2020 Health and Lifestyles Survey

Methodology Report

December 2021

CBG HEALTH RESEARCH LIMITED

hpa te hiringa hauora HEALTH PROMOTION AGENCY

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LIST OF ACRONYMS

CBG	CBG Health Research Ltd, the research provider for the HLS
DEFF	Design Effect
HLS	Health and Lifestyles Survey
HSC	Health Sponsorship Council
MHWS	Mental Health and Wellbeing Survey
PAF	NZ Post Postal Address File
PCG	Parent/caregiver
PPS	Probability Proportional to Size
PSU	Primary Sampling Units
SA1	Statistical Area 1

ACKNOWLEDGEMENTS

Te Hiringa Hauora/Health Promotion Agency would like to thank all the people who have participated in the 2020 Health and Lifestyles Survey (HLS). Their generosity in taking the time and effort to answer the questionnaire has been greatly appreciated.

Thanks to CBG Health Research Ltd for conducting the pilot, testing the questionnaire and undertaking the 2020 HLS fieldwork and to the interviewers who worked so diligently to collect the data. Thanks to Alistair Gray at Statistics Research Associates Ltd for his statistical support.

The survey was managed by Denise Grealish, Sarah Rendall, and Natalie Lucas (Te Hiringa Hauora).

This report was written by Natalie Lucas (Te Hiringa Hauora), and Neil Tee (CBG Health Research Ltd). It was reviewed internally by Felix Carroll (Te Hiringa Hauora).

EXECUTIVE SUMMARY

The following table provides a summary of the key methodological elements of the 2020 HLS.

Overview	Nationwide, face-to-face interviews
Objective	To measure progress against the existing programme plans of Te Hiringa Hauora and to provide quality measures for Statement of Intent reporting requirements To monitor short, medium and long-term societal changes in attitudes, knowledge and behaviours, and track changes in views about the social desirability and acceptability of various measures of tobacco control, minimising gambling harm, nutrition, alcohol, sun safety, and mental health.
Target population	Adults aged 16 years and over living in permanent private dwellings[1] in New Zealand
Frequency	Every two years since 2008
Primary sampling unit (PSU)	Using Census data, Statistical Area 1 Units (SA1s) with 10 or more dwellings were included in the sampling frame. The SA1s were grouped into two categories: • Pacific Peoples-dense SA1 (20% or more of Pacific Peoples ethnicity live in the area) • Other SA1 (more or less general population)
Sampling method	Multi-stage sampling: SA1 selection, household selection, and individual selection
Interview period	28 September 2020 to 4 May 2021
Sample size	3,089
Unweighted response rates	79%

[1] Excluded caravans, cabins and tents in a motor camp, and boats.

Data interpretation notes	Lower response rates in 2018 than in 2016 and 2020 among young (15 to 24 years) male Māori, young male NZ European/Other, young female Asian, and older (55+ years) male Asian respondents mean that comparisons of 2018 data with 2016 and 2020 should be made with caution. We recommend focusing on longer-term trends where possible.
COVID-19 Impact	Interviewing for the 2020 HLS was delayed for five months due to the COVID-19 lockdown. Interviewing was then suspended twice in the Auckland region in response to the alert level being raised to level 3. At all other times, interviewing took place at alert levels 1 and 2 with additional COVID-19 precautions in place. It is unclear what impact the delays to the survey and the pandemic response have had on the data. No adjustments have been made to account for the impacts of these delays and the pandemic response.

1. INTRODUCTION

The Health and Lifestyles Survey (HLS) is a two-yearly monitor of the health behaviours and attitudes of New Zealanders which first carried out in 2008. In 2020, it was a survey of adults aged 16 years and over[2]. The HLS is managed by Te Hiringa Hauora. The mission of Te Hiringa Hauora is to inspire all New Zealanders to lead healthier lives by leading and delivering programmes to promote health and wellbeing. These programme areas include alcohol, minimising gambling harm, health education, mental health, nutrition, tobacco and skin cancer prevention.

This report details the procedures and protocols followed to ensure the HLS produces high quality, robust data.

Over 2022, specific reports and publications will be uploaded to our website at https://www.hpa.org.nz/our-work/research/publications

1.1 BACKGROUND

In previous years the HLS included two components – a survey of adults aged 15 years and over and a survey of parents and caregivers (PCGs) of 5 to 16-year-olds.

Prior to 2008, the Health Sponsorship Council (HSC)[3] undertook a number of different surveys to benchmark and monitor changes in New Zealanders' knowledge, attitudes and behaviour in response to its social marketing and health promotion programmes, and community-level activities in the health sector. These included Smokefree/Auahi Kore Monitor, 2006/07 Gaming and Betting Activities Survey, New Zealand Children's Food and Drinks Survey, and Sun Protection Triennial Survey. These monitors focused on adults, although the Gaming and Betting Activities Survey, the Children's Food and Drink Survey and the Sun Protection Triennial Survey also interviewed young people in the target age group for that particular programme.

In 2007, HSC reviewed the adult surveys and combined the majority of these into a single survey — the HLS — covering attitudes and behaviours toward alcohol, tobacco control, sun safety, minimising gambling harm, nutrition and physical activity, mental health and immunisation.

1.2 OBJECTIVES OF THE HLS

The objectives of the HLS are to monitor short, medium and long-term societal changes in attitudes, knowledge and behaviours, and track changes in views about the social desirability and acceptability of various measures of tobacco control, minimising gambling harm, nutrition, alcohol, sun safety, and mental health.

[2] In previous years, the minimum age for inclusion was 15 years.
[3] HSC and the Alcohol Advisory Council (ALAC) merged in 2012 to form The Health Promotion Agency (HPA), now known as Te Hiringa Hauora.

1.3 ETHICAL CONSIDERATION

The 2020 HLS was approved by the New Zealand Ethics Committee (NZEC Application 2018_15). Participants took part in the survey voluntarily, which was clearly explained to potential participants in initial communications on the Te Hiringa Hauora website and verbally by the interviewer. Confidentiality of all information provided by respondents in the interviews was assured by the Privacy Act 2020. The final datasets stored as electronic records contain no identification of the participating respondents and responses can only be analysed as overall or grouped data.

