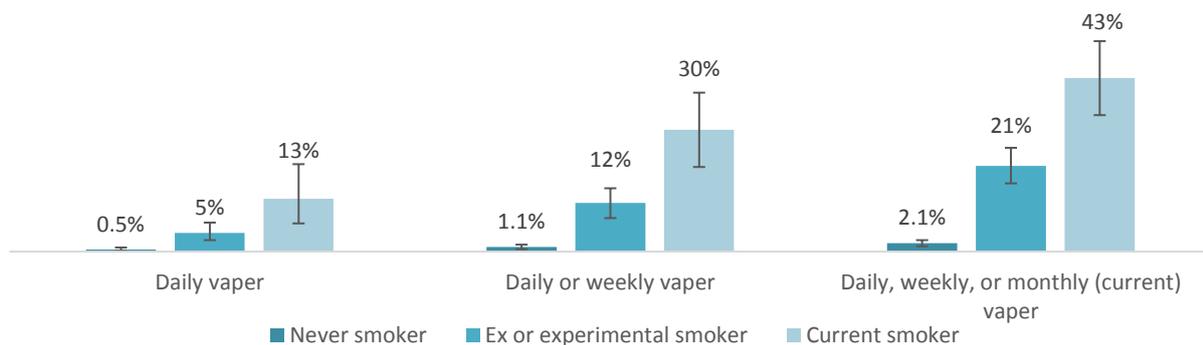
3.3.2 Current smokers most likely to vape

Current smokers had the highest vaping rates: 13% of current smokers vaped daily, 30% vaped at least weekly, and 43% vaped at least monthly (current vapers; see Figure 4).

Ex or experimental smokers had the second highest vaping rates: 5% of ex or experimental smokers vaped daily, 12% vaped at least weekly, and 21% were current vapers.

Those who had never smoked were the least likely to vape: 0.5% of never smokers vaped daily, 1% vaped at least weekly, and 2% vaped at least monthly.

Figure 4: Frequency of vaping status by smoking status, 2018



Base= All respondents aged 14 and 15-years-old

3.4 SOURCE OF USUAL CIGARETTES AND FIRST VAPE

3.4.1 Usual source of cigarettes is most often from a social contact

Students who were current smokers usually got their cigarettes by giving a person money to buy them (41%), being given them by a friend or person their own age (40%), buying them from a friend or person their own age (30%), and buying them themselves from a shop (18%; see Figure 5).

Figure 5: Source of current smokers usual cigarettes during past 30 days, 2018 (Multiple choices allowed)



Base= Current smokers aged 14 and 15-years-old (n=123)

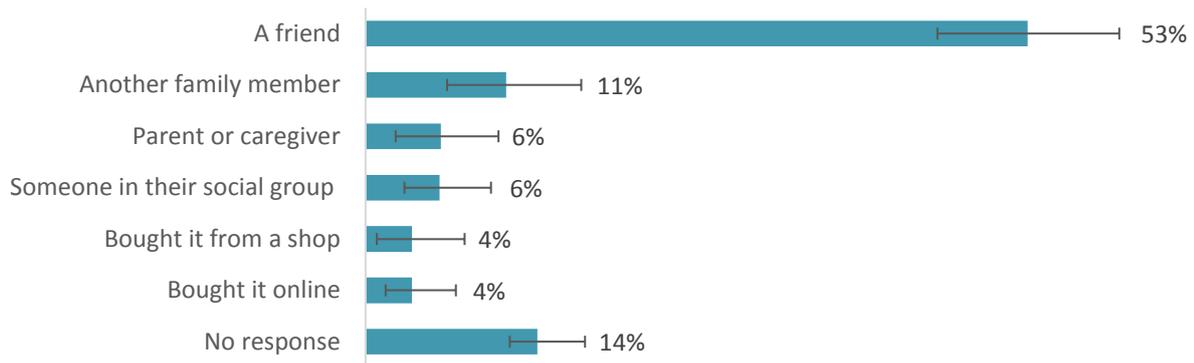
Students' sources of cigarettes have changed over time. In 2018, there were fewer current smokers getting cigarettes from a friend (54% to 40% between 2012 and 2018). Similarly, there

were half as many current smokers who were taking cigarettes from a parent without asking (30% to 15% between 2012 and 2018).

