MINISTRY OF HEALTH
MANATŪ HAUORA

New Zealand Government

Young Māori women who smoke:
technical report

June 2017

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This report and the additional outputs from the project on young Māori women who smoke was created through collaboration between NOOS Consulting and the Ministry of Health. The project team consisted of:

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Disclaimer

The results in this report are not official statistics; they have been created for research purposes from the Integrated Data Infrastructure (IDI), managed by Statistics NZ. The opinions, findings, recommendations, and conclusions expressed in this report are those of the authors, not the Ministry of Health, Statistics NZ or other government agencies.

Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation, and the results in this report have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz.

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Executive summary

This project took an innovative approach to gaining greater understanding of the lives of a group of New Zealanders for whom the smoking rate remains persistently high despite efforts to reduce it: young Māori women. This project used a '**think big, test small and move fast**' approach to build an understanding of the lives of young Māori women who smoke, to lead to actionable insights.

This technical report describes the analytics component of the project, presenting results of the analysis itself. The report also shows that this form of innovative project process, which represented a number of 'firsts' for the Ministry of Health (including having the co-design and analytics components running in tandem), was largely successful. However, we note a number of lessons learnt that will improve the process for future projects. As such, the key findings of this report are divided into two sections – **what we discovered** and **how we learnt**.

This technical report should be read in conjunction with the other three documents that were produced as part of the analytical part of this project: evidence brief, summary A3, and the how-to guide.

Key findings about young Māori women who smoke

We did the data analysis in three main steps:

- **Step 1:** descriptive statistics (including baseline information on age by smoking status) to provide a view of the young Māori women aged between 18 and 24 years in terms of **who** they are, **where** they live and **what** their lives are like.
- **Step 2:** statistical testing (chi-square, odds ratios, correlation coefficient) to examine which variables were likely to be determinants.
- **Step 2:** predictive modelling (multiple logistic regression) to quantify the influence of key variables identified through statistical testing.

Overall, approximately 38% (13,473) of the 35,010 Māori women aged between 18 and 24 years indicated that they were regular smokers (ie, daily smokers) during the 2013 Census, compared with 48% (16,959) who indicated they had never smoked and 13% (4,578) who were ex-smokers.

The biggest change in smoking status among Māori females happen at a fairly young age, particularly between the ages of 15 and 24 years. At 18 years of age, **2 in 3** had never smoked. At age 24 years, only **1 in 3** had never smoked.

From our analyses, different patterns can be seen in several areas of the lives of young Māori women aged between 18 and 24 years who regularly smoke and those who have never smoked:

- Young Māori women who are regular smokers are 3 times more likely to live in a household where there are other smokers compared with those who do not smoke. More than 1 in 2 young Māori women who smoke lived with at least one other adult who smokes. In contrast, almost 2 in 3 women who have never smoked live with adults who also do not smoke.

- Young Māori women who are regular smokers are 1.5 times more likely to have no secondary school qualification than those who have never smoked, while those who have never smoked are likely to have a higher secondary school qualification (2.5 times more likely to attain a Level 3 or 4 Certificate at secondary school) than those who are regular smokers.
- Young Māori women who are regular smokers are 1.7 times more likely to receive the unemployment benefit as a source of income than those who do not smoke. Not smoking is more common among young Māori women who are in paid employment (57%), compared with those who smoke (31% are regular smokers).
- Young Māori women who are regular smokers are 1.5 times more likely to receive the domestic purposes benefit as a source of income than those who do not smoke. Among those who have never given birth before, 59% have never smoked while 31% are regular smokers.

For all three smoking statuses (regular smoker, ex-smoker, never smoked), there is a far greater proportion of young Māori women living in the most deprived neighbourhoods, with 42% of young Māori women who live in the most deprived neighbourhoods (quintile 5), while 7% live in the least deprived neighbourhoods (quintile 1).

There is a large difference in the proportions of regular smokers and those who have never smoked by quintile.

- In the least deprived neighbourhoods, 19% were regular smokers and 70% have never smoked.
- In the most deprived neighbourhoods, 48% were regular smokers and 39% have never smoked.
- Young Māori women who have never smoked are 1.5 times more likely to live in the least deprived neighbourhoods (quintile 1), compared with those who are regular smokers or ex-smokers.

Key lessons learnt from a new way of working

This project represented **a valuable opportunity** for Ministry of Health staff and external partners to learn about young Māori women and trial a new process for producing actionable insight. The first month of the project was focussed on setting the data foundation, the second on data analysis and interpretation, and the third on collation of analytical results and integration to produce the series of outputs.

As the project progressed, it quickly became apparent that lessons we were learning could improve both the understanding of the subject area as well as the efficiency of the process for future projects.

The following factors greatly contributed to the success of the project process:

- **Sharing, ideas and results early and often** (including with an advisory group and co-design partners).
- Selecting a **team with the full complement of appropriate skills**.

The following points are of particular note for those who intend to carry out projects of a similar nature:

- **Timing** is important from the point of lining up all project components (including personnel), particularly with mandatory requirements from Statistics New Zealand for two phases of checking outputs before release.
- Striking a **balance between interpretation and speculation** to communicate results effectively is a challenge that requires constant mindfulness.
- The **modelling phase** was not deemed to be crucial at the start of this project but the results proved to be informative and future projects would benefit from inclusion of predictive modelling from the outset. However, our modelling results must be interpreted with caution as we had limited capacity to refine the models in the time available.

This project represented **a valuable opportunity** for Ministry staff and external partners to learn more about young Māori women who smoke and trial a new process.

We recommend that this process is repeated, focussing on developing replicable and re-usable code and methods.

Analysts and others who are interested in developing projects of a similar nature can use this technical report in conjunction with the **how-to guide** as guiding documents.

Introduction

This technical report describes the results from and methods used in the analytics component of a project looking at the lives of young Māori women who smoke. The project shows that it is possible to build understanding of the lives of this cohort of women (Māori women aged 18–24 years who said 'yes' to smoking at least one cigarette per day in the 2013 Census) in a very short timeframe.

This technical report is structured to provide information on both analytic insights observed about the lives of young Māori women and the innovative process of investigating the issue. We outline the methods, results, conclusions and limitations for both aspects, addressing the questions as two separate parts.

- **Smoking:** Who are the young Māori women who smoke? What are the lived experiences of young Māori women who smoke and those who do not?
- **Project process**: How can the 'think big, test small and move fast' approach focusing on a singular health issue used here be adopted/adapted for future projects of a similar nature?

Smoking in New Zealand

New Zealand has made a commitment to reduce smoking rates across all sectors of society, in line with the goal to be smokefree by 2025. However, while smoking rates are dropping for some groups, for others there has been little decline, suggesting that some interventions are ineffective. Reducing smoking among Māori is one of the fastest ways to address inequities in Māori health outcomes, to increase whanāu well-being and to relieve the high burden and costs of smoking to communities and the health system.

Previous research has shown that Māori women aged between 18 and 24 years stand out as a group of particular concern, with 42.7% of this group reporting regular (daily) smoking, compared with 8.6% of non-Māori women of the same age[1]. The first step towards reducing the smoking prevalence for young Māori women is to develop a deeper understanding of who they are. The Ministry of Health therefore initiated a project to gain greater understanding of the lives led by the smoking and non-smoking portions of this population.

A new way of working: analytics and co-design in tandem

The project brought together external experts in co-design and analytics and a core internal analytics team and co-design team from the Ministry of Health to get a better understanding about the lives of young Māori women. Reducing smoking rates is a *complex* problem (Cynefin framework) where cause and effect is unknown without a clear cut path forward.[2] Therefore, this project takes a 'think big, test small and move fast' approach by:

- being ambitious in tackling tough problems and being innovative by bringing many different expertise areas to build new insight (think big)
- having clear timelines, monitoring against them and being disciplined about sticking to them (test small)

1 Ministry of Health. 2016. Annual Update of Key Results 2015/16: New Zealand Health Survey. Wellington: Ministry of Health.
2 Snowden D and Boone M. *A Leader's Framework for Decision Making*. Harvard Business Review, November 2007.

- using project management disciplines and using a feedback-driven approach to work, and being flexible and adaptive to changes gathered from feedback (move fast).

This project also aims to build organisational understanding and capacity to adopt/adapt co-design methodologies, in line with the Ministry's aims to learn how to gather and use new insight connecting empathy to policy and service design and to demonstrate what can be achieved through working together innovatively. It is the first of its kind to be commissioned by the Ministry.

This project also represents the first occasion that the Ministry of Health has led work of this type using Statistics New Zealand's Integrated Data Infrastructure (IDI).

The analytics component

Key task: take a broad sweep approach to identify Māori women who smoke and describe the lives that they lead.

The task of the analytics team was not to identify what causes these women to smoke, but rather to describe as best we can the lives lead by young Māori women. We undertook a descriptive analysis to define the Māori women smoking population using research, data and analytics and present a more nuanced picture of this group of women (who they are, what they do, where they live) in this technical report. The intention was to triangulate quantitative and qualitative insights, by combining data insights together with people insights to provide as rich a picture as possible, to enhance our capability to find meaning. This report and the other project outputs build on previously published literature that is outlined in the accompanying evidence brief (Figure 1).

From a social investment perspective, this project has five components and the analytical phase outlined in this report is a proof of concept for components 1 and 2:

- **Component 1: Data foundation.**
- **Component 2: Understand the population.**
- Component 3: Evaluate service effectiveness (out of scope).
- Component 4: Calculate value (out of scope).
- Component 5: Make decisions (out of scope).

We used principles from the agile framework in how we designed and implemented the analytics complement of the project. This included:

- using an iterative approach to analysis where each step of the analysis strengthens the one before
- sharing results early and often within the team and with the wider group
- incorporating feedback from team members and the wider group with each step we took
- keeping in touch regularly through face-to-face meetings and emails so that progress was visible and responsibilities were clear
- playing to our strengths by having a cross-functional team.

This technical report is part of the suite of outputs for the analytical component (Figure 1). The outputs are designed to share what we learnt about young Māori women who smoke using data and analytics, and about how to use a similar process effectively for future projects of a similar nature.

Figure 1: Outputs from analytical component of project

EVIDENCE BRIEF
contains a summary of what we already know about young Māori women who smoke from previous research

SUMMARY A3
contains high level summary of what we learnt about young Māori women who smoke in this project

TECHNICAL REPORT
contains details about processes taken and our analytical results from analysis on data about young Māori women

HOW-TO GUIDE
contains information about resources needed, processe to take, and other tips to adopt/adapt for future projects of a similar nature

We also presented results and lessons learnt during the project at update sessions (all-comers meetings) where any interested parties were welcome. The attendees found these sessions to be informative and were a good opportunity for the project team to hear from other people in the Ministry of Health. We had three all-comers sessions:

- The 1st all-comers (9 May 2017) focussed on process, particularly: how to take a social investment approach for data and analytics; how the IDI can be used and its benefits; and our plan for delivering the analytics component of this project.
- The 2nd all-comers (31 May 2017) presented descriptive statistics as preliminary results, and included a discussion with the attendees about the results and actionable insights.
- The 3rd all-comers (29 June 2017) focussed on integrating insights from the co-design component with the analytics component. Attendees participated in discussion of the results and had the opportunity to view results presented on boards around the room.

Those attending the second all-comers session were invited to respond to the preliminary results through group discussion of the following questions:

- What is one thing you feel?
- What is one thing you wonder?
- What is one thing that surprises you?
- What is one thing that you could do with this information?

Despite the focus provided by the questions, responses were wide-ranging, reflecting the complexity of the issue. Many responses were relevant to future iterations of the project process (*I wonder how we can understand those that are missing in the data?*). A number of comments suggested the results were not entirely surprising (eg, *I'm surprised at the magnitude of the results*) but some also indicated frustration about how to effect positive change (eg, *I feel hopeless that the enablers are really big things – education, poverty, employment. I feel worried that we aren't helping fast enough*). Several respondents indicated that they would take the information to other teams in the Ministry and think about how the integrated approach could be used elsewhere.

Key lessons and future improvements

It is important to reiterate that in combining analytics and co-design in this way, this project is the first of its kind to be carried out by the Ministry of Health. It is also the first time that the team has used the IDI. The lessons learnt while attempting this new way of working cooperatively are highly valuable for future endeavours of a similar nature, and the skills gained can be applied to other questions using the 28 data sets available in the IDI. We therefore outline here one set of key lessons and suggestions for future improvements that relate to the study itself (analytical methods) and another for the project process.

Choice of variables and study population for analyse

- Using census data held in the IDI, we were able to identify variables that may have intervention power in our target group of young Māori women.
- Other data sets in and outside the IDI should be considered for analysis to form a broader picture. Other areas of interest that we did not include in our analysis are recreational activities, mental health conditions, alcohol consumption, and contact with other people (outside of the household).
- Young Māori women who were ex-smokers represented a small proportion of our overall study population, primarily due to the age inclusion criteria we applied. A future option would be to shift the study population to an older age group and potentially choose other variables more in line with the older age group.
- In the future, it could be useful to start from the Statistics New Zealand estimated resident population so that we can quantify the quality of linkages between our data sets and the base population.

Balancing between output that is timely and adding value

- Team members should be coached at the beginning of the project with regard to **expectations**; it was necessary to get used to the different way of working that was required (eg, sharing draft outputs earlier than usual).
- There is danger of '**scope creep**' when a project garners wide interest, as this project did.
- The **modelling phase** was not deemed to be crucial at the start of the project but the results proved to be informative and future projects will benefit from inclusion of predictive modelling.

Variations to modelling

- These models were the best the analysis was able to produce within the short timeframe of the project. They do not represent the best models for the topic of our analysis. For example, some variables with high correlation are included in these initial models.
- With more time, the next step would be to remove some variables, such as PHO enrolment (95% of the population are enrolled anyway), or trade-off between variables with high dependency, and see what impact that might have on the model.
- The variable "internet" shows up as significant, but it is possible that it is a proxy for another variable that is not included in this study. Indeed, access to the internet would have changed

since 2013 (most people will have it now), so if we run the model again we might want to exclude it.

- A possible future option would be to run the models excluding the New Zealand Deprivation Index to see what else becomes influential in absence of a measure that is designed to represent cumulative material and social disadvantage.