2. POPULATION AND FRAME

The 2020 HLS made changes to the target population. Previous HLS surveys included people aged 15 years and over. The methodology of the survey was reviewed and found that the number of 15-year-olds who took part in recent surveys was very small and some questions were not fit for purpose for this age. Informed consent from parents was also required for participants aged under 16 years. Increasing the minimum age at interview to 16 years simplified the interview process while having a minimal change to consistency in the target population between survey years.

The 2020 HLS also did not include the Parent Caregiver (PCG) survey. In previous waves, if a household included 5 to 16-year-olds, then one of the parent-caregivers would be invited to take part in the PCG survey. This component was removed due to reductions in the number of questions in the PCG questionnaire, which meant that the value of this component was limited. Removing the PCG survey also simplified the sampling process, leaving more resource to focus on the rest of the survey.

2.1 TARGET POPULATION

The target population was the usually resident civilian population aged 16 years and over living in permanent private dwellings in New Zealand. The size of the target population for the survey was 4,071,000 individuals based on the September 2021 estimated resident population aged 16 years and over from Statistics NZ. The September 2021 data was used due to delays in the fieldwork, making it the most recent population data available.

For reasons of practicality and cost-effectiveness, the target population is defined to include only permanent private dwellings, so temporary private dwellings are excluded, including caravans, cabins and tents in a motor camp, and boats. The target population also excludes non-private dwellings. Examples of non-private dwellings are hotels, motels, guest houses, boarding houses, homes for the elderly, hostels, motor camps, hospitals, barracks and prisons.

People were eligible to be included at their usual residence only. If they were temporarily visiting a household that was selected into the HLS, they were not eligible for selection as part of that household. This process ensured that double counting was not possible.

People who were usually resident in a private dwelling in New Zealand, but who were temporarily overseas for some of the survey period, were included in the target population. In the majority of cases these individuals had a chance of being selected in the survey, as the survey provider made up to 10 calls to selected households in the sample over the survey period.

2.2 SURVEY POPULATION

Households were only included if they were in Statistical Area 1 units (SA1s) with 10 or more occupied dwellings (according to the 2018 New Zealand Census of Population and Dwellings). It means that a fraction of households (0.06%) that were part of the defined target population were excluded from the survey population. This could introduce a selection bias to the survey results. However, the issues have been accounted for in the final estimates via the survey weights. Also, due to the small number of households omitted, any possible bias is likely to be limited.

2.3 SAMPLING FRAME

The 2018 New Zealand Census SA1 data were used as the area-based sampling frame and were treated as primary sampling units (PSUs). SA1s are aggregations of meshblocks[4], optimised to be of similar population size. In previous surveys, meshblocks were used as PSUs. Due to changes in the availability of meshblock data, SA1s were used instead. As SA1s combine one, two, or more meshblocks there is less variation in weights than using meshblocks and a minimal reduction in variance of weighted data. SA1s have an ideal size range of 100–200 residents, and a maximum population of about 500. Around 19,000 of the 29,889 SA1s (about two-thirds) consist of a single meshblock (Stats NZ, 2020). The sampling frame comprised of 29,203 SA1s that had 10 or more dwellings. A sample of 350 SA1s was selected from this frame. Addresses for households in the selected SA1s (from the New Zealand Post Postal Address File — PAF) were used as a frame from which a sample of dwellings was selected. One eligible adult was then selected from each selected dwelling.

3. SAMPLE DESIGN

The 2020 HLS was designed to be a nationally representative survey. It was conducted using a complex survey design, where different people had different probabilities of being selected to participate in the survey. The complex design was used for a variety of reasons, including reducing

[4] Meshblocks are the smallest geographical measure used by Stats NZ. They vary in size from a city block to a large rural area and are used to make up other geographical measures in New Zealand (Stats NZ, 2021).

interviewer travel costs by ensuring the sample was geographically clustered and ensuring all sub-populations of interest had a sufficient sample size to provide reliable statistics.

In order to meet our obligations under Te Tiriti o Waitangi, we increased the sampling size for Māori to allow for more precise results.

3.1 RATIONALE FOR THE SAMPLE DESIGN

A primary consideration in the sample design of the HLS was the need for sufficient sample sizes of Māori, Pacific Peoples, and people of New Zealand (NZ) European/Other ethnicities, as well as low socio-economic status groups. The main group of interest was adults aged 16 years and over. The challenge for the sampling methodology was to arrive at a sample that could:

- provide national, projectable figures
- use a survey method with higher (face-to-face) rather than lower (phone, mail, web) public participation
- deliver 3,000 interviews with adults aged 16 years and over, including 1,000 interviews with Māori and 300 with Pacific Peoples
- provide the minimum design effect for the overall sample and specific target groups within the budget for the survey.