3.4.2 A friend is most likely to supply first vape

The first time that current vapers vaped, they were most likely to obtain it from a friend (53%), from another family member besides their parent or caregiver (11%) or from their parent or caregiver (6%). Only 8% of current vapers bought it from a shop or bought it online (see Figure 6).

Figure 6: Source of current vapers first time trying a vape (top 7), 2018



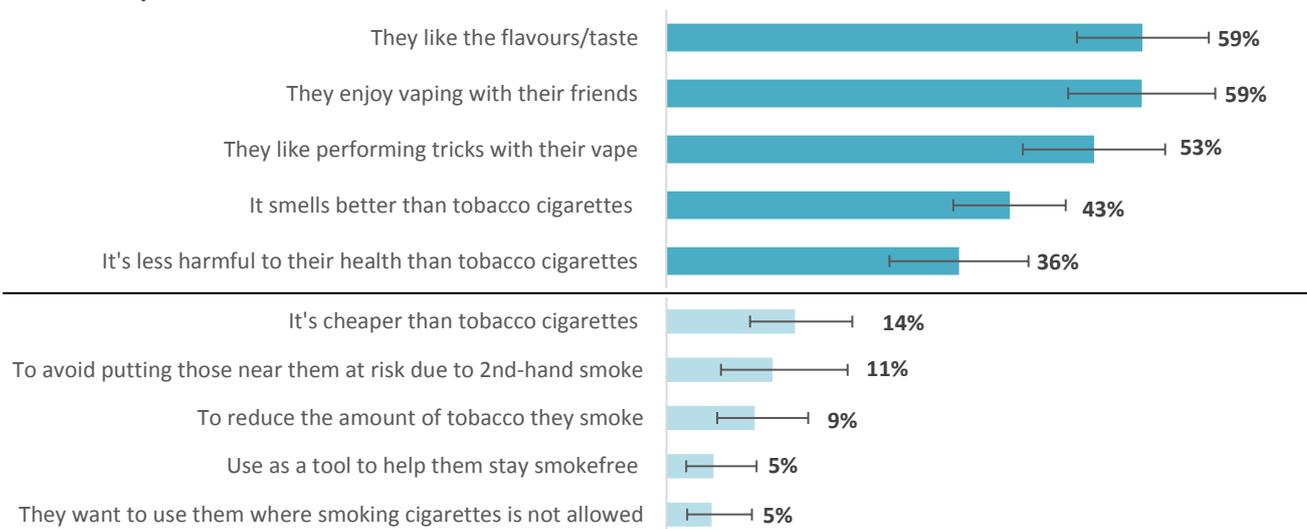
Base= Current vapers aged 14 and 15-years-old (n=190)

3.5 WHY STUDENTS ARE CURRENTLY VAPING

3.5.1 Flavours and friends are top reasons for vaping

The top reasons current vapers gave for vaping were because they liked the flavours/taste and they enjoyed vaping with their friends (both 59%⁴; see Figure 7). This was followed by those who liked performing tricks with their vape (53%). Only 5% of current vapers vaped as a tool to help them stay smokefree and/or vaped when they were not permitted to smoke.

Figure 7: Reasons why current vapers vape (top 5 and bottom 5), 2018 (Multiple choices allowed)



Base= Current vapers aged 14 and 15-years-old (n=190)

⁴ Multiple answers could be chosen for this question so percentages do not sum to 100 percent.