Project planning and timing

- The initial project timeframe was 4 to 6 weeks, but this proved to be unfeasible. However, we have shown that it is possible to identify key factors relating to a singular health issue in a short timeframe (approximately 3 months).
- Statistics New Zealand implements a rigorous system for checking outputs based on IDI data to protect confidentiality. These **timeframes for checking of output for release** (up to 1 week for phase 1 and 3 weeks for phase 2) must be incorporated into project timelines.
- **Timing** and **project management** are important with regard to lining up all **project components** (including personnel) are lined up in a timely manner and with regard to obtaining and incorporating **feedback on draft outputs**, which is a more complex task when the team is a multidisciplinary/multiagency one.

Getting the right people together at the right time

- Team members needed to be demanding, flexible, disciplined and creative to be able to operate effectively in this type of work situation.
- Engaging with the wider multidisciplinary group at each milestone was hugely helpful in refining the scope of the study and ensuring that the outputs are useful.
- Seeking guidance from, and providing project updates to the advisory group at regular intervals ensured that the project team received high-level input throughout the iterative project process.
- Including three **'all-comers' meetings** (for Ministry staff with an interest in the process or outputs of the project) proved vital in terms of encouragement and feedback.
- Having **close contact with the co-design partners** from early on in the process also benefitted both components of the project (analytics and co-design).
- The project benefited from ideas and **results and processes being shared early and often**. However, there is a need to have discipline around sharing early and often, to keep project on track and allow for the requisite amount of discussion, as this is somewhat contrary to natural instincts around sharing only when components are in a more polished state.
- It will vastly aid future projects of a similar nature if there is capacity for **knowledge transfer** between by adding other analysts to projects so that they can learn from us and continue to build skills within the Ministry of Health for this type of work.

This project represented **a valuable opportunity** for Ministry staff and external partners to learn more about young Māori women who smoke and implement a new process.

We recommend that this process is repeated, focussing on developing replicable and re-usable code and methods.

Analysts and others who are interested in developing projects of a similar nature can use this technical report in conjunction with the **how-to guide** as guiding documents.

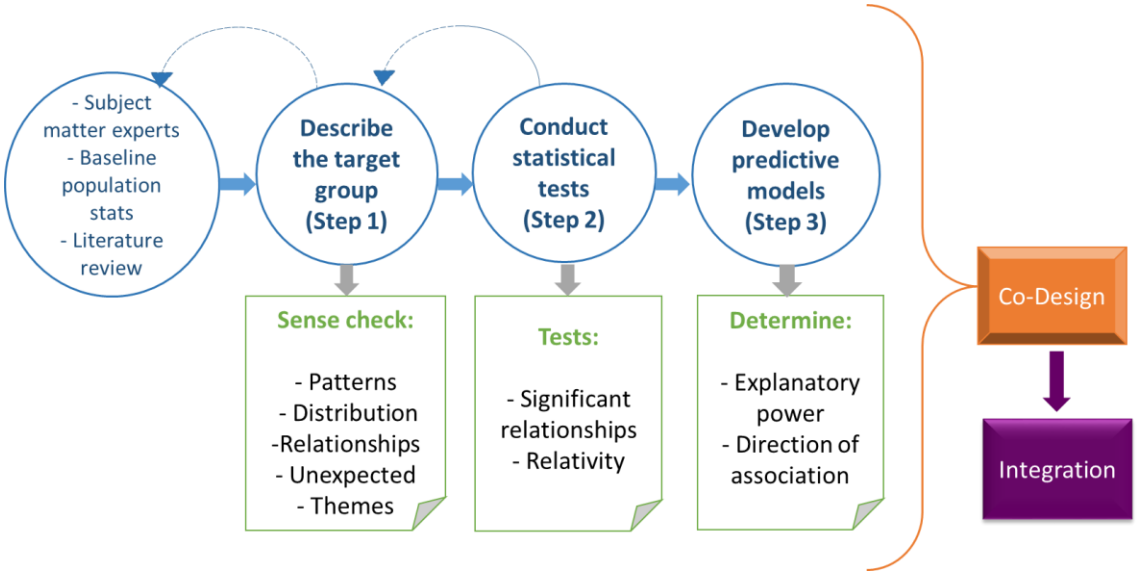
Methodology

Process

The quantitative analysis described in this report followed an iterative approach with each step building on the preceding one and with the aim to provide the results with a strong evidence base (Figure 2). We were mindful that future interventions might be aimed at preventing women smoking in the first place or encouraging smokers to quit, but that it would likely be a combination of both. Therefore, the scope of the analysis includes identifying the influencing factors for young Māori women who smoke and have never smoked, and determining how influential those factors are.

The timeframe for the project was three months (April–June 2017) and the major tasks were divided up as shown in Table 1. The methods relating to data foundation and data analysis are outlined in more detail in the following sections.

Figure 2: Analytics project process and methods overview



Team members and principal responsibilities

All team members worked in a collaborative fashion by being involved in discussions and providing feedback for all outputs. The principal responsibilities for each team member were as follows:

- Cheree Shortland-Nuku: project co-ordinator
- Emily Mason: data and analytics leadership and co-ordinator
- Esther Lim: data analysis and interpretation, preparation of technical report, summary A3 and how-to guide
- Sonia Chen: data analysis and interpretation, preparation of technical report, summary A3 and how-to guide
- Jo Davy: technical report writer
- Louise Rutherford: evidence brief and how-to guide writer
- Kylie Reiri: peer review and advisor for data analysis and interpretation.

Table 1: Project timeline and major steps

Month 1: Data foundation	
Week 1	Engaged project analysts; applied for access to the IDI; defined the project goal; identified potential data sources; decision made on which data sources to use.
Week 2	Literature review; discussion around a stepped statistical approach, variables and project population; continued pursuit of IDI access approval.
Week 3	Test data set constructed and used to build a statistical model; IDI access confirmed; confidentiality training completed.
Week 4	Team members for analytical, process and evidence brief support engaged; target population selected; variable shortlist selected; outcome categories defined.
Month 2: Data analysis and interpretation	
Week 5	Three-step statistical approach confirmed; first step results submitted to Statistics NZ microdata team for phase 1 checking; variable selection and categories refined; presentation for first all-comers meeting submitted for phase 1 checking.
Week 6	First all-comers meeting; technical report writer engaged; second step statistical analyses started.
Week 7	Second step results submitted for phase 1 checking; phase 1 approval granted for new team members; third step statistical analyses started.
Week 8	Analytical results sent out for peer review; presentation for second all-comers meeting submitted for phase 2 checking.
Month 3: Collation of analytical results and integration	
Week 9	Interpretation of third step results; third step results submitted to IDI for phase 1 checking; second all-comers meeting.
Week 10	Technical report and A3 preparation; drafts of technical report, evidence brief and A3 sent out for wider group (using phase 1 output) review.
Week 11	Draft technical report and draft A3 submitted for phase 2 checking; evidence brief finalised.
Week 12	Third all-comers meeting; How-To guide draft sent out for comment.
Week 13	Technical report and How-To guide submitted to project advisory group.

Note: Statistics NZ follows a two-phase model to ensure that microdata output from the IDI is acceptable for sharing. Phase 1 output is confidentialised output used for further research and writing up findings and can only be shared with the research team (ie, named researchers on the microdata access application). Phase 2 output is confidentialised output that is usually in the form of a publication, paper, or presentation and can be released into the public domain.

Data foundation

Data sources used

New Zealand is a wealthy country with regards to data. There are a number of data sources, both administrative data and survey data, which would contribute to developing a rich picture of the lives of young Māori women.

With a short project time frame and tightly defined goals, we applied the following criteria to each candidate data set:

- data is available for use now: can it be accessed within one week?
- data is at the appropriate level: is the data at an individual level and event level?
- data can be linked: can the data be linked to other data sets now or in the future?
- data has sufficient coverage: does the data cover a large enough sample of smokers when broken down by 3 or more variables?
- data is current: does the data cover the period 2011 onwards?

The Integrated Data Infrastructure (IDI) platform was decided to be the best option, based on the above criteria, as well as the relative advantages comparing to many other subject specific survey data sets:

- a large number of health and non-health data sets are already available
- linkages have already been made
- analysts have a good chance of gaining access within a relatively short timeframe.

We decided to use the 2013 Census data via Statistics New Zealand's IDI as the primary source of data, with additional information from other relevant data sets already available in the IDI. The 2013 Census data was also used as a means to identify the study population. For future analytics projects, it will be worth considering adding data from the NZ Health Survey as it contains more in depth data about smoking behaviour, undiagnosed mental health conditions and alcohol use that is not currently available in the IDI.

Ball et al (2016)[3] presented a critical review of national data sources to inform progress towards the Smokefree 2025 goal. Based on this paper and the criteria set out above, the 2013 Census was deemed to be the best means of identifying smokers for this project because:

- it has the advantage of reaching 93–95% of the NZ adult population
- it is not subject to sampling error
- it has a clear smoking question (Do you smoke cigarettes regularly, that is, one or more a day?)
- it is accompanied by other key information about the person that is likely to be useful
- it is in the IDI and has been linked to other data sets.

3 Ball J, Stanley J, Wilson N, et al. 2016. Smoking prevalence in New Zealand from 1996–2015: a critical review of national data sources to inform progress toward the Smokefree 2025 goal. *NZMJ* 129(1439). URL: https://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2016/vol-129-no-1439-5-august-2016/6958 (accessed 8 June 2017).

The following issues were highlighted when choosing to use the Census:

- It is a snapshot of someone's life on a single day and will not capture whether the person has since stopped smoking, has since commenced smoking, or smokes more now.
- Smokers are likely to be over-represented in the group most likely to be missed by the Census.

Establishing key variables and common definitions

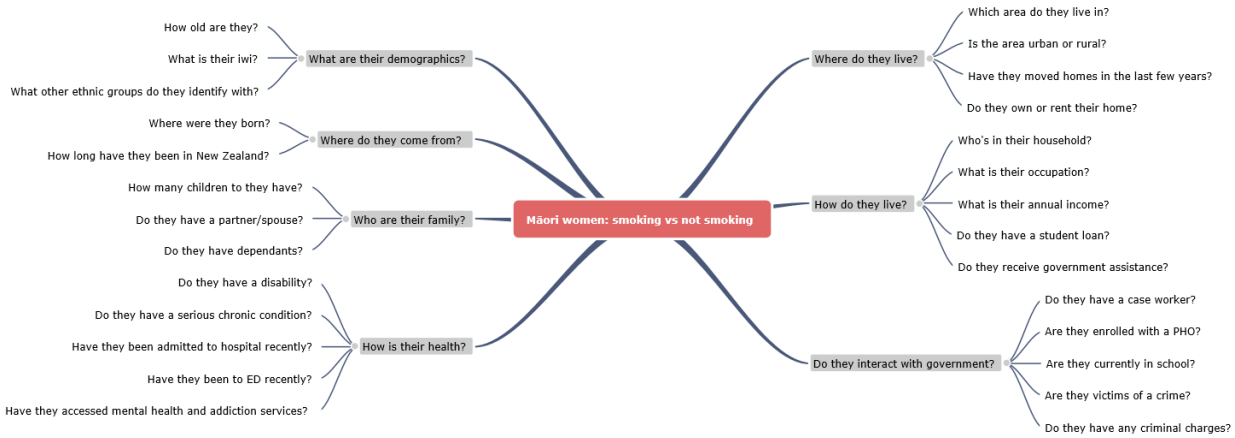
Given the breadth of data in the IDI and our timeframes, we needed to be disciplined about limiting the analysis to a key set of metrics at first, leaving ourselves with the option of expanding and refining later.

We established a set of themes and questions (Figure 3) and used the IDI dictionaries to pick out variables that would answer some of these questions. The initial set of about 50–60 variables was distributed to a wider group for feedback and consultation and aimed to reduce the list of fewer than 20 key variables in the first instance.

We sought advice from the wider group on their preferences, particularly in refining the variables to a derived version that hopefully answers a real question. For example, when looking at the size of the house an individual lives in, we wanted to understand whether the wider group wanted to know actual number of residents in the household or whether if the household is overcrowded (derived from number of residents and number of rooms).

The initial shortlist of variables was ranked according to importance and ease and some were included in the hope that myths could be debunked. Some variables were left in the "maybe" category until early results were available and then there was a further refinement. Following feedback and consultation, we reduced the number of variables to 30, grouped into 7 themes.

Figure 3: Project themes and questions



Refining the study population

While we were clear at the beginning of the project that we would limit the analyses to people we could identify as being Māori women using the 2013 Census, we had the option of limiting further to Māori women of a particular age group.

The following reasons for limiting further (maximum age is 15 to 35 years) were considered:

- Other data sets we might use to supplement the Census data do not cover people over a certain age (eg, education data).
- Analyses are simpler with fewer age groups and if they deal with fewer life factors (eg, the lifestyle factors and stresses of an 18 year old are very different from those of a 60 year old).

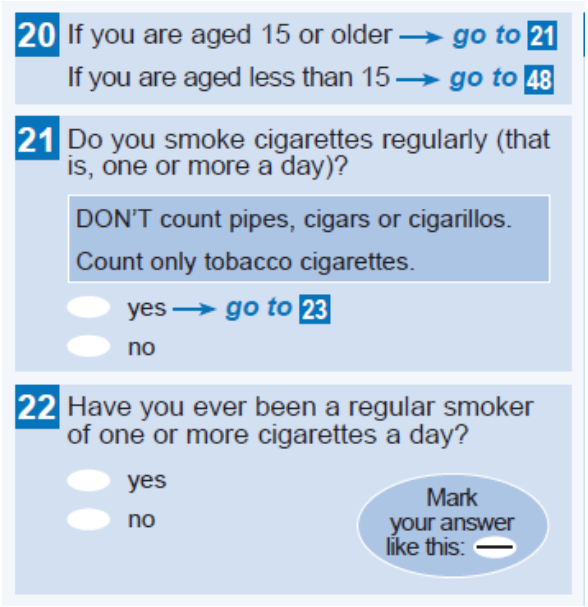
We sought advice from a wider group on their preferences, providing them with data on current smoking and daily smoking prevalence. With their recommendations in mind, we then looked through the refined list of variables and matched the time period of the data set to the age of the study population. We limited the study to the preferred age group of 18–24 years because:

- we were able to determine that we would be able to source all necessary data for this age group
- this group shows the biggest difference in daily smoking rates, compared with non-Māori in the same age group
- this age group represents the core age group targeted by the co-design team
- adding school-aged children who have parents/guardians makes data interpretation extremely difficult.