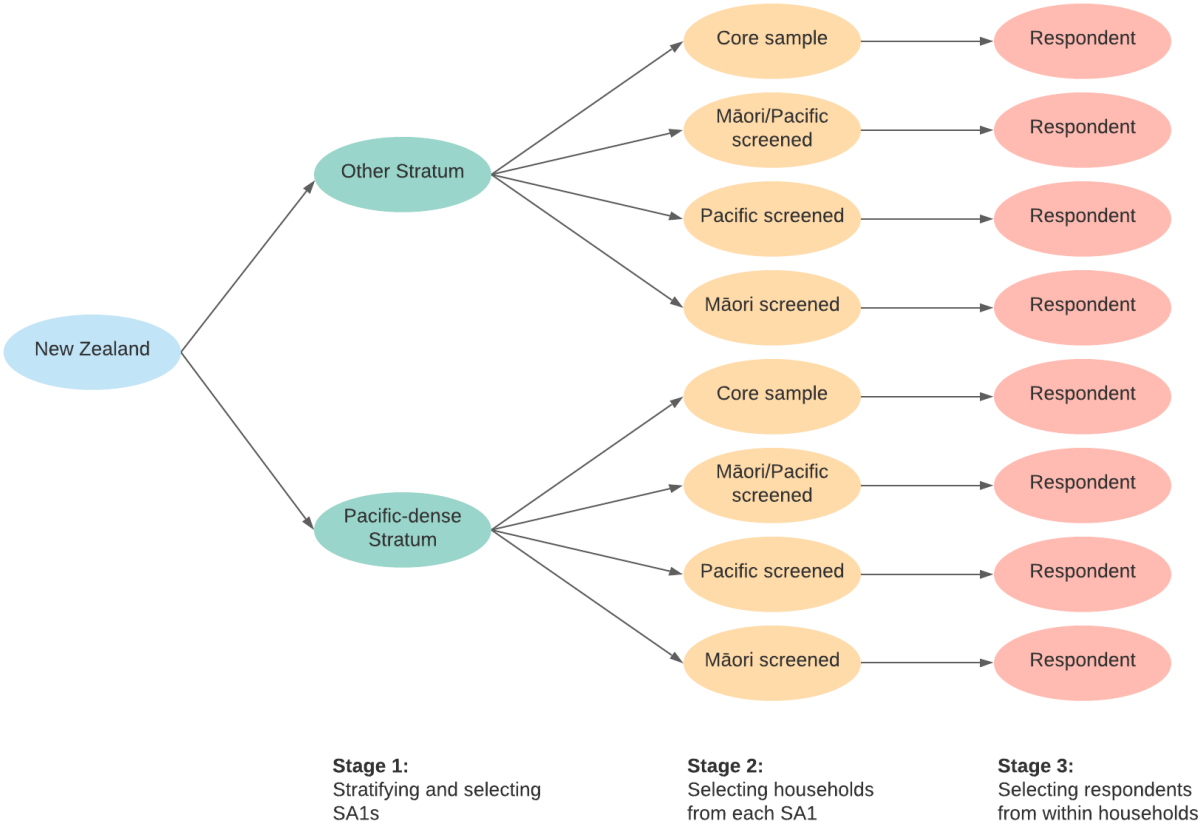
Complex designs have two main features that affect the precision of statistics coming from the survey:

- *Different people have a different chance of selection.* This is captured in the 'weight', which is the number of people that each survey respondent represents in the target population. In the 2020 HLS, Māori and Pacific Peoples had lower weights than other people to reflect the fact that these groups had an increased chance of selection in the sample, relative to simple random sampling. Sampling of one adult per household also led to different weights, because adults in larger households received a larger weight.
- *The sample is 'clustered'*. In the HLS a sample of SA1s was selected, and then a sample of households was selected from each SA1. If the households in the sample were shown on a map of New Zealand, they would appear clumped. Clustering made the survey more cost effective.

3.2 SAMPLE SELECTION PROCEDURE

The survey used a three-stage selection procedure. As illustrated in Figure 3-1 below, this was: stratifying and selecting SA1s; selecting households from each SA1; and selecting an individual from within each household to complete the questionnaire.

Figure 3-1 Multi-stage selection procedure



Stage 1: Stratifying and selecting SA1s

SA1s from the 2018 New Zealand Census were used as part of an area-based sampling frame. Based on 2018 Census data, 29,203 eligible SA1s met the 2020 HLS selection criteria. The SA1s were grouped into two strata — the Pacific Peoples-dense stratum and Other stratum.

The Pacific Peoples-dense stratum comprised SA1s where at least 20% of the dwellings in the SA1 contained at least one person of Pacific Peoples ethnicity in the 2018 Census. The Other stratum comprised all other remaining SA1s within the sampling frame.

SA1s were selected by a probability proportional to size (PPS) design within each stratum. The size measure was the number of occupied dwellings in the SA1 according to the 2018 Census. This means that larger SA1s had an increased chance of selection in the design. In total, 350 SA1s were drawn, with 56 selected from within the Pacific Peoples stratum and 294 selected from the Other stratum.

Stage 2: Selecting households within SA1s

Within each selected SA1, some households were screened for people within the sub-populations of interest (Māori and Pacific Peoples) and some households were not screened (Table 3-1). Households were classified into four categories on the basis of screening (as can be seen in Figure 3-1):