3.6 WHAT STUDENTS' LAST VAPE CONTAINED

3.6.1 Majority of students do not vape nicotine

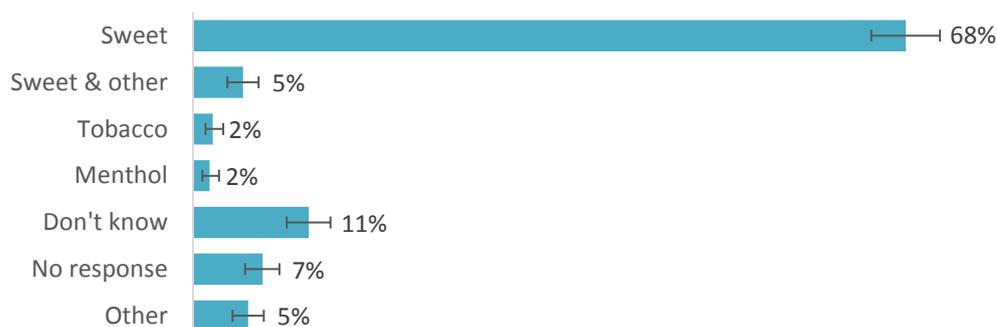
Of current vapers, over half (54%) of them did not vape nicotine in their last vape (only flavouring), followed by nicotine plus flavouring (14%) and nicotine (9%). One in eight (12%) did not give a response and 5% didn't know what their device contained.

Ever vapers had similar contents of their last vape to current vapers: 57% did not vape nicotine (only flavouring), 11% vaped nicotine plus flavouring and 6% vaped nicotine. More than one in ten ever vapers (12%) didn't know what their device contained and 11% did not give a response.

3.6.2 Sweet flavouring is most common

Sweet flavours⁵ were the most common flavours used, with 68% of ever vapers having used only a sweet flavour in their last vape (see Figure 8). This was followed by those who didn't know what was in their vape (11%). Current vapers (a subset of ever vapers) also most commonly used sweet flavours in their last vape (63%), followed by 'sweet and other' flavours (11%).

Figure 8: Flavour of ever vapers' last vape (combined flavours), 2018



Base= Ever vapers aged 14 and 15-years-old (n=979)

⁵ Sweet flavours include fruit, candy, dessert, sweet flavour combination, and sports or energy drink. Other flavours include savoury snack or meal, alcoholic drink, coffee or tea, and 'something else'.

4. DISCUSSION

The current findings provide an overview of smoking and vaping behaviours among 14 and 15-year-old students in New Zealand.

4.1 PREVALENCE OF SMOKING

Between 2012 and 2018, the prevalence of current smokers has decreased. The current smoking rate among 14 and 15-year-old Year 10 students in New Zealand (4.8%) is almost the same as the current smoking rate for 10th Grade students (15 and 16-year-olds) in the United States (4.2%; Johnston et al., 2019). Results from the 2018/19 New Zealand Health survey (NZHS) showed that the current smoking rates for 15 to 17-year-olds was 3.8%, which is slightly lower when compared to the results from our study (Ministry of Health, 2019b). This discrepancy may be due to the difference in definition of current smokers⁶ but the overall trend is the same.

There are potential inequities among some subpopulations. Current smoking rates were higher among Māori, Pasifika and students attending low decile schools after adjusting for demographics⁷.

4.2 VAPING PATTERNS

4.2.1 The prevalence of vaping

The prevalence of current vapers among 14 and 15-year-olds has increased between 2014 and 2018. The increase in vaping was observed in most demographic subpopulations. Despite increases in the ever and current vaping rates, the prevalence of daily vaping remained low.

The current vaping rate (7.5%) among 14 and 15-year-olds is low when compared to 10th grade students in the United States (21.7%; Johnston et al., 2019), but higher than 11 to 18-year-olds in the UK (4.9%; ASH UK, 2019). The daily vaping rate among 14 and 15-year-olds from this study (1.9%) is similar to 15 to 17-year-olds in New Zealand (1.7%; Ministry of Health, 2019b).

4.2.2 Vaping prevalence by smoking status

The current study found that among never smokers, current vaping (2.1%) and weekly vaping (1.1%) is extremely rare. This is consistent with research in the UK that found weekly vaping is extremely rare among 11 to 18-year-old never smokers (ASH UK, 2019). This is also consistent with a recent study that found that current vaping among never smokers is rare among New Zealanders aged 15-years and older (Guiney, Oakly, & Martin, 2019). Additionally, we observed a clear association between smoking and vaping status. That is, the prevalence of vaping among

⁶ NZHS defined current smokers as those who have smoked 100 cigarettes in their lifetime and currently smoke at least once a month. In contrast, our study defined current smokers as those who currently smoke at least once a month (Ministry of Health, 2019b).