Determining smoking status for young Māori women

We used questions 21 and 22 of the 2013 Census individual form (Figure 4) to establish the "outcome" categories of "Regular smoker", "Ex-smoker" and "Never smoked", with the definition of regular smoking being smoking one or more cigarette a day (ie, daily smoking). These smoking status questions were only applicable to people aged 15 years and over.

Figure 4: Questions related to smoking in the 2013 Census individual form



Data preparation and handling

The data required for analysis was sourced from four main data sets in the IDI:

- 2013 Census (Statistics New Zealand)
- National non-admitted patient collection (Ministry of Health)
- Publicly funded hospital discharges – event and diagnosis/procedure information (Ministry of Health)
- Primary health organisation enrolment data (Ministry of Health)

We used the 2013 Census individual table to identify the core study population. We then linked each person to other tables in the IDI (eg, 2013 Census dwelling data, emergency department events in the National non-admitted patient collection data) to build the data set and records were only kept if they had a valid smoking status recorded. The data set used for analysis had a single line per person.

Data analysis

Data analysis consisted of three steps (Figure 2):

- **The descriptive** component (including baseline information on age by smoking status) provided a view of the target group of young Māori women aged between 18 and 24 years in terms of **who** they are, **where** they live and **what** their lives are like (Step 1).
- **The statistical testing** component (chi-square, odds ratios, correlation coefficient) examined **which variables were likely to be determinants** (Step 2)**.**
- **Predictive modelling** (multiple logistic regression) was carried out to **quantify the influence of key variables** identified through statistical testing (Step 3).

Descriptive statistics

To calculate simple percentages for the descriptive statistics section, we took a group of individuals with a certain characteristic (eg, Māori women aged 18–24 years who had no secondary school qualification) and calculated the proportion of each smoking status to show how this differs from the proportion of each smoking status at a study population level (ie, Māori women aged 18–24 years).

All unweighted counts and corresponding percentages presented have been randomly rounded to base 3 as per Statistics New Zealand guidance.[4]

4 Statistics New Zealand. 2016. Microdata output guide (Fourth edition). Wellington: Statistics New Zealand.

Statistical testing

Chi-squared test: We conducted chi-squared tests to examine the relationship between smoking status and each variable (eg, regular smoking and age). The results provided evidence and guidance for the modelling exercise in the next step of the analysis.

Correlation coefficient: The same variables were then checked for their relationship with each other, with the correlation coefficient indicating the liner correlation between each pair of variables.

Predictive modelling

Logistic regression is commonly used to establish a model that predicts an outcome using one or more predictive variables. For this part of the analysis, we focused on establishing a logistic model for each smoking status to better understand how different variables are associated with smoking status. We were mindful from the outset that the timeframe of the project may not allow for a thorough predictive modelling exercise, which turned out to be the case.

Nevertheless, to establish a baseline for future work, three basic models were established using SAS software:

- We used odds ratios to quantify how strongly the presence (or absence) of a variable was associated with the presence (or absence) of another variable. For example, if the ratio between the odds of men who live in an apartment and women who live in an apartment is 2, it would suggest that men are twice more likely to live in apartments than women.
- We used multiple logistic regression to examine the significance of variables in relation to smoking status and the R-squared (R^2) value to assess the goodness-of-fit of the models. To do so, we converted all variables, except age, into binary values (yes/no) for the modelling exercise, resulting in a total of 31 predictive variables. We then constructed three models for each smoking status using forward selection, backward elimination and stepwise regression procedures. The results from the backward elimination procedure are presented in this report.

Additional information

The code used to extract, transform and analyse the data is stored on the IDI server (under MAA2016-05 project code). Please contact Esther Lim or Sonia Chen at the Ministry of Health for more information.

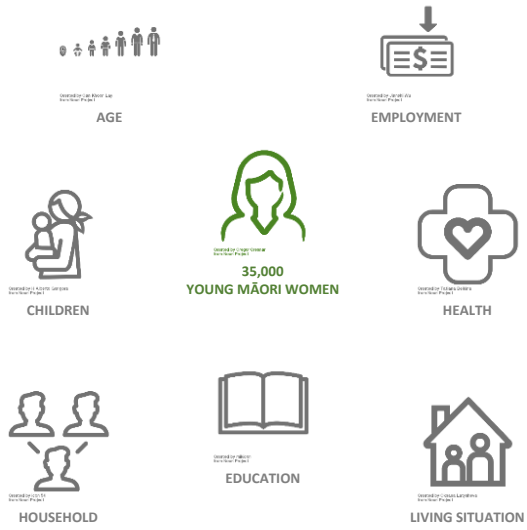
Results

All results presented in this section are based on data from Statistics New Zealand's Integrated Data Infrastructure (IDI).

Step 1: Descriptive statistics

The first analytical phase provides the basis of a better understanding of the lives of young Māori women aged between 18 and 24 years. The variables have been grouped into seven main areas (Figure 5). Only the results that the wider team have deemed to be most relevant for the co-design phase and for the design of future interventions are presented here. For a full set of results, see Table 2 at the end of this chapter.

Figure 5: Variables analysed in relation to smoking status of young Māori women



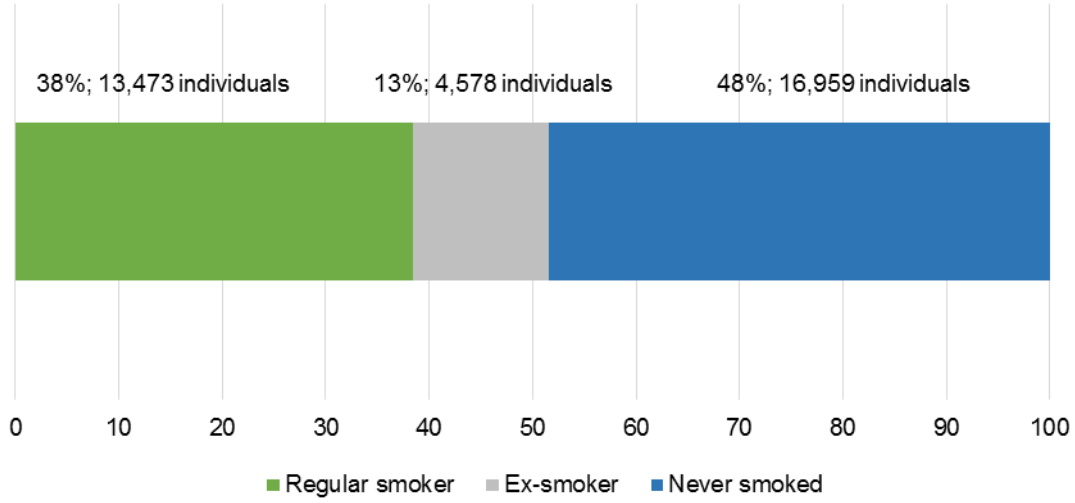
To aid with interpretation of graphs, please note the following:

- For each variable, you can see how smoking status is distributed. The vertical lines (dashed and dotted) indicate how the total study population is divided by smoking status (smoking, ex-smoker, never smoked). These lines are included on subsequent figures.
- Each bar adds up to 100%.

Overview

Overall, almost half (48%) of the study population indicated that they had never smoked and 38% were regular smokers (Figure 6).

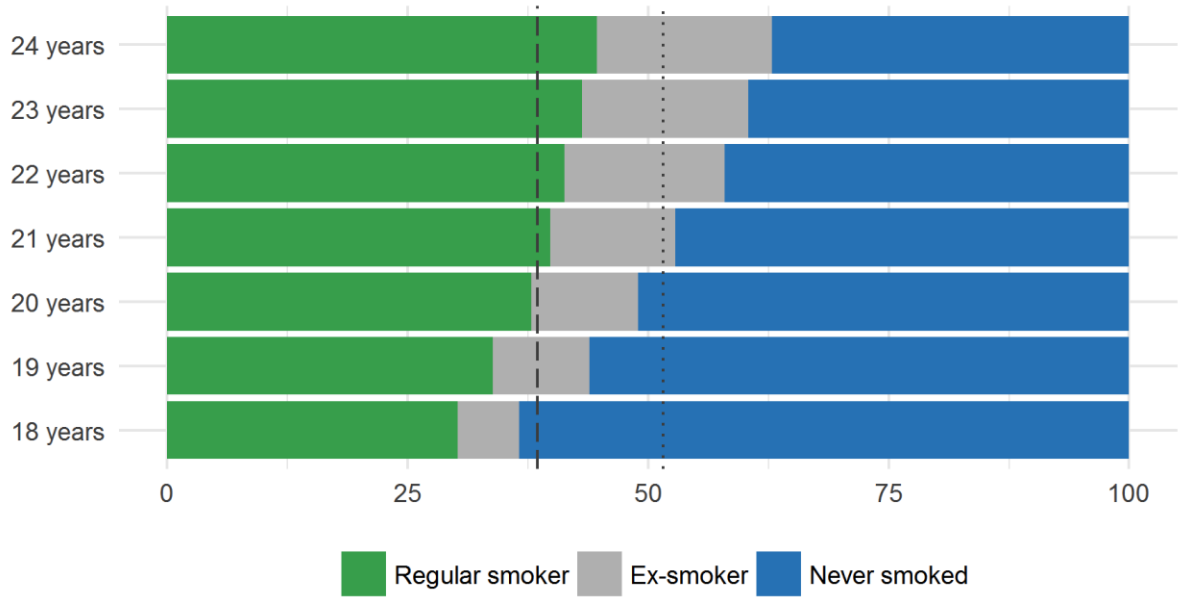
Figure 6: Distribution (%) of young Māori women by smoking status on 5 March 2013 (2013 Census)



Age

At 18 years of age, 2 in 3 Māori women have never smoked. At age 24 years, only **1 in 3** had never smoked (Figure 7).

Figure 7: Distribution (%) of smoking status among young Māori women by age (years)

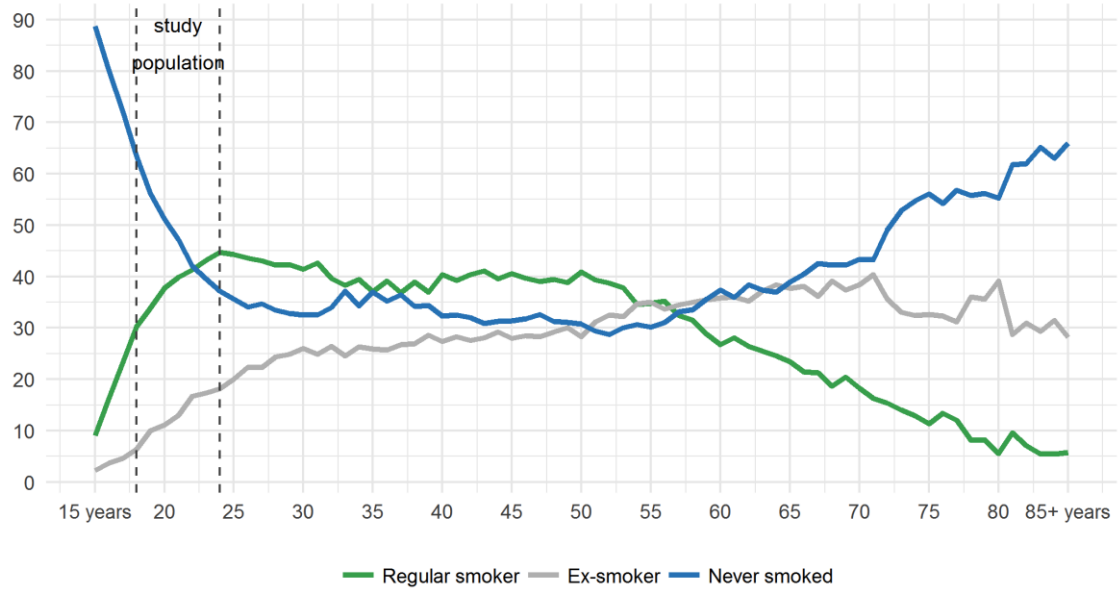


The data for 18 year-olds, which shows that many smokers – and also a sizeable number of ex-smokers – led us to consider that there might be value in determining the smoking status by age for all Māori women who responded to the 2013 Census. We hoped that this would give more insight as to when Māori women commence smoking, which could further inform the co-design portion of the project, particularly with regard to interventions targeting non-smokers.

The biggest change in smoking behaviour among Māori females happen at a fairly young age, particularly between the ages of 15 and 24 years (Figure 8). However, further considerations meant that we continued to restrict our study to the 18 to 24 age group, namely:

- this group shows the biggest difference in daily smoking rates, compared with non-Māori in the same age group
- this age group represents the core age group targeted by the co-design team
- adding school-aged children who have parents/guardians makes data interpretation extremely difficult.