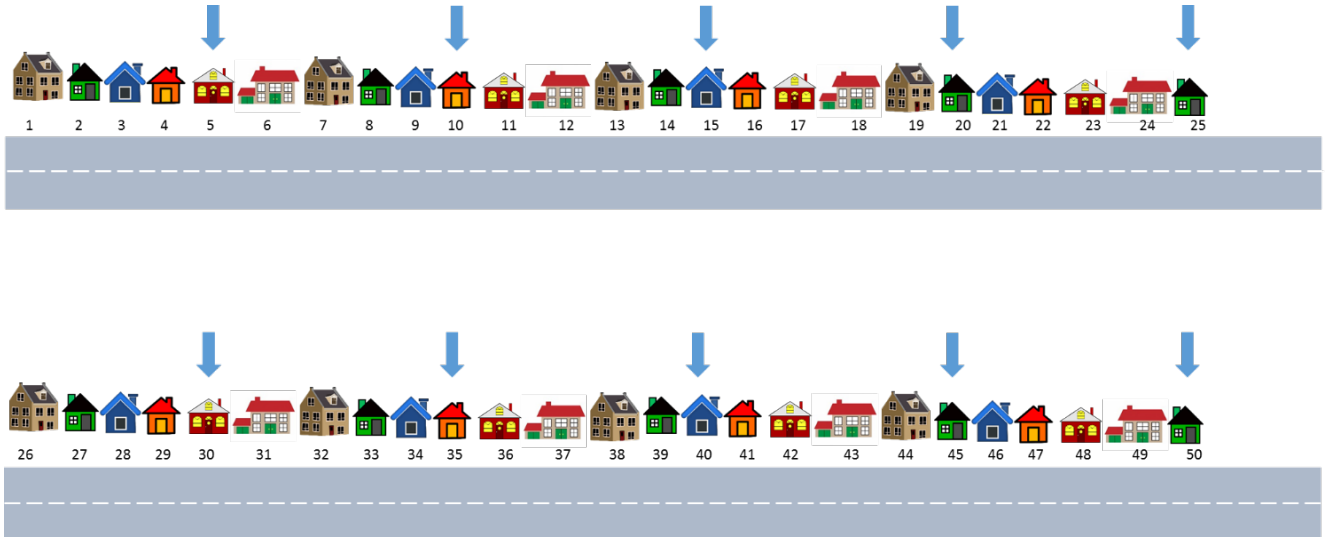
Table 3-1: Screening procedures

Sample	Screening procedures
Core	Households that were not screened and where anyone 16 years and over was eligible to participate
Māori/Pacific Peoples screened	Where screening took place and both Māori and Pacific Peoples were eligible to participate
Pacific Peoples-only screened	Where screening took place and only Pacific Peoples were eligible to participate
Māori-only screened	Where screening took place and only Māori were eligible to participate

The number of households selected in each of these four samples was determined before interviewers went to field, using the sample targets.

As the number of households selected in each of the sample types had been specified prior to the fieldwork, Pacific Peoples would be eligible to participate from three sample types (core, Māori/Pacific Peoples screened, and Pacific Peoples-only screened). Māori people would be eligible to participate in the survey if they lived in a household selected into the core sample, Māori/Pacific Peoples screened sample, or Māori-only screened sample. All other people would be eligible to participate only in the core sample households.

Figure 3-2: Example of how households were selected into the core sample



As presented in Figure 3-2, households in the core sample were selected first by a systematic procedure of beginning at a random dwelling pre-allocated within the SA1 and selecting every k^{th} house. The skip, k, is determined by the number of dwellings in the SA1 and it was defined as the ratio of the pre-determined number of households in the core sample for a particular SA1 and the

total number of households in that SA1. In the example SA1 in Figure 3-2, there are 50 houses with 10 houses selected for the core sample, so the skip is 5.

Ten households in each Other stratum SA1 were selected into the core sample.

Up to 25 of the dwellings between the core houses were then selected as the screened sample. In 13 of these 25 dwellings, both Māori and Pacific Peoples were eligible to be sampled. In up to six dwellings, only Pacific Peoples were eligible to be sampled, and in the remaining sample, up to six dwellings were selected where only Māori were eligible.

In the Pacific-Peoples stratum SA1s, nine dwellings were selected into the core sample. Up to 24 of the dwellings between the core houses were then selected as the screened sample. In 13 of these 24 dwellings, both Māori and Pacific Peoples were eligible to be sampled. In up to seven dwellings, only Pacific Peoples were eligible to be sampled, and in the remaining sample, up to four dwellings were selected where only Māori were eligible.

The dwellings chosen for the Māori-only sample were selected from the Māori electoral roll, which consists of households containing at least one elector identifying as having Māori ancestry. The inclusion of dwellings from the electoral roll increased the probability of an eligible respondent being selected at these screened houses, compared with houses selected at random. This approach had the benefit of minimising fieldwork costs associated with unproductive screening. A similar methodology is used in the New Zealand Health Survey and New Zealand Crime and Victims Survey.

There was no substitution of households or respondents if the selected household or respondent was not contactable or was unavailable.

Stage 3: Selecting respondents within households

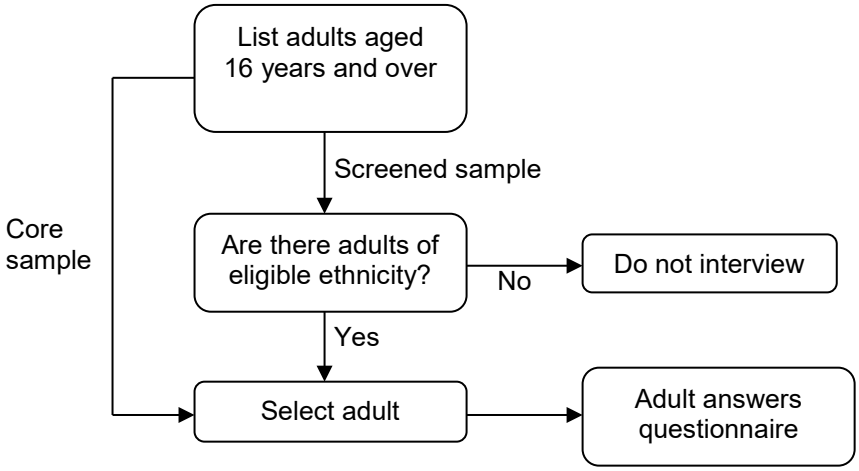
One eligible adult was selected for the survey in each household.

The procedure for selecting respondents in the core and screened households was essentially the same. Figure 3-3 shows that, within each household, all eligible adults who were aged 16 years and over and usually resided at that dwelling were identified. One adult was then selected from the lists of those who were eligible.

In the screened samples, the interviewer explained to the householder that they needed to first check if anyone was eligible to take part. They then asked the person to identify all the ethnic groups that the usually-resident occupants aged 16 years and over identified with. The interviewer coded from a list consisting of NZ European, Māori, Pacific Peoples, Fijian Indian, Chinese, Indian and Other (specify). Initially, the interviewer only recorded these details at the household-level, ie, they did not record the ethnic groups of each occupant.

If Māori and/or Pacific Peoples was ticked in a Māori and Pacific Peoples screened household, Pacific Peoples was ticked in a Pacific Peoples screened household, or Māori was ticked in a Māori screened household, then the interviewer was prompted to record the initials, age and sex of each occupant aged 16 years and over. Each person was also coded as either Māori, Pacific Peoples or Other for the purposes of respondent selection. In households screened for Pacific Peoples only, ethnicity was prioritised as Pacific Peoples, Māori or Other. In households screened for Māori only, ethnicity was prioritised as Māori, Pacific Peoples or Other. If there were no occupants of eligible ethnicity, the interviewer explained that the household was not eligible and no survey took place.