⁷ Total ethnicity was adjusted by gender and school decile group and school decile group was adjusted by prioritised ethnicity.

current smokers (commonly referred to as 'dual users') is higher when compared to ex or experimental smokers.

Studies show that vaping is associated with subsequent initiation of tobacco smoking (Berry et al., 2019; Primack et al., 2018). Research also shows that the downward trend in current smoking substantially accelerated among US youth and young adults once vaping became popular (Levy et al., 2019). In contrast, our study did not observe any accelerated decline or increase in smoking rates. There is a need for further research examining the trajectory of these behaviours among young people.

4.2.3 Reasons for vaping

In New Zealand, the self-reported reasons for vaping varied across different age groups. The top three reasons listed by 14 and 15-year-old current vapers were: they liked the flavours/taste (59%), they enjoyed vaping with their friends (59%) and they liked performing tricks with their vape (53%). Research in New Zealand adults aged 15-years and over showed that the top three reasons for vaping among current vapers were: to quit smoking or avoid returning to smoking (43.1%), to reduce the amount of tobacco smoked (21.8%) and for enjoyment and curiosity (18%; HPA, 2019b; Martin & Gurram, 2019). While the answer options provided were different, this suggests that different intervention strategies may be needed for different age groups of vapers.

4.2.4 Content of vapes

The current study found that 6.3% of 14 and 15-year-olds used nicotine in their last vape. This is low when compared to the past month prevalence of nicotine vaping among Grade 10 students in the U.S (16.1%; Johnston et al., 2019). Evidence suggests that vaping nicotine in higher concentrations by adolescents may increase the frequency of smoking and vaping among them (Goldenson, Leventhal, Stone, McConnell, & Barrington-Trimis, 2017). Not much is known about the concentration of nicotine used by adolescents in New Zealand. Further research is required to examine the nicotine concentrations used in vaping products by adolescents and how that relates to further vaping and smoking behaviour. Similar to other studies, we found that sweet flavours were most commonly used by adolescent vapers in New Zealand (Leventhal et al., 2019; J K Pepper, Ribisl, & Brewer, 2016). Continued monitoring of which flavours young people use could help with understanding vaping preferences.

4.3 SOURCE OF CIGARETTES AND VAPES

In New Zealand, under the Smokefree Environments Act 1990, it is illegal to sell or supply tobacco products to those under 18-years-old (Ministry of Health, 2005). It is also illegal to sell vaping products containing nicotine derived from tobacco to those aged under 18 years (Ministry of Health, 2020). Similar to other studies, the current study found that social sources of cigarettes and vapes were common among current adolescent users (Castrucci, Gerlach, Kaufman, & Orleans, 2002; Gratias, Krowchuk, Lawless, & Durant, 1999; Robinson, Dalton III, & Nicholson, 2006).

4.4 STRENGTHS

The strength of the study was the use of a nationally representative sample of young people aged 14 and 15-years-old in New Zealand. The survey instrument measures the prevalence and frequency of smoking and vaping, access to cigarettes and vapes, and vaping behaviours among the adolescents. Our data highlights differences for these behaviours by socio-demographics. We were also able to study subgroups such as gender among Māori. The study also examines trends in behaviours between 2012 and 2018. Essential information about smoking and vaping behaviours was provided from the study which identifies areas of focus for public health interventions that aim to protect young people from related harms.

4.5 LIMITATIONS

A limitation of the study was that the cross-sectional nature of the survey did not allow us to explore the trajectory of the smoking and vaping behaviours among individual respondents. There were also smaller sample sizes for Asian populations, daily users, and dual users which did not allow us to study these cohorts in detail. Finally, the terminology and technology around vaping is changing very quickly. There could be some underestimation of vaping as we did not prompt students by providing pictures of vaping devices.