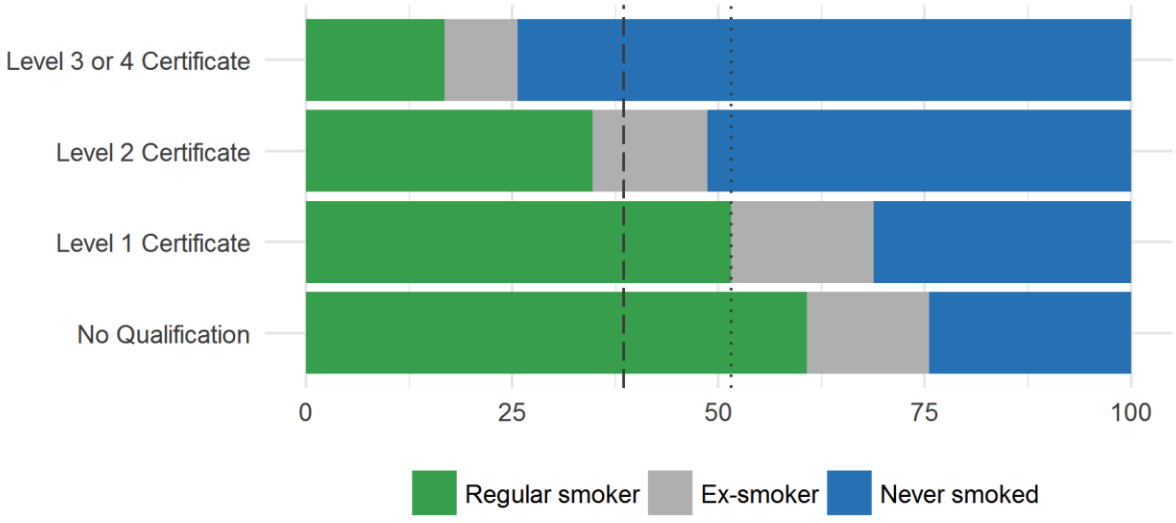
Figure 8: Distribution (%) of smoking status among Māori women at each age (years)



Secondary school qualification

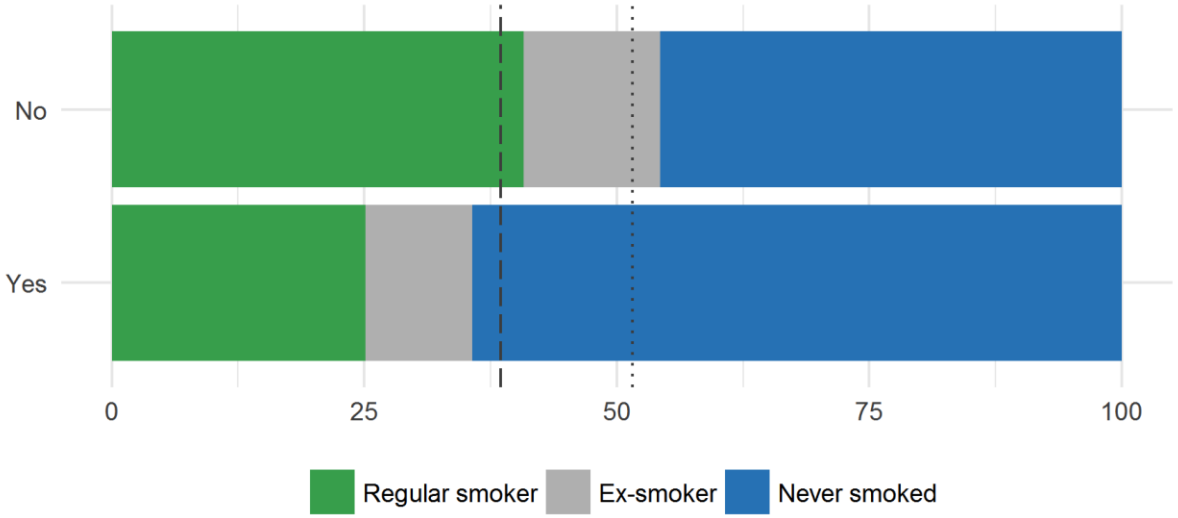
There is a clear pattern seen between level of secondary school qualification and smoking status, with 61% of young Māori women who smoke having no secondary school qualification at all and 75% of those who have never smoked having attained a Level 3 or 4 Certificate (Figure 9).

Figure 9: Distribution (%) of smoking status among young Māori women, by level of secondary school qualification



Following secondary school, young Māori women with a Level 3 or 4 Certificate have a greater opportunity for further education (particularly tertiary education) and the majority of this group have never smoked. The eligibility and uptake of student allowance shows a similar pattern for those with a Level 3 or 4 Certificate, with 64% having never smoked (Figure 10).

Figure 10: Distribution (%) of smoking status among young Māori women, by whether they receive the student allowance as a source of income



Children

Regular smoking is more common among young Māori women who have children (55% who have given birth at least twice were regular smokers) (Figure 11). We looked at multiple aspects of having children and found that regular smoking was more commonly associated with several aspects, including requiring income assistance (57% of regular smokers receive the domestic purposes benefit) (Figure 12).

In contrast, 58% of Māori women who have never smoked have never given birth to a (live-born) baby. These women are less likely to have to look after children in or outside their household without pay or to receive the domestic purposes benefit.

Figure 11: Distribution (%) of smoking status among young Māori women, by number of (live-born) babies

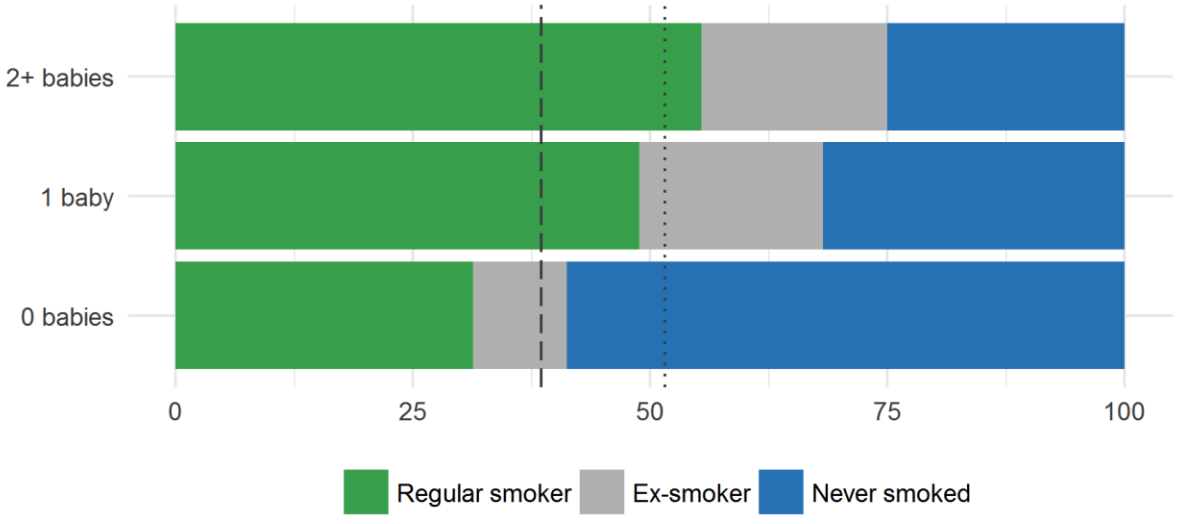
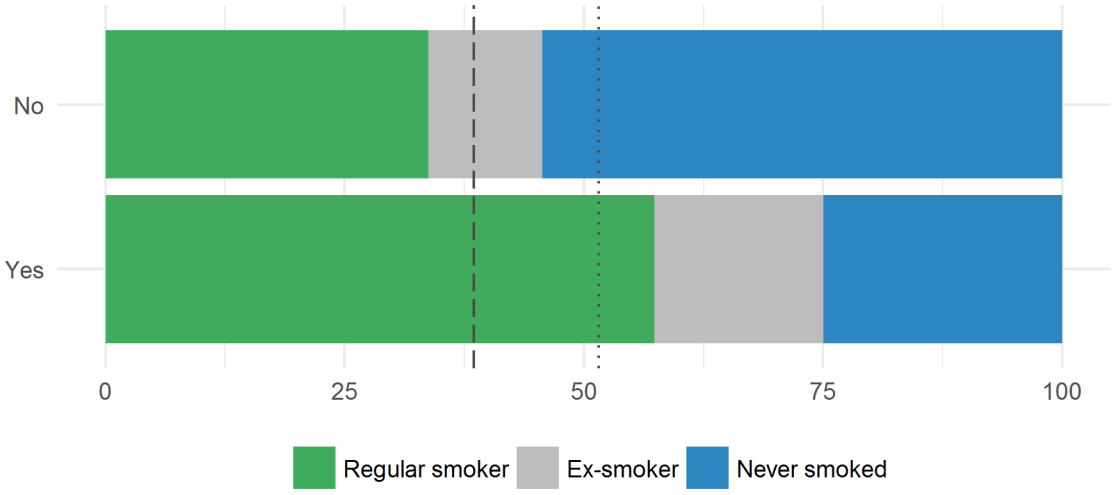


Figure 12: Distribution (%) of smoking status among young Māori women, by whether they receive the domestic purposes benefit as a source of income



Employment

Regular smoking is more common among young Māori women who are not employed (Figure 13), particularly among those who receive unemployment benefit (53%) (Figure 14), while more than half of young Māori women who were in paid employment have never smoked (%).

Figure 13: Distribution (%) of smoking status among young Māori women, by whether they have paid employment

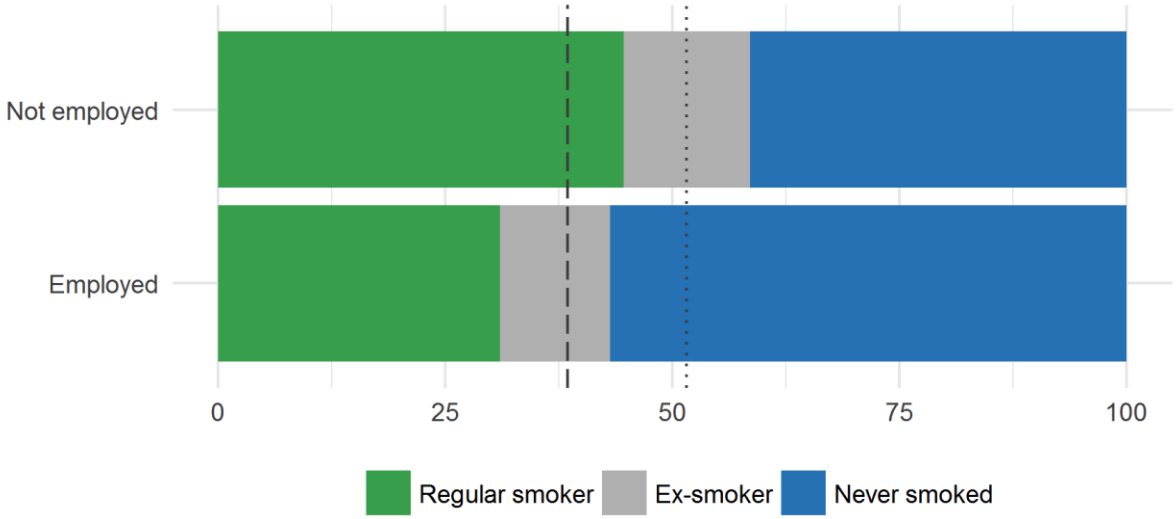
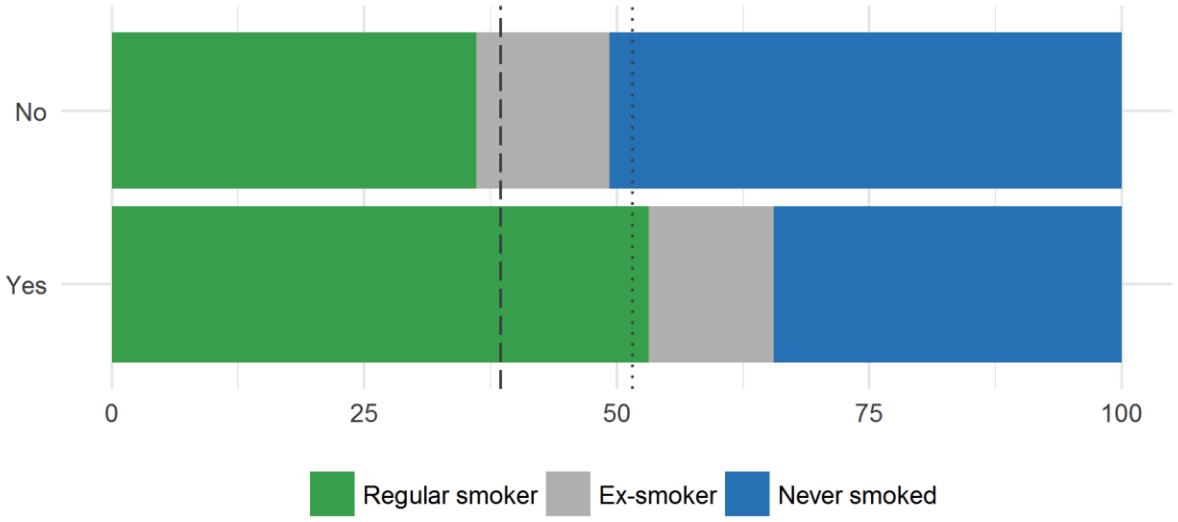


Figure 14: Distribution (%) of smoking status among young Māori women, by whether they receive the unemployment benefit as a source of income

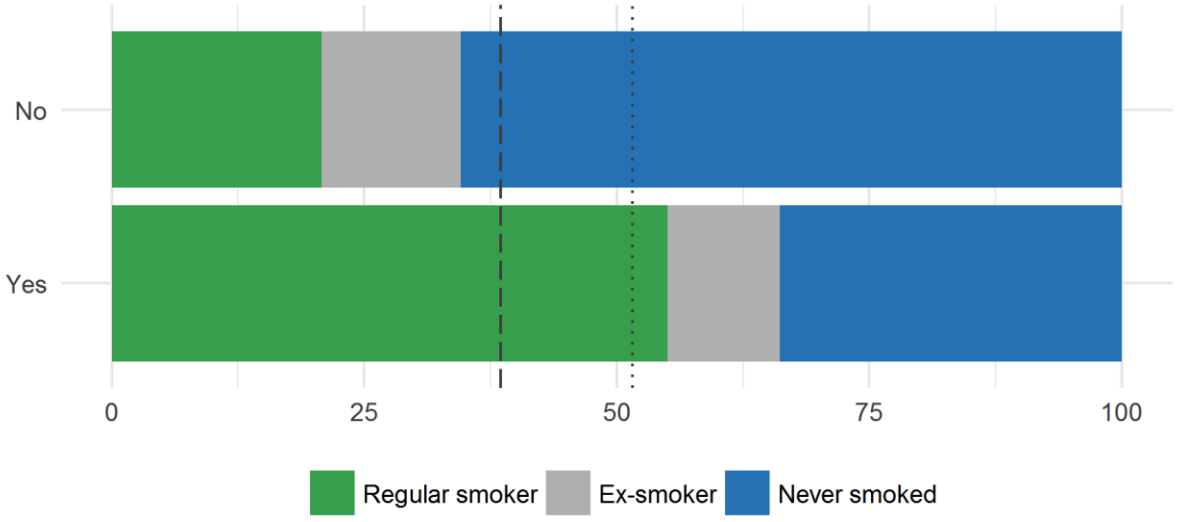


Household

Living with other adults who smoke is common among young Māori women who smoke, with 55% those who live with at least one other adult who smokes were also regular smokers and 34% have never smoked (Figure 15).

The majority of young Māori women who live with other adults who do not smoke have never smoked (65%) while 21% were regular smokers.