Figure 3-3: Diagram of the 2020 HLS respondent selection process within the household



For the core sample, within each household, all eligible adults who were aged 16 years and over and usually resided at that dwelling were identified. The initials, age and sex details of eligible respondents were obtained from the person who answered the door.

3.3 DESIGN EFFECT

The net effect of a complex design can be measured by the design effect (DEFF). The DEFF is commonly used across household surveys to evaluate the effect of the survey design on estimates calculated from survey data (see for example: Gibson, Beegle, De Weerdt, & Friedman, 2015; Lotz et al., 2016; Groves & Heeringa, 2006). It is important to consider the DEFF because the underlying assumption of most statistical tests is that the data are equivalent to a simple random sample with a 100% response rate. However, for the reasons outlined in Section 3.1, the HLS used a complex survey design.

The DEFF is the ratio of the variance (a measure of precision) of an estimate achieved by a complex design relative to the variance of the same estimate that would be achieved by a simple random sample of the same size. The closer the DEFF is to 1, the closer the design is to simple random sampling. DEFFs of between 2 and 4 are typical in population health surveys, which means the variance is larger than would have been obtained using a simple random sample. A complex design like that used in the 2020 HLS is less precise than a simple random sample with

the same sample size, but is much more precise than could be achieved by a simple random sample with the same budget.

Nevertheless, DEFFs should not be too large. On the one hand, it is appropriate for weights to vary across the sample, otherwise it would not be possible for Māori and Pacific Peoples to have an increased chance of selection in the sample. On the other hand, if the variation in weights is too extreme, the DEFF will be very large, and this would be counterproductive for all statistics, even for Māori and other sub-population groups. The methods to sample sub-populations for the 2020 HLS were used to ensure the sample design was appropriate for achieving adequate precision for national and sub-population estimates within the survey budget.

The DEFFs are different for each statistic. Table 3-2 presents the design effects for three key indicators, all of which fall within 1.3 and 2.5. These are calculated by dividing the actual variance of the sample proportion by the variance assuming simple random sampling without replacement, with the same sample size ($\frac{proportion \times (1-proportion)}{sample\ size}$).

Table 3-2: Design effects for three key indicators from the 2020 HLS for each sample, by ethnic group

Indicator	Ethnic group	Design effect
Current smoker	Total	1.62
	Māori	1.89
	Pacific Peoples	2.05
	Asian	1.35
	NZ European/Other	1.35
Current vaper	Total	2.43
	Māori	2.06
	Pacific Peoples	1.70
	Asian	1.53
	NZ European/Other	1.64
Participated in any gambling activity in the past 12 months	Total	2.06
	Māori	1.55
	Pacific Peoples	1.66
	Asian	2.02
	NZ European/Other	1.58

4. QUESTIONNAIRE CONTENT

For each HLS survey year, the content of the questionnaire is reviewed and updated to see if it is still relevant and fit for purpose. As mentioned in Section 2, the Parent Caregiver (PCG) sample was dropped for the 2020 HLS. Correspondingly, all questions targeted at this group were

removed. Respondent feedback from the 2018 survey was used to streamline the questionnaire in an effort to reduce respondent burden. Where applicable, questions were deleted or updated.

The 2020 HLS questionnaire was informed by advice from Te Hiringa Hauora staff working in the specific programme areas, external researchers working in the specific topic areas, and other surveys. Table 4-1 outlines the topic areas covered by the questionnaire. The full details of the showcards and questionnaire, and changes made from the 2018 survey, are available from https://www.hpa.org.nz/our-work/research/publications

Table 4-1: Summarised content of the 2020 HLS questionnaire

Programme area	Information domains	Output details
All	Demographics	• Age, gender, ethnicity • Sexual identity • For those not born in New Zealand, the year of arrival • Employment status • Highest qualification • Household income • COVID-related impacts and silver linings • Household composition
	Re-contact	• Respondents were asked if they would consent to be re-contacted to participate in further Te Hiringa Hauora research in the next five years. Details from the re-contact question responses have been kept separately from the main dataset to maintain confidentiality.
Mental health, wellbeing and connectedness		• Self-rated health • General wellbeing and connectedness • Life satisfaction • Family cohesion • Psychological distress screening • Mental health stigma and discrimination • Cultural identity
Tobacco control	Tobacco control-related demographics	• Smoking status • Stages of nicotine addiction • Heavy smoking index • Products used • Smoking inside the home and vehicles
	Quitting	• Time since stopping smoking • Quit attempts • Resources used

Programme area	Information domains	Output details
	Knowledge	• Knowledge of how many adult smokers there are in New Zealand • Knowledge of government smoking rate reduction by 2025
	Attitudes	• Attitudes towards smoking in public dining areas and outdoor transport waiting areas • Attitude towards regulation of cigarette or tobacco sales
	E-cigarettes and vaping devices	• Usage and attitudes towards use • Products used • Helpfulness in assisting to quit smoking tobacco
	Marijuana	• Usage
Gambling harm	Gambling harm-related demographics	• Participation in gambling activity - nature and frequency of this participation • Personal gambling harm (Problem Gambling Severity Index)
	Exposure	• Household gambling harm • Support service usage
	Awareness	• Gambling harm help service advertising
	Attitudes	• Concern towards level of gambling in community
Sun safety	Sun protection-related demographics	• Skin type
	Sun protection behaviour	• Use of sun protection behaviours • Exposure to information at pharmacies or medical centres • Advice from doctor or nurse about skin cancer • Tanning behaviour • Skin checks
	Incidence of sunburn	• Incidence of mild and extreme sunburn last summer
	Campaign monitoring	• Recognition and understanding of the UV level alert
Healthy eating	Fruit and vegetables	• Fruit and vegetable intake
	Healthy eating behaviour	• Main meal preparation • Main meal eaten together or with a device in use • Main meal eaten outside home • Cooking methods • Meal planning

Programme area	Information domains	Output details
	Shopping patterns	• Weekly spend on food and drinks from supermarket-type locations, greengrocer, fruit and vegetable shops or markets, farmers' markets, cafés, bars, restaurants, takeaway outlets, food courts, and from convenience-type locations • Purchase drivers
Alcohol	Alcohol-related demographics	• Drinking status • Heavy drinking

5. DATA COLLECTION

Interviews were predominantly conducted in respondents' homes, although the interview could be completed at another location at the request of the respondent (eg, their workplace). Interviewers entered responses directly into laptop computers, with some questions being completed by the respondents independently. Showcards with predetermined response categories were used to assist respondents where appropriate. Full detail of the showcards is publicly available at https://www.hpa.org.nz/our-work/research/publications

5.1 INTERVIEWER TRAINING

Thirty-six interviewers were trained to deliver the survey in-field. Interviewers were trained over a two-week period which consisted of remote learning and face-to-face in-field assessment. Training covered both sampling procedures and questionnaire administration. Practice interviews were conducted by each interviewer as part of this training. Online training modules were developed, which contained both generic CBG training material as well as material specific to the administration of the HLS.