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APPENDIX A PREVALENCE AND ADJUSTED RISK RATIOS

Table 2: Proportion of 14 and 15-year-old current smokers by demographics, 2012 to 2018^R

Demographics	2012	2014	2016	2018 ^R
	<i>n</i> =3,017	<i>n</i> =2,855	<i>n</i> =2,884	<i>n</i> =2,689
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Total	7.1 (5.9-8.3)**	7.7 (6.1-9.2)**	4.8 (3.8-5.8)	4.8 (3.8-5.9)
Gender				
Female	8.0 (6.2-9.8)*	9.2 (7.3-11.1)**	5 (3.6-6.3)	5.2 (3.7-6.6)
Male	6.2 (4.9-7.6)	6.2 (4.2-8.2)	4.5 (3.2-5.7)	4.4 (3.1-5.7)
Prioritised ethnicity				
Asian	-	3.2 (1.6-5.8)	-	-
Māori	15.8 (12.8-18.8)**	13.9 (10.3-17.6)	10.6 (7.8-13.4)	9.7 (6.7-12.6)
NZ European/Other	4.4 (3.1-5.6)	5.7 (4-7.4)*	2.6 (1.8-3.5)	3.2 (2.1-4.3)
Pasifika	9.2 (5.9-13.6)	8.7 (5-12.4)	6.4 (3.2-11.4)	6.6 (2.4-13.8)
Māori vs non-Māoric				
Total Māori	15.8 (12.8-18.8)**	13.9 (10.3-17.6)	10.6 (7.8-13.4)	9.7 (6.7-12.6)
Non-Māori	4.5 (3.4-5.6)	5.8 (4.4-7.1)**	3 (2.2-3.8)	3.3 (2.3-4.3)
Females:				
Māori vs non-Māori				
Total Māori female	18.0 (13.9-22.2)*	17.6 (12.2-23)	10.9 (7.3-14.5)	11.1 (7.1-15.1)
Non-Māori female	5 (3.4-6.7)	6.6 (4.9-8.4)**	3.1 (1.9-4.3)	3.3 (2-4.6)
Males:				
Māori vs non-Māori				
Total Māori males	13.7 (9.7-17.7)	10.4 (6.9-14)	9.7 (5.8-13.7)	8.6 (5.4-12.9)
Non-Māori males	4 (2.8-5.2)	4.9 (2.9-6.9)	2.9 (1.9-4.1)	3 (1.9-4.6)
Pasifika vs non-Pasifika				
Total Pasifika	11.6 (7.5-15.7)	11 (7.6-14.5)	8 (4.9-12.2)	9.9 (5.6-14.1)
Non-Pasifika	6.4 (5.2-7.7)**	7.2 (5.5-8.8)**	4.2 (3.2-5.3)	4.1 (3-5.1)
School decile group				
Low decile	12.3 (9.1-15.5)	11.9 (7.6-16.3)	8.6 (5.5-11.6)	8.3 (5-11.7)
Mid decile	6.1 (4-8.1)	7.1 (4.8-9.3)*	4.3 (2.9-5.8)	4.2 (2.7-5.6)
High decile	3.6 (2.5-4.7)	5.4 (3.2-7.6)*	2.5 (1.6-3.6)	2.9 (2-4.1)

Notes:

- Bold value indicates that the prevalence is statistically significant compared to reference (R) (*:p<.05, **:p<.01, ***: p<.001)*
- Dash (-) indicates data was suppressed due to insufficient sample size*
- Māori and Pasifika are analysed by total response measure of ethnicity*

Table 3: Prevalence and adjusted risk ratios of current smokers and current vapers by demographics, 2018

Base	Current smokers		Current vapers	
	%	Adjusted risk ratio	%	Adjusted risk ratio
Gender				
Female	5.2	1.2	6.3	0.7
Male	4.4	<i>R</i>	8.4	<i>R</i>
Māori vs non-Māori				
Total Māori	9.7	2.5	12.0	2.0
Total non-Māori	3.3	<i>R</i>	6.0	<i>R</i>
Māori male vs non-Māori male				
Total Māori male	8.6	2.2	12.8	1.9
Total non-Māori male	3.0	<i>R</i>	7.0	<i>R</i>
Māori female vs non-Māori female				
Total Māori female	11.1	3.2	11.5	2.4
Total non-Māori female	3.3	<i>R</i>	4.6	<i>R</i>
Pasifika vs non-Pasifika				
Total Pasifika	9.9	1.9	9.2	-
Non-Pasifika	4.1	<i>R</i>	7.2	<i>R</i>
School decile group				
Low decile (1 – 4)	8.3	2.0	9.6	1.4
Mid decile (5 – 7)	4.2	1.2	8.1	1.3
High decile (8 – 10)	2.9	<i>R</i>	5.5	<i>R</i>