Figure 15: Distribution (%) of smoking status among young Māori women who live with other adults who smoke



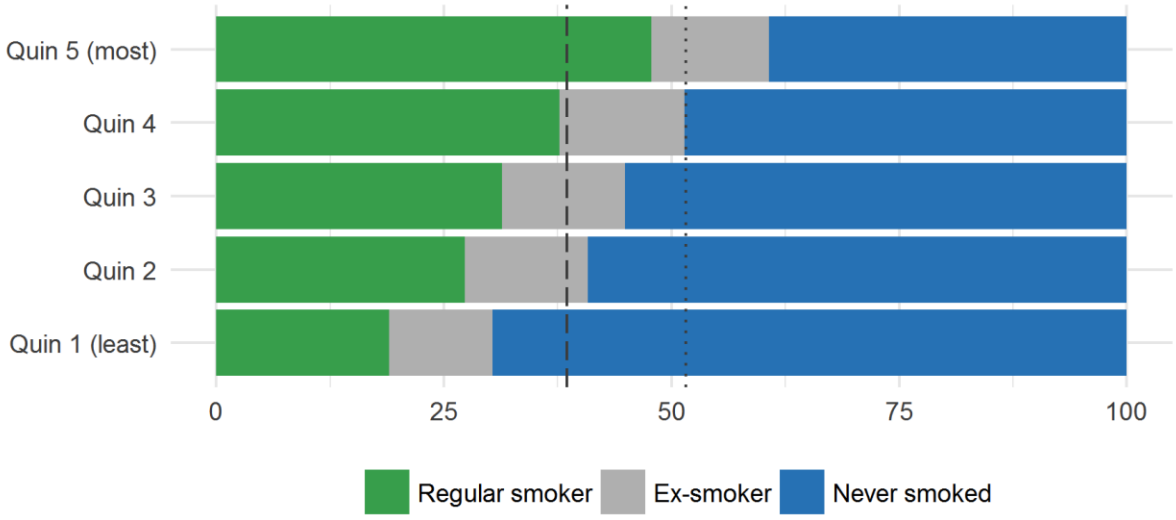
Living situation

The way socio-economic deprivation is measured in New Zealand means that we expect to see equal proportions of smokers across each deprivation quintile (which are of approximately equal size for New Zealand) at a total population level. Our results do not reflect this. For all three smoking statuses (regular smoker, ex-smoker, never smoked), there is a far greater proportion of

young Māori women (42%) living in the most deprived neighbourhoods. Even among those who have never smoked, there were more young Māori women living in more deprived neighbourhoods.

However, the difference in proportions between quintile 1 (least deprived) and quintile 5 (most deprived) is much larger for regular smokers than for those who have never smoked (Figure 16). In the least deprived neighbourhoods, 19% were regular smokers and 70% have never smoked, while in the most deprived neighbourhoods, 48% were regular smokers and 39% have never smoked.

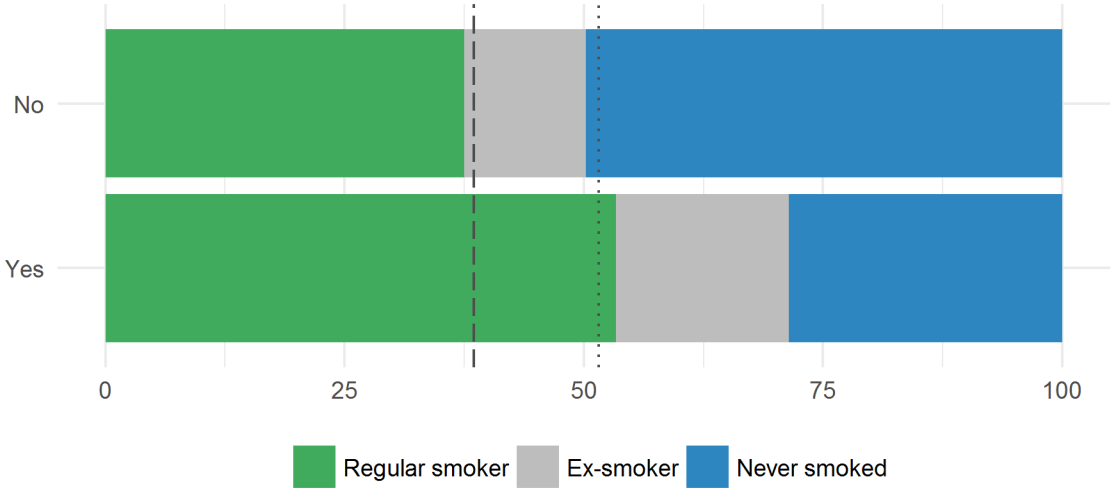
Figure 16: Distribution (%) of smoking status among young Māori women, by neighbourhood deprivation quintile



Health

More than half of young Māori women who receive the sickness benefit were regular smokers (Figure 17). Regular smoking was also more common for those who attended the emergency department, and for those who were admitted to hospital at least once in the previous 12 months (47% and 46%, respectively).

Figure 17: Distribution (%) of smoking status among young Māori women, by whether they received the sickness benefit as a source of income



Step 2: Statistical tests

Chi-squared test

In Step 2 of the analysis, we first examined the variables discussed above for their relationship with smoking status using a chi-squared test. All variables showed a strong relationship with smoking status ($p<0.05$).

Correlation coefficient

The same variables were then checked for their relationship with each other, with the correlation coefficient indicating the linear correlation between each pair of variables (outlined in full in Table 3 at the end of the report). A coefficient of 1 indicates total positive linear correlation, 0 indicates no linear correlation, and −1 indicates total negative linear correlation.

Variables with a coefficient greater or equal to 0.5[5] or lesser or equal to -0.5 are highlighted in green in Table 3. As "Child care", "Has Children" and "Receiving DPB" are highly correlated they may not need to be included in the predictive model at the same time. The modelling step (step 3) will explore this further, time permits. Logistic regression analysis allows us to examine each variable's explanatory power by including different combinations of variables in the predictive model.

Step 3: Predictive models

At the start of the modelling exercise, all variables were included in the multiple logistic regression model to form a baseline model for each smoking status. Two results from the regression analysis are presented here for each smoking status: odds ratio and multiple logistic regression model. For a full set of results, see Table 4 at the end of this chapter.

Odds ratio

Figure 18, Figure 20 and Figure 22 show the odds ratios for each smoking status with 95% confidence intervals (CI) The solid dots represent the average and the bars on either side represent the lower boundary (left) and upper boundary (right) of the confidence interval. Where the confidence intervals overlap, the variables are not considered to be significantly different at the 95% CI level.

Multiple logistic regression

The results from the backward elimination procedure are presented in this report. Only variables with statistical significance (p-value < 0.05) are included in the model, as well as their effect on smoking. The intercept reflects the log odds of a smoking status in the absence of all the predictive variables.

R^2 values were small for all three models, which suggests a poor model fit. Two main reasons for this are:

- the models need further refinement
- R^2 values tend to be low in models relating to predicting human behaviour.

5 The cut-off point of 0.5 was selected based on similar work done in the past.

Regular smokers

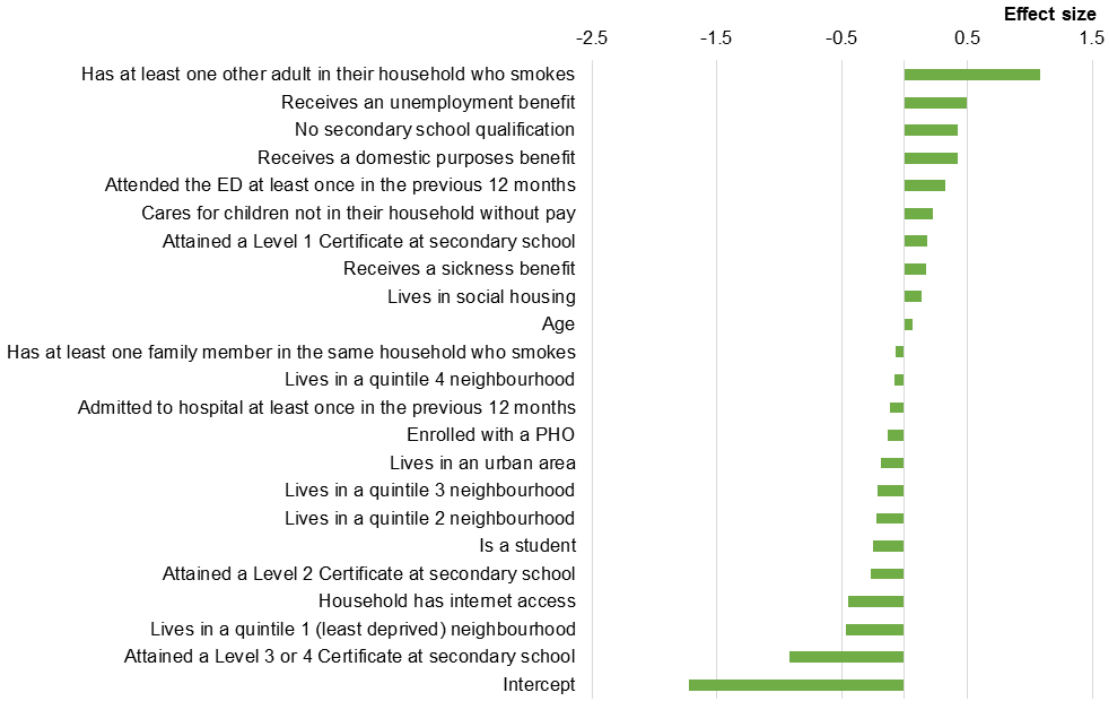
Of the 31 predictive variables analysed, 22 were identified as being statistically significantly related to being a regular smoker ($R^2 = 0.212$). When compared with the rest of the study population (ie, never smoked and ex-smokers), young Māori women who are regular smokers

- are 3 times more likely to live in a household where there are other smokers
- are 1.5 times more likely to have no secondary school qualification, and have a 60% decreased chance of having attained a Level 3 or 4 Certificate
- are 1.6 times more likely to receive unemployment benefit, and 1.5 times more likely to receive domestic purposes benefit
- have a 20% decreased chance of living in more affluent areas (quintiles 2 and 3).

See Figure 18 for odds ratios of predictive variables and Figure 19 for the size and the direction of the influence of predictive variables on being a regular smoker.

Figure 18: Odds ratios (with 95% confidence intervals) for variables influencing young Māori women who are regular smokers

Figure 19: Logistic regression analysis for variables influencing young Māori women who are regular smokers



Ex-smokers

Of the 31 predictive variables analysed, 17 were identified as being statistically significantly related to being an ex-smoker ($R^2 = 0.036$). When compared with the rest of the study population (ie, regular smokers and never smoked), young Māori women who are ex-smokers:

- are 1.6 times more likely to live alone
- are 1.5 times more likely to have children or are in partnership
- have a 33% reduced chance of attaining a Level 3 or 4 Certificate at secondary school.

See Figure 20 for odds ratios of predictive variables and Figure 21 for the size and the direction of the influence of predictive variables on being an ex-smoker.

Figure 20: Odds ratios (with 95% confidence intervals) for variables influencing young Māori women who are ex-smokers

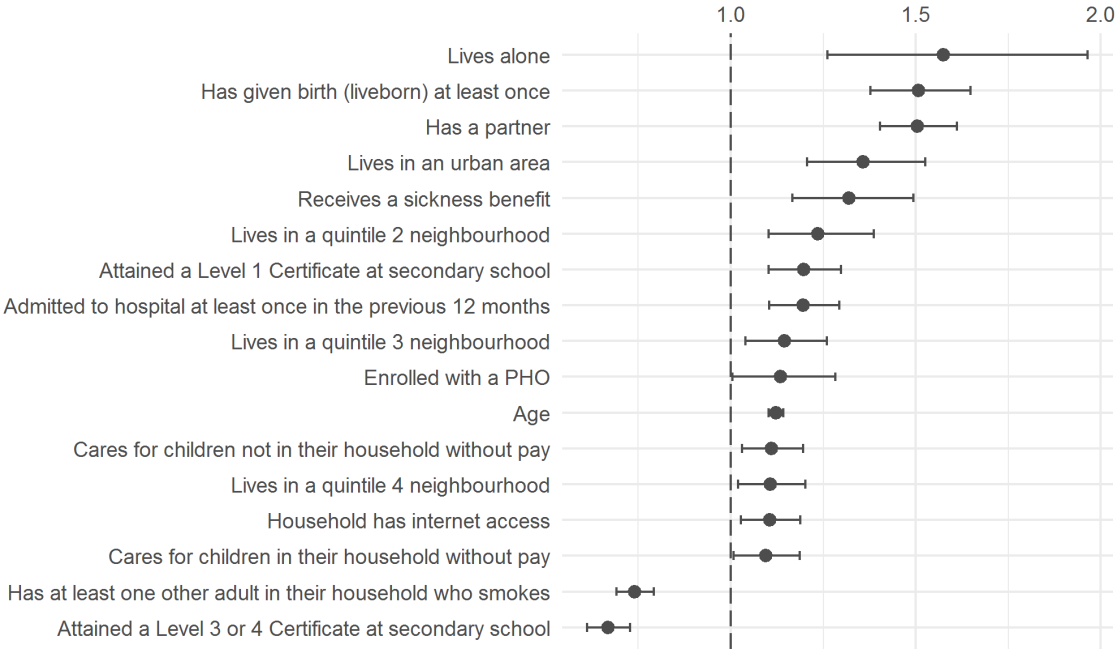
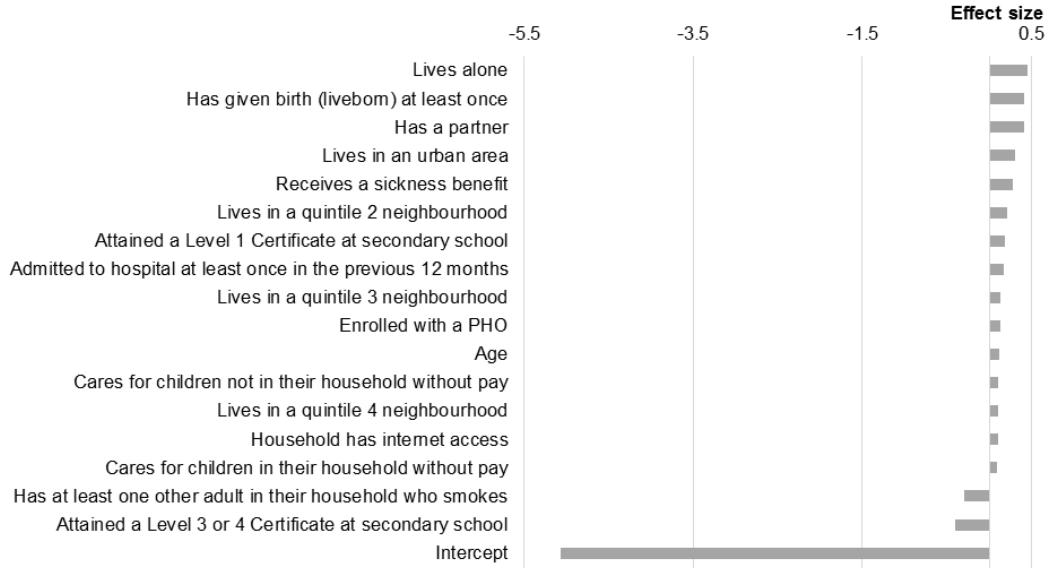


Figure 21: Logistic regression analysis for variables influencing young Māori women who are ex-smokers



Never smoked

Of the 31 predictive variables analysed, 19 were identified as being statistically significantly related to having never smoked (R^2 = 0. 242). When compared with the rest of the study population (ie, regular smokers and ex-smokers), young Māori women who have never smoked:

- are 2.5 times more likely to have attained Level 3 or 4 Certificate at secondary school
- are at least 1.1 times more likely to live in a more affluent area
- are less likely to receive social welfare benefits.