5.2 ENUMERATION

Households were pre-selected from SA1s for inclusion in the survey using the NZ Post Postal Address File (PAF). Each SA1 was re-enumerated when the interviewer first visited, in order to record new dwellings built and those removed since the last pre-Census enumeration and release of the PAF. The details of the new dwellings were entered into CBG's 'Sample Manager' software while the interviewer was in the field, allowing these households to be included in the random selection process for the SA1.

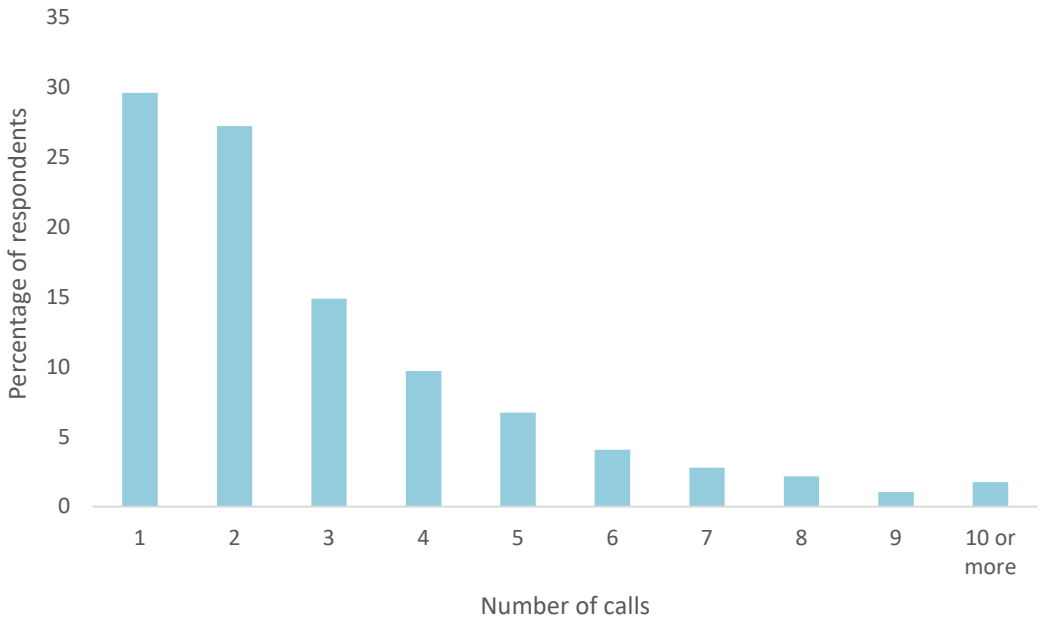
5.3 CALL PATTERN

A 'call' refers to one visit on one day during a particular time period. Up to 10 calls to each sampled dwelling were made at different times of the day and on different days of the week, before accepting that a dwelling was a non-contact. Calls were recorded as unique events only if they

were made at least two hours apart. Calls were spread out over the duration of the fieldwork. Six calls were made in the survey month in which the SA1 was issued. If no contact had been achieved by this point, there was a pause with no attempted contact with the dwelling for one to two weeks, before attempting four more calls.

For 95% of households, the interview took place within seven calls (Figure 5-1 below).

Figure 5-1: Proportion of households agreeing to interview, by number of calls, 2020 HLS



Households where no contact had been established, or where the selected respondent was unable to take part at that time but did not refuse to participate, were revisited during a mop-up phase in an effort to secure their participation.

5.4 COVID-19

In response to the COVID-19 pandemic, a number of protocols were developed by CBG to ensure the safety of households selected to participate, and of their field interviewers. A flyer detailing these measures was included in the invitation pack mailed to each selected address. These measures included:

- Interviewer training on infection control
- Physical distancing
- Cleaning and sanitising of equipment and hands
- Household and interviewer wellbeing checks
- Record keeping.

Once contact had been made with a household, the interviewer ensured that a distance of at least one metre was maintained on the doorstep during the respondent selection process. In those houses where a respondent was selected, an additional COVID-19 screener was administered to

identify if anyone in the household was at increased risk of COVID-19. The screener asked the door opener:

- Is anyone in your household currently unwell and have symptoms similar to COVID-19? This includes fever, coughing, sore throat and sneezing.
- Is anyone in your household self-isolating, or is anyone awaiting the result of a COVID test? For example, because they have travelled back from overseas recently or have been in contact with someone who has had COVID-19?
- Is anyone in your household currently employed in a role where they may come in contact with COVID-19? For example, working at official quarantine facilities, or employed to work on aircrafts that come from overseas?

If the door opener answered any of these questions affirmatively, then a face-to-face interview was not permitted. In this situation, the respondent had the option of completing the interview virtually, or face-to-face at a later date.

CBG developed a Virtual Interview Platform (VIP), which allowed selected respondents to meet with their interviewer online to conduct the survey, in a secure private 'room'. The platform featured an integrated video call component and large survey window. In total, two interviews were completed virtually during the course of fieldwork.

A new household outcome code was also made available to interviewers in order to capture COVID-related non-response.