Notes:

- Bold value indicates that the prevalence is statistically significant compared to reference group (R)*
- Adjusted risk ratios were determined using a logistic regression model adjusted by prioritised ethnicity, school decile group, and gender except school decile group was adjusted for only prioritised ethnicity*
- Māori and Pasifika are analysed by total response measure of ethnicity*

Table 4: Proportion of 14 and 15-year old current vapers by demographics, 2014 to 2018^R

Demographics	2014	2016	2018 ^R
	<i>n</i> = 2,855	<i>n</i> = 2,884	<i>n</i> = 2,689
	% (95% CI)	% (95% CI)	% (95% CI)
Total	3.0 (2.2-3.9)***	3.6 (2.8-4.3)***	7.5 (6-8.9)
Gender			
Female	2.2 (1.3-3)***	2.2 (1.4-3)***	6.3 (4.7-7.9)
Male	3.9 (2.6-5.2)***	4.7 (3.5-5.9)**	8.4 (6.3-10.5)
Prioritised ethnicity			
Asian	-	-	2.2 (0.9-4.4)
Māori	4.0 (2.5-5.9)***	5.8 (3.9-7.7)**	12.0 (9-15)
NZ European/Other	2.7 (1.5-3.8)**	3.0 (2.2-3.9)***	6.4 (4.9-8)
Pasifika	5.7 (3-9.7)	3.6 (1.5-7.3)	8.3 (4.2-14.4)
Māori vs non-Māori			
Total Māori	4.0 (2.5-5.9)***	5.8 (3.9-7.7)**	12.0 (9-15)
Non-Māori	2.7 (1.8-3.7)***	2.9 (2.2-3.6)***	6.0 (4.6-7.5)
Females:			
Māori vs non-Māori			
Total Māori	2.3 (0.9-4.7)***	4.6 (2.5-7.7)**	11.5 (7.8-15.2)
Non-Māori	2.1 (1.2-3.4)*	1.5 (0.8-2.5)**	4.6 (3-6.3)

Demographics (continued)	2014 n= 2,855 % (95% CI)	2016 n = 2,884 % (95% CI)	2018 ^R n = 2,689 % (95% CI)
Males:			
Māori vs non-Māori			
Total Māori	5.6 (3.2-9.1)*	6.3 (3.9-9.5)*	12.8 (8.1-17.5)
Non-Māori	3.3 (2.4-7)**	4.2 (3-5.5)*	7.0 (4.9-9.2)
Pasifika vs non-Pasifika			
Total Pasifika	5.2 (3-8.4)	5.1 (2.9-8.1)	9.2 (5.3-13.1)
Non-Pasifika	2.7 (1.8-3.6)***	3.3 (2.5-4.1)***	7.2 (5.7-8.7)
School decile group			
Low decile	3.9 (2.2-6.3)**	4.7 (2.8-6.6)*	9.6 (6.7-12.5)
Mid decile	1.8 (0.9-3.3)***	4.1 (2.9-5.2)**	8.1 (5.3-10.8)
High decile	3.6 (2.1-5.1)	2.1 (1.3-3.3)**	5.5 (3.3-7.6)
Smoking (cigarettes) status			
Current smoker	14.9 (9.6-21.6)***	26.1 (17.3-34.8)*	42.5 (33.4-51.5)
Ex or experimental smoker	7.7 (5.2-10.1)***	7.8 (5.4-10.2)***	21.0 (16.7-25.4)
Never smoker	0.6 (0.3-1.2)**	0.8 (0.4-1.3)**	2.1 (1.3-2.8)

Notes:

- Bold value indicates that the prevalence is statistically significant compared to reference (R) (*:p<.05, **:p<.01, ***: p<.001)*
- Dash (-) indicates data was suppressed due to insufficient sample size*
- Māori and Pasifika are analysed by total response measure of ethnicity*
- Vaping frequency was first included in the 2014 YIS*

APPENDIX B 2018 YIS SELECTED QUESTIONS

Smoking status

Have you ever smoked a cigarette, even just a few puffs?