See Figure 22 for odds ratios of predictive variables and Figure 23 for the size and the direction of the influence of predictive variables on having never smoked.

Figure 22: Odds ratios (with 95% confidence intervals) for variables influencing young Māori women who have never smoked

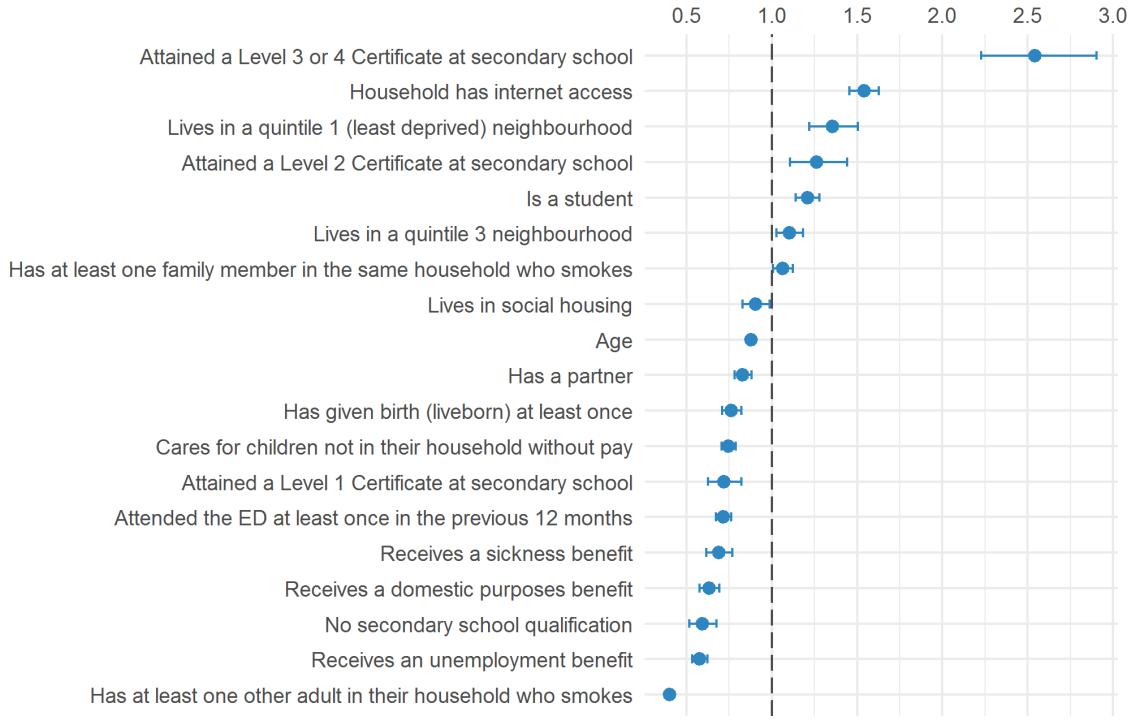
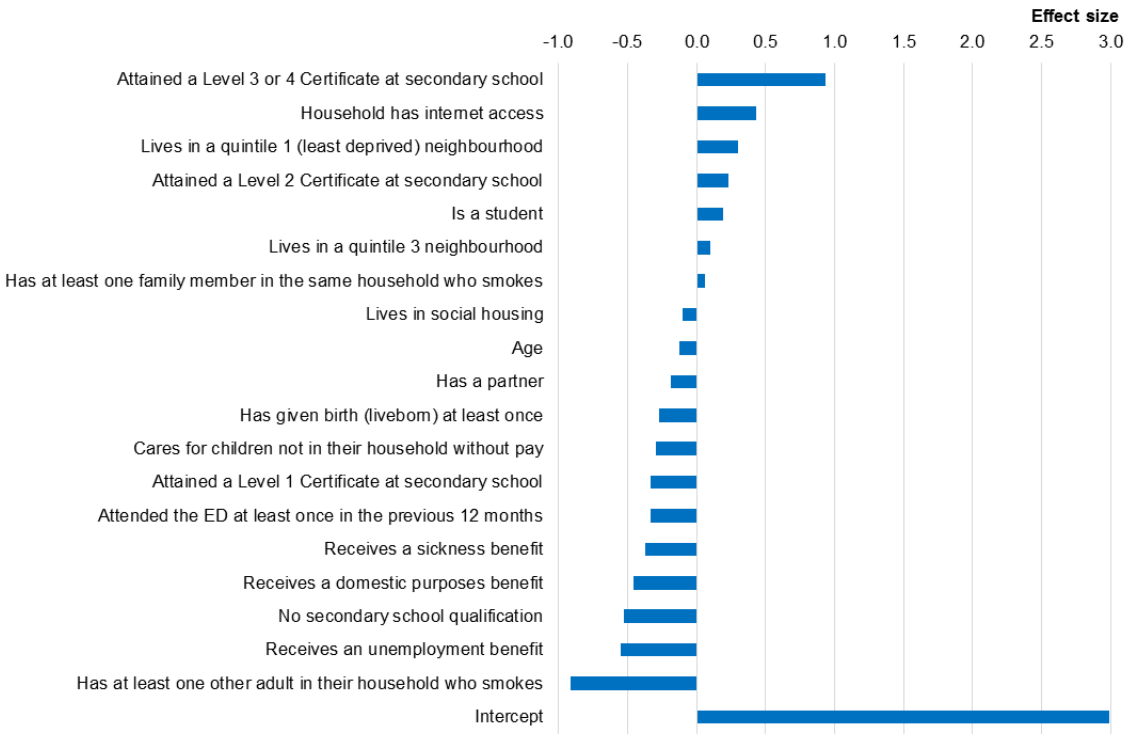


Figure 23: Logistic regression analysis for variables influencing young Māori women who have never smoked



Common predictive variables

Some variables are presented across all models. Even though the variables should be considered within their own models and cannot be compared across the models, these variables fall under the same high level categories as the ones highlighted by the descriptive analysis (Step 1), mainly (in no order of significance):

- age
- attained a Level 1 Certificate at secondary school (secondary education qualification)
- attained a Level 3 or 4 Certificate at secondary school (secondary education qualification)
- lives in a quintile 3 neighbourhood (living situation)
- has at least one other adult in their household who smokes (household)
- household has internet access (living situation)
- cares for children not in their household without pay (children)
- receives a sickness benefit (income).

It is encouraging to note that the results of the descriptive analysis and logistic regression are largely consistent, although as some variables have been shown to be highly dependent, these predictive modelling results must be considered preliminary, and could change.

Additional tables

Table 2: Number and percentage of Māori females aged 18–24 years for each variable by smoking status

	Count			Percentage of smoking status (%)[a]			Percentage of characteristic (%)[b]		
Variable / characteristic	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**
Overall									
Total	13,473	4,578	16,959	38.5	13.1	48.4	100.0	100.0	100.0
Age									
18 years	1602	339	3363	30.2	6.4	63.4	11.9	7.4	19.8
19 years	1752	519	2904	33.9	10.0	56.1	13.0	11.3	17.1
20 years	1938	570	2613	37.8	11.1	51.0	14.4	12.5	15.4
21 years	2007	654	2379	39.8	13.0	47.2	14.9	14.3	14.0
22 years	2091	843	2127	41.3	16.7	42.0	15.5	18.4	12.5
23 years	2064	828	1896	43.1	17.3	39.6	15.3	18.1	11.2
24 years	2016	822	1677	44.7	18.2	37.1	15.0	18.0	9.9
Secondary school qualification									
No qualification	4,848	1,182	1,956	60.7	14.8	24.5	37.7	26.8	11.9
Level 1 Certificate	3,372	1,128	2,040	51.6	17.2	31.2	26.2	25.6	12.4
Level 2 Certificate	2,757	1,101	4,074	34.8	13.9	51.4	21.4	25.0	24.8
Level 3 or 4 Certificate	1,881	996	8,343	16.8	8.9	74.4	14.6	22.6	50.8
Overseas Secondary School Qualification	102	42	189	0.0	0.0	0.0	-	-	-
Unknown	513	129	357	-	-	-	-	-	-
Student status									
Full-time	1,968	864	5,874	22.6	9.9	67.5	15.2	19.4	35.5
Part-time	747	318	1,098	34.5	14.7	50.8	5.8	7.1	6.6
Not studying	10,206	3,267	9,573	44.3	14.2	41.5	79.0	73.4	57.9
Unknown	552	126	417	-	-	-	-	-	-
Receives a student allowance									
Yes	1,296	543	3,315	25.1	10.5	64.3	9.6	11.9	19.5
No	12,177	4,035	13,644	40.8	13.5	45.7	90.4	88.1	80.5

	Count			Percentage of smoking status (%)[a]			Percentage of characteristic (%)[b]		
Variable	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**
Number of babies (live-born) they given birth to									
0 babies	6,981	2,199	13,104	31.3	9.9	58.8	54.1	49.5	79.7
1 baby	3,342	1,329	2,175	48.8	19.4	31.8	25.9	29.9	13.2
2+ babies	2,580	912	1,167	55.4	19.6	25.0	20.0	20.5	7.1
Unknown	570	141	516	-	-	-	-	-	-
Gave birth at least once in the previous 12 months									
Yes	1,746	756	1,146	47.9	20.7	31.4	13.0	16.5	6.8
No	11,727	3,822	15,813	37.4	12.2	50.4	87.0	83.5	93.2
Receives a domestic purposes benefit									
Yes	4,032	1,242	1,752	57.4	17.7	24.9	29.9	27.1	10.3
No	9,441	3,336	15,207	33.7	11.9	54.3	70.1	72.9	89.7
Number of children living in the same household									
0 children	4,845	1,707	9,225	30.7	10.8	58.5	38.0	39.4	59.1
1 child	3,696	1,335	3,339	44.2	15.9	39.9	29.0	30.8	21.4
2 children	2,424	819	1,908	47.1	15.9	37.0	19.0	18.9	12.2
3+ children	1,773	468	1,140	52.4	13.8	33.7	13.9	10.8	7.3
Unknown	738	246	1,341	-	-	-	-	-	-
Cares for children in their household without pay									
Yes	6,492	2,322	5,409	45.6	16.3	38.0	48.2	50.7	31.9
No	6,981	2,256	11,550	33.6	10.9	55.6	51.8	49.3	68.1
Cares for children not in their household without pay									
Yes	4,071	1,329	3,879	43.9	14.3	41.8	30.2	29.0	22.9
No	9,402	3,249	13,080	36.5	12.6	50.8	69.8	71.0	77.1
Employment status									
Employed	4,902	1,914	8,997	31.0	12.1	56.9	36.4	41.8	53.1
Not employed	8,571	2,664	7,962	44.6	13.9	41.5	63.6	58.2	46.9
Receives an unemployment benefit									
Yes	2,616	609	1,695	53.2	12.4	34.5	19.4	13.3	10.0
No	10,857	3,969	15,264	36.1	13.2	50.7	80.6	86.7	90.0

	Count			Percentage of smoking status (%)[a]			Percentage of characteristic (%)[b]		
Variable	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**
Has at least one other adult in their household who smokes									
Yes	8,100	1,635	4,989	55.0	11.1	33.9	72.4	44.4	33.9
No	3,084	2,046	9,717	20.8	13.8	65.4	27.6	55.6	66.1
Has at least one family member in the same household who smokes									
Yes	4,377	840	2,739	55.0	10.6	34.4	67.1	35.4	27.7
No	2,148	1,536	7,164	19.8	14.2	66.0	32.9	64.6	72.3
Has at least one extended family member in the same household who smokes									
Yes	3,771	774	2,109	56.7	11.6	31.7	77.1	55.2	49.1
No	1,119	627	2,190	28.4	15.9	55.6	22.9	44.8	50.9
Has a partner									
Yes	4,086	1,875	4,536	38.9	17.9	43.2	30.3	40.9	26.7
No	9,387	2,706	12,423	38.3	11.0	50.7	69.7	59.1	73.3
Role in their household									
Parent/partner	6,840	2,832	5,526	45.0	18.6	36.4	51.9	63.5	34.2
Child	3,252	735	6,150	32.1	7.3	60.7	24.7	16.5	38.1
Not in family nucleus	3,093	891	4,473	36.6	10.5	52.9	23.5	20.0	27.7
Unknown	291	126	807	-	-	-	-	-	-
Lives alone									
Yes (private dwelling)	255	108	282	39.5	16.7	43.7	1.9	2.4	1.7
No (private dwelling)	12,954	4,350	15,888	39.0	13.1	47.9	96.1	95.0	93.7
No (non-private dwelling)	264	120	786	22.6	10.3	67.2	2.0	2.6	4.6
Deprivation quintile of neighbourhood									
Quin 1 (least deprived)	444	267	1,632	19.0	11.4	69.7	3.5	6.1	10.3
Quin 2	939	465	2,034	27.3	13.5	59.2	7.4	10.7	12.8
Quin 3	1,638	708	2,877	31.4	13.6	55.1	12.9	16.3	18.1
Quin 4	3,006	1,098	3,876	37.7	13.8	48.6	23.7	25.3	24.4
Quin 5 (most deprived)	6,669	1,809	5,484	47.8	13.0	39.3	52.5	41.6	34.5
Unknown	780	237	1,056	-	-	-	-	-	-