5.5 PERFORMANCE AND QUALITY CONTROL

Interviewers were monitored by CBG management by:

- in-field assessment to ensure survey protocols were being followed correctly
- examination of individual performance metrics and exploration of strategies to improve these if necessary
- checking of a random selection of completed interviews by phoning respondents to confirm the interview was completed according to survey protocols, and to collect satisfaction ratings.

Participants were also left with feedback postcards that they could use to send feedback directly to CBG, anonymously if they chose. In addition, CBG operated a toll-free survey helpline that participants could call if they had any questions about the survey or wanted to provide feedback. The results of these quality checks were communicated to the individual interviewers on a regular basis throughout the fieldwork period, with additional training and mentoring provided where required.

5.6 INFORMED CONSENT

The 2020 HLS was voluntary. Consent was obtained without coercion and no incentive was offered. Selected households were mailed an invitation letter and information leaflet prior to the interviewer's first visit. Participants selected for the survey were presented with a copy of these documents as part of the informed consent process. Participants were asked to sign an electronic consent form and were given a copy of the consent form to keep. The consent form included a request for an interpreter if required (in a range of different languages, including New Zealand Sign Language), and the option was available to match respondents and interviewers by ethnicity and/or gender, although this was rarely requested.

The information brochure was available on the Te Hiringa Hauora website for respondents to view and is provided in the Appendix.

5.7 PILOT

A pilot survey involving 100 respondents and six interviewers was completed between 8 and 25 February 2020. The pilot was designed to mimic the main study in order to test:

- the duration of the survey and the sections within
- that the questionnaire loaded into the CAPI software performed as expected and electronic sample management behaved as expected
- wording of new questions and how respondents understood them
- flow of the questionnaire
- that questions would provide useful information
- that interviewer training was appropriate and adequately prepared them for fieldwork
- that interviewer materials and resources were fit for purpose.

The survey design and sampling method had already been successfully used for the 2008, 2010, 2012, 2014, 2016 and 2018 HLS. The pilot sample was not random, as people were selected to represent the different mix of ethnic groups, age groups and geographic locations likely to be included in the main survey (a purposive sample). Once the pilot was reviewed, a number of minor refinements were made to the questionnaire.

5.8 FIELD DATES

Interviews for the main survey were conducted between 28 September 2020 and 4 May 2021.

Interviewing was originally scheduled to commence on 20 April 2020 and was delayed due to the COVID-19 lockdown. Interviewing was then suspended twice in the Auckland region during 15–18 February and 28 February–8 March 2021 in response to the alert level being raised to level 3. At all other times, interviewing took place at alert levels 1 and 2 with additional COVID-19 precautions in place.

5.9 RESPONDENT BURDEN

The following strategies were used to minimise the burden on respondents. Interviewers:

- sought interviews by appointment rather than requesting immediate participation
- conducted a maximum of one interview at each sampled address
- used showcards wherever possible to assist answering
- invited open-ended answers to enable respondents to feel they could express themselves, and were not simply an information source
- made an effort to reduce respondent burden. Compared with previous iterations of the survey, a number of questions were removed for the 2020 survey (Table 5-1). This resulted in a mean duration of 28 minutes for the interview. The overall interview duration and the breakdown by each section is presented in Table 5-1 and Figure 5-2. These times are the CAPI times and include all question modules. They do not include the time spent in a household before or after the interview was conducted.

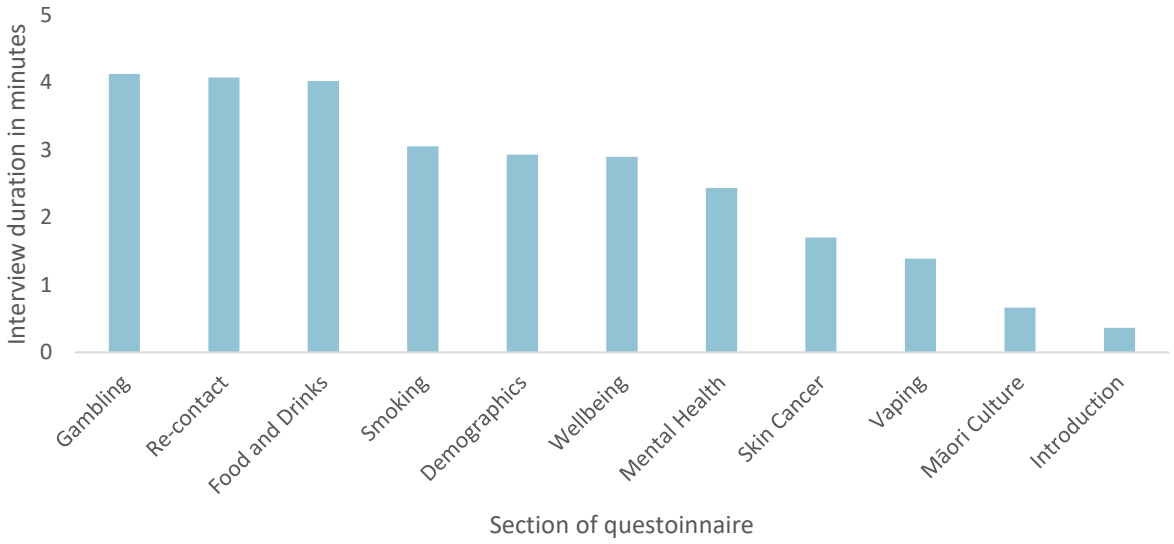
Table 5-1: Number of questions and interview duration

Section	2006/07	2008	2010	2012	2014	2016	2018	2020
Core demographics	-	11	10	10	10	14	11	6
Lifestyle factors	-	-	-	9	13	9	6	-
Tobacco/Vaping	-	90	46	39	54	54	29	30
Minimising gambling harm	125	39	132	61	107	107	65	53
Skin cancer prevention	-	113	28	23	18	20	16	10
Alcohol	-	-	10	17	18	25	26	3
Food and drinks	-	15	65	71	67	52	31	13
Physical activity	-	-	-	14	23	11	2	-
Child/family health	-	-	-	-	-	36	11	-
Mental health, wellbeing and connectedness	-	-	-	-	-	33	33	41
General health	-	-	8	-	-	8	4	-
Other	-	-	-	30	59	-	-	-
Demographics	7	23	25	26	28	34	17	19
Total	132	291	324	300	397	403	251	175
% Change from previous survey	-	+220%	+11%	-7%	+32%	+2%	-38%	-30%[5]
Duration (minutes)	-	-	*49*	*50*	*54*	*53*	*33*	*28*

Note – (dash) indicates data is not available

[5] This reduction includes the removal of all PCG content.