- Yes
 No

How often do you smoke now?

PLEASE TICK ONE BOX ONLY

- I have never smoked cigarettes / I am not a smoker now
 At least once a day
 At least once a week
 At least once a month
 Less often than once a month

Usual source of cigarettes

During the past 30 days (one month) how did you **usually get** your own cigarettes?

PLEASE TICK ALL THAT APPLY

- I have never smoked / I am not a smoker now
 I bought them from a shop
 I bought them from a vending machine
 I bought them from a friend / friends or person my age
 I gave someone money to buy them for me
 A friend/friends or person my age gave them to me
 A parent or caregiver gave them to me
 I took them from a parent or caregiver without asking
 I got them from an older brother or sister
 I got them some other way (Please write in) ⁸

Source of first vape

The first time you tried an e-cigarette (e-cig, vape), where did you get it from?

PLEASE TICK ONE BOX ONLY

- I have never tried e-cigarettes
 A friend
 Someone in my social group
 My parent or caregiver
 Another family member
 I sampled it at a store
 A free starter kit
 A stall at a sponsored event
 A free mail sample
 I bought it from a shop
 I bought it online
 Other (please write in) ⁸

Vaping status

Have you ever tried e-cigarettes (even just a single puff or vape)?

- Yes
 No

How often do you use e-cigarettes (e-cigs, vapes), now?

PLEASE TICK ONE BOX ONLY

- I have never tried e-cigarettes / I do not use e-cigarettes now
 At least once a day
 At least once a week
 At least once a month
 Less often than once a month

Reasons for vaping

Why do you use e-cigarettes (e-cigs, vapes) now?

PLEASE TICK ALL THAT APPLY

- I have never tried using e-cigarettes / I do not use e-cigarettes now
 I want to quit smoking cigarettes completely
 I want to reduce the amount of tobacco I smoke, but not stop smoking completely
 I have made an attempt to quit smoking and I want a tool to help me stay smokefree
 I want to use them in places where smoking cigarettes is not allowed
 I like performing tricks with my vape
 I enjoy vaping with friends
 I like to video myself doing vape tricks
 Cheaper than tobacco cigarettes
 Less harmful to my health than tobacco cigarettes
 To avoid putting those around me at risk due to second-hand smoke
 I like the flavours / taste
 Cooler than tobacco cigarettes
 Smells better than tobacco cigarettes
 More convenient than tobacco cigarettes
 I like holding it / keeps my hands busy
 I am curious about them
 Another reason (Please write in) ⁸

⁸ Answers written for the option of 'Please write in' were recoded into existing categories where possible.

Content of last vape

Thinking about the **last time** you used an e-cigarette (e-cig, vape), what did it contain?

PLEASE TICK ONE BOX ONLY

- I have never tried e-cigarettes*
- Nicotine
- Just flavouring
- Nicotine plus flavour
- Marijuana or hash oil
- Other
- Don't know

Flavour of last vape⁹

Thinking about the **last time** you used an e-cigarette (e-cig, vape), what flavour was it?

PLEASE TICK ONE BOX ONLY

- I have never tried e-cigarettes*
- Fruit
- Candy
- Dessert
- Savoury snack or meal
- Alcoholic drink
- Sports or energy drink
- Coffee or tea
- Tobacco
- Menthol
- Tobacco and menthol
- Something else
- Don't know

⁹ 'Sweet flavour combination' and 'Sweet and other flavours' answers were created due to multiple options being chosen in the survey. 'Sweet flavour combination' includes more than

one sweet flavour and 'Sweet and other flavours' includes at least one sweet flavour and one non-sweet flavour.