	Count			Percentage of smoking status (%)[a]			Percentage of characteristic (%)[b]		
Variable	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**	**Regular**	**Ex**	**Never**
Lives in social housing									
Yes	1,887	396	1,098	55.8	11.7	32.5	14.0	8.7	6.5
No	11,586	4,182	15,861	36.6	13.2	50.1	86.0	91.3	93.5
Lives in an urban area									
Yes	11,871	4,155	15,267	37.9	13.3	48.8	88.1	90.7	90.0
No	1,602	426	1,689	43.1	11.5	45.4	11.9	9.3	10.0
Household has internet access									
Yes	6,216	2,700	12,105	29.6	12.8	57.6	46.1	59.0	71.4
No	7,257	1,878	4,854	51.9	13.4	34.7	53.9	41.0	28.6
Household has a mobile phone									
Yes	10,797	3,771	13,683	38.2	13.3	48.4	80.1	82.4	80.7
No	2,676	807	3,276	39.6	11.9	48.5	19.9	17.6	19.3
Enrolled with a PHO									
Yes	11,973	4,194	15,354	38.0	13.3	48.7	88.9	91.6	90.5
No	1,500	384	1,605	43.0	11.0	46.0	11.1	8.4	9.5
Attended an ED at least once in the previous 12 months									
Yes	3,462	1,080	2,790	47.2	14.7	38.1	25.7	23.6	16.5
No	10,011	3,498	14,169	36.2	12.6	51.2	74.3	76.4	83.5
Admitted to hospital at least once in the previous 12 months									
Yes	3,618	1,392	2,856	46.0	17.7	36.3	26.9	30.4	16.8
No	9,855	3,186	14,103	36.3	11.7	52.0	73.1	69.6	83.2
Receives a sickness benefit									
Yes	1,161	393	621	53.4	18.1	28.6	8.6	8.6	3.7
No	12,312	4,185	16,338	37.5	12.7	49.8	91.4	91.4	96.3

a Sum of percentages for each smoking status is 100%. For example, among 18-year-olds, the sum of regular smokers (30.2%), ex-smokers (6.4%) and those who have never smoked (63.4%) is 100%.

b Sum of percentages of each characteristic for the variable for the smoking status is 100%. For example, among regular smokers, the sum of those who receive a sickness benefit (8.6%) and those who don't (91.4%) is 100%.

Note: All values presented in this table are randomly rounded to base 3.

Table 3: Correlation coefficients of variables relating to smoking status of young Māori women

	age	Child_in_House	Has_Child	NZDepQ1	NZDepQ2	NZDepQ3	NZDepQ4	NZDepQ5	Employed	Live_Alone	Enrolled_PHO	Internet	MobilePhone	Social_Housing	ED_Visit	Hopsital_Visit	Partnership	DPB	SB	UB	SA	NCEA_None	NCEA_L1	NCEA_L2	NCEA_L3Plus	Study	ChildCare	ChildCare_extnl	Urban	Smoker_House	Smoker_Family
age	1.00	0.09	0.31	-0.01	0.00	0.01	0.00	0.00	0.07	0.04	0.01	-0.04	0.00	-0.03	0.00	0.07	0.17	0.23	0.01	-0.09	-0.12	0.09	0.05	-0.03	-0.09	-0.19	0.14	0.05	-0.01	-0.02	-0.02
		<.00011	<.00011	0.02	0.69	0.09	0.60	0.50	<.00011	<.00011	0.10	<.00011	0.40	<.00011	0.36	<.00011	<.00011	<.00011	0.09	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.16	0.00	0.00
Child_in_House	0.09	1.00	0.56	-0.10	-0.09	-0.07	-0.02	0.17	-0.28	-0.14	0.01	-0.17	0.03	0.12	0.05	0.20	0.02	0.41	0.03	-0.03	-0.14	0.20	0.08	-0.03	-0.23	-0.14	0.58	0.01	-0.01	0.16	0.03
	<.00011		<.00011	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	<.00011	0.02	<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.08	0.22	<.00011	<.00011
Has_Child	0.31	0.56	1.00	-0.11	-0.09	-0.06	-0.01	0.16	-0.34	-0.04	0.05	-0.23	-0.01	0.07	0.08	0.34	0.14	0.66	0.07	-0.09	-0.22	0.25	0.12	-0.05	-0.28	-0.20	0.53	0.03	-0.01	0.09	0.01
	<.00011	<.00011		<.00011	<.00011	<.00011	0.14	<.00011	<.00011	<.00011	<.00011	<.00011	0.26	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.04	<.00011	0.32
NZDepQ1	-0.01	-0.10	-0.11	1.00	-0.09	-0.12	-0.16	-0.24	0.12	-0.01	0.02	0.15	0.03	-0.09	-0.04	-0.04	-0.07	-0.02	-0.10	-0.03	-0.06	0.01	-0.10	-0.04	0.02	0.12	0.05	-0.07	-0.03	-0.03	-0.10	-0.03
	0.02	<.00011	<.00011		<.00011	<.00011	<.00011	<.00011	<.00011	0.04	0.00	<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	<.00011	0.06	<.00011	<.00011	0.00	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011
NZDepQ2	0.00	-0.09	-0.09	-0.09	1.00	-0.15	-0.19	-0.29	0.10	-0.01	0.01	0.13	0.03	-0.09	-0.03	-0.05	0.01	-0.08	-0.03	-0.05	0.02	-0.08	-0.03	0.02	0.09	0.04	-0.07	-0.03	-0.10	-0.07	-0.02
	0.69	<.00011	<.00011	<.00011		<.00011	<.00011	<.00011	<.00011	0.31	0.01	<.00011	<.00011	<.00011	<.00011	<.00011	0.27	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011
NZDepQ3	0.01	-0.07	-0.06	-0.12	-0.15	1.00	-0.25	-0.37	0.08	0.00	0.01	0.10	0.02	-0.10	-0.01	-0.02	0.03	-0.08	-0.02	-0.03	0.02	-0.06	0.00	0.01	0.06	0.01	-0.04	-0.02	-0.07	-0.07	-0.02
	0.09	<.00011	<.00011	<.00011	<.00011		<.00011	<.00011	<.00011	0.90	0.34	<.00011	0.00	<.00011	0.24	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.43	0.06	<.00011	0.02	<.00011	0.00	<.00011	<.00011	<.00011
NZDepQ4	0.00	-0.02	-0.01	-0.16	-0.19	-0.25	1.00	-0.48	0.02	0.00	0.00	0.03	0.00	-0.08	0.01	0.01	0.02	-0.02	0.01	-0.01	0.01	-0.02	0.00	0.02	0.01	0.01	0.00	0.00	0.03	0.00	0.00
	0.60	0.00	0.14	<.00011	<.00011	<.00011		<.00011	0.00	0.95	0.65	<.00011	0.87	<.00011	0.02	0.25	0.00	0.00	0.31	0.02	0.05	0.00	0.39	0.00	0.13	0.01	0.46	0.89	<.00011	0.92	0.39
NZDepQ5	0.00	0.17	0.16	-0.24	-0.29	-0.37	-0.48	1.00	-0.20	0.01	-0.03	-0.25	-0.05	0.24	0.03	0.06	-0.03	0.17	0.05	0.10	-0.04	0.16	0.05	-0.04	-0.17	-0.07	0.12	0.05	0.10	0.14	0.04
	0.50	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011		<.00011	0.08	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011
Employed	0.07	-0.28	-0.34	0.12	0.10	0.08	0.02	-0.20	1.00	0.04	0.02	0.21	0.05	-0.13	-0.07	-0.18	0.08	-0.34	-0.17	-0.14	-0.02	-0.22	-0.07	0.11	0.18	-0.06	-0.24	-0.04	0.00	-0.11	-0.02
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011		<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.67	<.00011	<.00011
Live_Alone	0.04	-0.14	-0.04	-0.01	-0.01	0.00	0.00	0.01	0.04	1.00	-0.01	-0.08	-0.06	-0.02	0.01	-0.01	-0.04	-0.03	0.02	0.02	-0.01	0.00	0.00	0.00	-0.01	-0.02	-0.06	0.01	-0.02	0.00	-0.01
	<.00011	<.00011	<.00011	0.04	0.31	0.90	0.95	0.08	<.00011		0.16	<.00011	<.00011	<.00011	0.02	0.21	<.00011	<.00011	<.00011	0.00	0.31	0.73	0.97	0.36	0.15	0.00	<.00011	0.02	0.00	0.62	0.10
Enrolled_PHO	0.01	0.01	0.05	0.02	0.01	0.01	0.00	-0.03	0.02	-0.01	1.00	0.06	0.02	-0.02	0.11	0.13	0.02	0.03	0.02	-0.03	0.00	-0.04	0.00	0.02	0.03	0.01	0.03	0.00	0.02	-0.03	-0.01
	0.10	0.02	<.00011	0.00	0.01	0.34	0.65	<.00011	<.00011	0.16		<.00011	0.00	<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011	0.72	<.00011	0.93	0.00	<.00011	0.03	<.00011	0.72	0.00	<.00011	0.31
Internet	-0.04	-0.17	-0.23	0.15	0.13	0.10	0.03	-0.25	0.21	-0.08	0.06	1.00	0.21	-0.17	-0.07	-0.10	0.00	-0.23	-0.06	-0.09	0.10	-0.21	-0.10	0.06	0.24	0.14	-0.13	-0.04	0.04	-0.17	-0.04
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011		<.00011	<.00011	<.00011	<.00011	0.87	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011
MobilePhone	0.00	0.03	-0.01	0.03	0.03	0.02	0.00	-0.05	0.05	-0.06	0.02	0.21	1.00	-0.03	0.00	0.00	0.02	-0.02	0.00	-0.02	0.01	-0.04	-0.01	0.03	0.03	0.01	0.02	0.02	0.04	-0.02	-0.01
	0.40	<.00011	0.26	<.00011	<.00011	0.00	0.87	<.00011	<.00011	<.00011	0.00	<.00011		<.00011	0.52	0.86	<.00011	0.00	0.38	0.00	0.09	<.00011	0.15	<.00011	<.00011	0.04	<.00011	0.00	<.00011	<.00011	0.01
Social_Housing	-0.03	0.12	0.07	-0.09	-0.09	-0.10	-0.08	0.24	-0.13	-0.02	-0.02	-0.17	-0.03	1.00	0.02	0.03	-0.07	0.09	0.04	0.06	-0.03	0.13	0.03	-0.04	-0.12	-0.04	0.05	0.01	0.09	0.12	0.04
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011		0.00	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.02	<.00011	<.00011	<.00011
ED_Visit	0.00	0.05	0.08	-0.04	-0.03	-0.01	0.01	0.03	-0.07	0.01	0.11	-0.07	0.00	0.02	1.00	0.39	0.03	0.05	0.10	0.03	-0.02	0.06	0.03	0.00	-0.09	-0.05	0.04	0.01	0.00	0.05	0.01
	0.36	<.00011	<.00011	<.00011	<.00011	0.24	0.02	<.00011	<.00011	0.02	<.00011	<.00011	0.52	0.00		<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	0.42	<.00011	<.00011	<.00011	0.03	0.57	<.00011	0.01
Hopsital_Visit	0.07	0.20	0.34	-0.04	-0.05	-0.02	0.01	0.06	-0.18	-0.01	0.13	-0.10	0.00	0.03	0.39	1.00	0.09	0.21	0.18	0.00	-0.07	0.10	0.06	-0.01	-0.13	-0.12	0.20	-0.02	0.00	0.05	0.02
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.25	<.00011	<.00011	0.21	<.00011	<.00011	0.86	<.00011	<.00011		<.00011	<.00011	<.00011	0.58	<.00011	<.00011	<.00011	0.08	<.00011	<.00011	<.00011	0.00	1.00	<.00011	0.00
Partnership	0.17	0.02	0.14	-0.02	0.01	0.03	0.02	-0.03	0.08	-0.04	0.02	0.00	0.02	-0.07	0.03	0.09	1.00	0.01	0.01	-0.05	0.00	0.05	0.02	-0.06	-0.12	0.06	0.00	-0.06	0.01	0.00
	<.00011	0.00	<.00011	0.00	0.27	<.00011	0.00	<.00011	<.00011	<.00011	<.00011	0.87	<.00011	<.00011	<.00011	<.00011		<.00011	0.07	0.02	<.00011	0.82	<.00011	<.00011	<.00011	<.00011	<.00011	0.66	<.00011	0.02	0.45
DPB	0.23	0.41	0.66	-0.10	-0.08	-0.08	-0.02	0.17	-0.34	-0.03	0.03	-0.23	-0.02	0.09	0.05	0.21	-0.15	1.00	0.00	-0.13	-0.18	0.22	0.09	-0.06	-0.22	-0.12	0.37	0.05	0.03	0.09	0.01
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	<.00011	<.00011		0.68	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.30
SB	0.01	0.03	0.07	-0.03	-0.03	-0.02	0.01	0.05	-0.17	0.02	0.02	-0.06	0.00	0.04	0.10	0.18	0.01	0.00	1.00	0.08	-0.03	0.08	0.05	-0.02	-0.10	-0.09	0.04	0.01	0.00	0.06	0.01
	0.09	<.00011	<.00011	<.00011	<.00011	<.00011	0.31	<.00011	<.00011	<.00011	0.00	<.00011	0.38	<.00011	<.00011	<.00011	0.07	0.68		<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.30	0.84	<.00011	0.13
UB	-0.09	-0.03	-0.09	-0.06	-0.05	-0.03	-0.01	0.10	-0.14	0.02	-0.03	-0.09	-0.02	0.06	0.03	0.00	0.01	-0.13	0.08	1.00	0.04	0.05	0.05	0.00	-0.09	-0.06	-0.02	0.04	0.01	0.09	0.03
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.02	<.00011	<.00011	0.00	<.00011	<.00011	0.00	<.00011	<.00011	0.58	0.02	<.00011	<.00011		<.00011	<.00011	<.00011	0.92	<.00011	<.00011	<.00011	0.14	<.00011	<.00011
SA	-0.12	-0.14	-0.22	0.01	0.02	0.02	0.01	-0.04	-0.02	-0.01	0.00	0.10	0.01	-0.03	-0.02	-0.07	-0.05	-0.18	-0.03	0.04	1.00	-0.14	-0.09	-0.01	0.22	0.33	-0.11	0.00	0.05	-0.07	-0.01
	<.00011	<.00011	<.00011	0.06	0.00	<.00011	0.05	<.00011	<.00011	0.31	0.72	<.00011	0.09	<.00011	0.00	<.00011	<.00011	<.00011	<.00011	<.00011		<.00011	<.00011	0.01	<.00011	<.00011	<.00011	0.48	<.00011	<.00011	0.01
NCEA_None	0.09	0.20	0.25	-0.10	-0.08	-0.06	-0.02	0.16	-0.22	0.00	0.00	-0.04	-0.21	-0.04	0.13	0.06	0.10	0.00	0.22	0.08	0.05	-0.14	1.00	-0.26	-0.29	-0.37	-0.18	0.14	0.01	-0.01	0.14	0.04
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.00	<.00011	<.00011	0.73	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.82	<.00011	<.00011	<.00011	<.00011		<.00011	<.00011	<.00011	<.00011	<.00011	0.11	0.04	<.00011	<.00011
NCEA_L1	0.05	0.08	0.12	-0.04	-0.03	0.00	0.00	0.05	-0.07	0.00	0.00	-0.10	-0.01	0.03	0.03	0.06	0.05	0.09	0.05	0.05	-0.09	-0.26	1.00	-0.26	-0.33	-0.11	0.08	0.02	-0.03	0.09	0.02
	<.00011	<.00011	<.00011	<.00011	<.00011	0.43	0.39	<.00011	<.00011	0.97	0.93	<.00011	0.15	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011		<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.00
NCEA_L2	-0.03	-0.03	-0.05	0.02	0.02	0.01	0.02	-0.04	0.11	0.00	0.02	0.06	0.03	-0.04	0.00	-0.01	0.02	-0.06	-0.02	0.00	-0.01	-0.29	-0.26	1.00	-0.37	-0.04	-0.01	0.01	-0.01	-0.01	-0.01
	<.00011	<.00011	<.00011	0.00	<.00011	0.06	0.00	<.00011	<.00011	0.36	0.00	<.00011	<.00011	<.00011	0.42	0.08	<.00011	<.00011	<.00011	0.92	0.01	<.00011	<.00011		<.00011	<.00011	0.03	0.06	0.04	0.08	0.14
NCEA_L3Plus	-0.09	-0.23	-0.28	0.12	0.09	0.06	0.01	-0.17	0.18	-0.01	0.03	0.24	0.03	-0.12	-0.09	-0.13	-0.06	-0.22	-0.10	-0.09	0.22	-0.37	-0.33	-0.37	1.00	0.29	-0.18	-0.03	0.04	-0.20	-0.04
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.13	<.00011	<.00011	0.15	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011		<.00011	<.00011	<.00011	<.00011	<.00011	<.00011
Study	-0.19	-0.14	-0.20	0.05	0.04	0.01	0.01	-0.07	-0.06	-0.02	0.01	0.14	0.01	-0.04	-0.05	-0.12	-0.12	-0.12	-0.09	-0.06	0.33	-0.18	-0.11	-0.04	0.29	1.00	-0.12	-0.01	0.07	-0.12	-0.02
	<.00011	<.00011	<.00011	<.00011	<.00011	0.02	0.01	<.00011	<.00011	0.00	0.03	<.00011	0.04	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011		<.00011	0.03	<.00011	<.00011	<.00011
ChildCare	0.14	0.58	0.53	-0.07	-0.07	-0.04	0.00	0.12	-0.24	-0.06	0.03	-0.13	0.02	0.05	0.04	0.20	0.06	0.37	0.04	-0.02	-0.11	0.14	0.08	-0.01	-0.18	-0.12	1.00	0.17	-0.01	0.09	0.00
	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.46	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.03	<.00011	<.00011		<.00011	0.05	<.00011	0.57
ChildCare_extnl	0.05	0.01	0.03	-0.03	-0.03	-0.02	0.00	0.05	-0.04	0.01	0.00	-0.04	0.02	0.01	0.01	-0.02	0.00	0.05	0.01	0.04	0.00	0.01	0.02	0.01	-0.03	-0.01	0.17	1.00	0.01	0.02	0.00
	<.00011	0.08	<.00011	<.00011	<.00011	0.00	0.89	<.00011	<.00011	0.02	0.72	<.00011	0.00	0.02	0.03	0.00	0.66	<.00011	0.30	<.00011	0.48	0.11	<.00011	0.06	<.00011	0.03	<.00011		0.13	0.00	0.57
Urban	-0.01	-0.01	-0.01	-0.03	-0.10	-0.07	0.03	0.10	0.00	-0.02	0.02	0.04	0.04	0.09	0.00	0.00	-0.06	0.03	0.00	0.01	0.05	-0.01	-0.03	-0.01	0.04	0.07	-0.01	0.01	1.00	-0.01	0.00
	0.16	0.22	0.04	<.00011	<.00011	<.00011	<.00011	<.00011	0.67	0.00	0.00	<.00011	<.00011	<.00011	0.57	1.00	<.00011	<.00011	0.84	0.14	<.00011	0.04	<.00011	0.04	<.00011	<.00011	0.05	0.13		0.03	0.60
Smoker_House	-0.02	0.16	0.09	-0.10	-0.07	-0.07	0.00	0.14	-0.11	0.00	-0.03	-0.17	-0.02	0.12	0.05	0.05	0.01	0.09	0.06	0.09	-0.07	0.14	0.09	-0.01	-0.20	-0.12	0.09	0.02	-0.01	1.00	0.35
	0.00	<.00011	<.00011	<.00011	<.00011	<.00011	0.92	<.00011	<.00011	0.62	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.02	<.00011	<.00011	<.00011	<.00011	<.00011	<.00011	0.08	<.00011	<.00011	<.00011	0.00	0.03		<.00011
Smoker_Family	-0.02	0.03	0.01	-0.03	-0.02	-0.02	0.00	0.04	-0.02	-0.01	-0.01	-0.04	-0.01	0.04	0.01	0.02	0.00	0.01	0.01	0.03	-0.01	0.04	0.02	-0.01	-0.04	-0.02	0.00	0.00	0.00	0.35	1.00
	0.00	<.00011	0.32	<.00011	<.00011	<.00011	0.39	<.00011	<.00011	0.10	0.31	<.00011	0.01	<.00011	0.01	0.00	0.45	0.30	0.13	<.00011	0.01	<.00011	0.00	0.14	<.00011	<.00011	0.57	0.57	0.60	<.00011	

Note: 1 indicates total positive linear correlation, 0 indicates no linear correlation, −1 indicates total negative linear correlation, and coefficient>= 0.5 are highlighted in green.

Table 4: Odds rations (with 95% confidence intervals) and logistic regression analysis for variables influencing young Māori women, for each smoking status

Influencing variable	Odds ratio (95% confidence interval)		Logistic regression analysis			
			Estimate	Standard error	Wald chi-squared	p-value
Regular smokers						
Intercept			-1.724	0.168	105.8	<.0001
Has at least one other adult in their household who smokes	2.97	(2.81, 3.14)	1.088	0.029	1457.0	<.0001
Receives an unemployment benefit	1.65	(1.54, 1.78)	0.502	0.037	184.9	<.0001
No secondary school qualification	1.53	(1.35, 1.75)	0.427	0.067	41.1	<.0001
Receives a domestic purposes benefit	1.52	(1.43, 1.63)	0.421	0.034	157.4	<.0001
Attended the ED at least once in the previous 12 months	1.38	(1.30, 1.48)	0.325	0.034	93.4	<.0001
Cares for children not in their household without pay	1.26	(1.19, 1.33)	0.227	0.029	61.5	<.0001
Attained a Level 1 Certificate at secondary school	1.20	(1.05, 1.37)	0.183	0.067	7.3	0.007
Receives a sickness benefit	1.18	(1.07, 1.31)	0.168	0.052	10.4	0.001
Lives in social housing	1.15	(1.06, 1.25)	0.139	0.043	10.7	0.001
Age	1.07	(1.05, 1.08)	0.064	0.007	86.3	<.0001
Has at least one family member in the same household who smokes	0.93	(0.88, 0.99)	-0.070	0.029	5.8	0.016
Lives in a quintile 4 neighbourhood	0.92	(0.86, 0.98)	-0.083	0.033	6.2	0.013
Admitted to hospital at least once in the previous 12 months	0.89	(0.83, 0.95)	-0.117	0.034	12.0	0.001
Enrolled with a PHO	0.87	(0.80, 0.95)	-0.138	0.044	9.8	0.002
Lives in an urban area	0.83	(0.76, 0.90)	-0.190	0.043	19.7	<.0001
Lives in a quintile 3 neighbourhood	0.81	(0.75, 0.87)	-0.216	0.040	29.2	<.0001
Lives in a quintile 2 neighbourhood	0.80	(0.73, 0.88)	-0.224	0.049	21.2	<.0001
Is a student	0.78	(0.73, 0.82)	-0.254	0.030	69.3	<.0001
Attained a Level 2 Certificate at secondary school	0.76	(0.67, 0.87)	-0.273	0.067	16.5	<.0001
Household has internet access	0.64	(0.60, 0.67)	-0.452	0.028	262.4	<.0001
Lives in a quintile 1 (least deprived) neighbourhood	0.63	(0.55, 0.71)	-0.468	0.062	57.0	<.0001
Attained a Level 3 or 4 Certificate at secondary school	0.40	(0.35, 0.45)	-0.922	0.068	183.1	<.0001
Ex-smokers						
Intercept			-5.077	0.211	579.1	<.0001
Lives alone	1.58	(1.26, 1.97)	0.454	0.113	16.2	<.0001
Has given birth (live-born) at least once	1.51	(1.38, 1.65)	0.410	0.046	81.3	<.0001
Has a partner	1.50	(1.40, 1.61)	0.408	0.035	136.0	<.0001

Influencing variable	Odds ratio (95% confidence interval)		Logistic regression analysis			
			Estimate	Standard error	Wald chi-squared	p-value
Lives in an urban area	1.36	(1.21, 1.53)	0.305	0.060	26.1	<.0001
Receives a sickness benefit	1.32	(1.17, 1.49)	0.278	0.063	19.4	<.0001
Lives in a quintile 2 neighbourhood	1.24	(1.10, 1.39)	0.212	0.059	13.1	0.000
Attained a Level 1 Certificate at secondary school	1.20	(1.10, 1.30)	0.180	0.042	18.7	<.0001
Admitted to hospital at least once in the previous 12 months	1.20	(1.10, 1.29)	0.178	0.040	19.5	<.0001
Lives in a quintile 3 neighbourhood	1.15	(1.04, 1.26)	0.135	0.049	7.6	0.006
Enrolled with a PHO	1.14	(1.01, 1.28)	0.127	0.062	4.1	0.042
Age	1.12	(1.10, 1.14)	0.115	0.009	157.1	<.0001
Cares for children not in their household without pay	1.11	(1.03, 1.20)	0.105	0.038	7.8	0.005
Lives in a quintile 4 neighbourhood	1.11	(1.02, 1.20)	0.102	0.042	6.0	0.015
Household has internet access	1.11	(1.03, 1.19)	0.100	0.037	7.4	0.007
Cares for children in their household without pay	1.09	(1.01, 1.19)	0.090	0.042	4.7	0.031
Has at least one other adult in their household who smokes	0.74	(0.69, 0.79)	-0.301	0.035	76.2	<.0001
Attained a Level 3 or 4 Certificate at secondary school	0.67	(0.61, 0.73)	-0.404	0.044	84.1	<.0001
Never smoked						
Intercept			2.987	0.161	344.2	<.0001
Attained a Level 3 or 4 Certificate at secondary school	2.54	(2.23, 2.90)	0.934	0.068	190.8	<.0001
Household has internet access	1.54	(1.46, 1.63)	0.432	0.028	231.4	<.0001
Lives in a quintile 1 (least deprived) neighbourhood	1.35	(1.22, 1.50)	0.303	0.053	32.6	<.0001
Attained a Level 2 Certificate at secondary school	1.26	(1.11, 1.44)	0.232	0.068	11.8	0.001
Is a student	1.21	(1.14, 1.28)	0.189	0.029	41.7	<.0001
Lives in a quintile 3 neighbourhood	1.10	(1.03, 1.18)	0.097	0.036	7.4	0.007
Has at least one family member in the same household who smokes	1.06	(1.01, 1.12)	0.062	0.028	4.7	0.030
Lives in social housing	0.90	(0.83, 0.99)	-0.102	0.045	5.1	0.024
Age	0.88	(0.87, 0.89)	-0.129	0.007	336.2	<.0001
Has a partner	0.83	(0.78, 0.88)	-0.187	0.030	38.5	<.0001
Has given birth (liveborn) at least once	0.76	(0.71, 0.82)	-0.271	0.039	49.3	<.0001
Cares for children not in their household without pay	0.75	(0.70, 0.79)	-0.294	0.029	100.7	<.0001
Attained a Level 1 Certificate at secondary school	0.72	(0.63, 0.82)	-0.331	0.069	22.9	<.0001
Attended the ED at least once in the previous 12 months	0.72	(0.67, 0.76)	-0.336	0.032	108.4	<.0001
Receives a sickness benefit	0.69	(0.62, 0.77)	-0.373	0.056	43.9	<.0001

Influencing variable	Odds ratio (95% confidence interval)		Logistic regression analysis			
			Estimate	Standard error	Wald chi-squared	p-value
Receives a domestic purposes benefit	0.63	(0.58, 0.69)	-0.459	0.047	96.7	<.0001
No secondary school qualification	0.59	(0.52, 0.68)	-0.525	0.069	58.1	<.0001
Receives an unemployment benefit	0.58	(0.53, 0.62)	-0.552	0.038	206.6	<.0001
Has at least one other adult in their household who smokes	0.40	(0.38, 0.42)	-0.913	0.028	1060.1	<.0001