Figure 5-2 Interview duration (minutes) for each section of the 2020 HLS



6. SAMPLE SIZES

The target number of interviews for the sample was met overall, for Pacific Peoples and for NZ European/Other. The Māori sub-group target was 99% achieved and the Asian sub-group target was 98% achieved. Table 6-1 shows the interviews achieved in the 2020 HLS, broken down by total ethnicity.

Table 6-1: Interview target achievement for the 2020 HLS

	Target	Achieved	Proportion of target
Sample	3,000	3,089	103%
Māori	1,000	992	99%
Pacific Peoples	300	472	157%
Asian	250	255	98%
NZ European/Other	1,450	1,991	137%

Table 6-2 to Table 6-5 show the 2020 HLS actual sample sizes and the weighted counts by gender, age, ethnicity, and NZDep2018 quintile. Note that the sample was weighted and benchmarked to the New Zealand population.

Table 6-2: Sample size by gender for the 2020 HLS

Gender	Actual	Weighted
Male	1,289	1,519
Female	1,794	1,565
Gender diverse/prefer not to say	6	5
Total	3,089	3,089

Table 6-3: Sample size by ethnic group and gender for the 2020 HLS

Prioritised ethnic group	Gender	Actual	Weighted
Māori	Male	391	217
	Female	598	226
Pacific Peoples	Male	161	94
	Female	249	94
Asian	Male	97	254
	Female	118	262
NZ European/Other	Male	640	953
	Female	829	983

Table 6-4: Sample size by age group and gender for the 2020 HLS

Age group	Gender	Actual	Weighted
16-24 years	Male	154	225
	Female	179	214
25-34 years	Male	232	288
	Female	318	279
35-44 years	Male	196	244
	Female	324	248
45-54 years	Male	190	243
	Female	285	253
55-64 years	Male	204	201
	Female	284	239
65+ years	Male	313	316
	Female	404	332

Table 6-5: Sample size by NZDep2018 group and gender for the 2020 HLS

NZDep2018 group	Gender	Actual	Weighted
Low (least deprived)	Male	309	482
	Female	415	495
Mid	Male	541	655
	Female	697	659
High (most deprived)	Male	439	381
	Female	682	412

7. METHOD OF CALCULATING RESPONSE RATES

The response rate is a measure of how many people, from those selected to take part in the survey, actually participated. The response rate reflects the proportion of people interviewed from those who were selected for the sample, and describes the success of the study in terms of achieving cooperation from the population being measured. A high response rate suggests the survey results are more representative of the target population.

The response rate calculation classifies all selected households into four categories as seen in the following table:

Table 7-1: Response rate calculation components

Category	Outcomes
Interviews (a_i)	Interviews
Not eligible (b_i)	Not Eligible, COVID-19 Screener Failed
Eligibility not established (c_i)	No Reply, Access Denied, Screened Household Refusal, Screened Household Language Issues, Not Visited, Other
Eligible non-response (d_i)	Respondent Refusal, Not Available, Core Household Refusal, Core Household Language Issues, Partial

The response rate for a PPS survey is calculated according to internationally approved standards (RR3 in The American Association for Public Opinion Research (2016) and the 'full response rate' in Lynn et Al., (2001)). Using the categories from Table 7-1, the formula is:

$$RR_i = \frac{a_i}{a_i + d_i + e_i}$$

Where the subscript 'i' refers to the ith PSU (SA1) and e_i is the estimated number of eligibles from the instances of eligibility not established.

$$e_i = c_i \times \frac{a_i + d_i}{a_i + d_i + b_i}$$

The same response rate formula and estimation of the number of eligibles were used in the New Zealand Health Survey, the New Zealand Crime and Victims Survey, and the New Zealand Alcohol and Drug Use Survey, among others.

The outcomes for all dwellings visited are detailed in the following table:

Table 7-2: Outcomes for all dwellings visited

Outcome	Code	Outcome Description	Number	Category
Interview	I	Survey fully completed	3,089	Interviews (a_i)
Not Eligible	NE	No eligible respondent in the dwelling	6,122	Not eligible (b_i)
COVID-19 Screener Failed	COV	Respondent selected but survey not completed due to household failing COVID-19 screener	5	
Not Occupied (Vacant)	V	Dwelling determined as vacant following all call-back attempts	543	Out of frame
Not a Dwelling/Empty Section	NDE	Selected address is not a residential dwelling or is an empty section	350	
No Reply	NR	Dwelling occupied, but no reply following all call-back attempts	244	Eligibility not established (c_i)
Screened Household Language Issues	SL	Household members cannot understand the surveyor or any of the translated materials	0	
Not Visited	NV	Address not visited	9	
Other	OTH	Call back, danger, dogs, etc.	58	
Screened Household Refusal	SHR	Decline by someone on behalf of the whole household for a screened household before screening has taken place	237	
Core Household Refusal	CHR	Decline by someone on behalf of the whole household for a core household	516	Eligible non-response (d_i)
Core Household Language Issues	CL	Household members cannot understand the surveyor or any of the translated materials	10	
Respondent Refusal	RR	Decline by an individual respondent after they have been selected	20	
Not Available	NA	Respondent selected but not available to complete an interview	283	
Partial	P	Interview only partially completed	0	
Selected Dwellings			**11,486**	

Unweighted response rates are calculated using the raw counts and reflect the success of the survey in terms of achieving participation from people selected, whereas weighted response rates take probability of selection into account and reflect the success of the survey in terms of the population being measured. The unweighted and weighted response rates would be the same in the case where every person selected for the survey has the same probability of selection. In the HLS, the need to oversample some groups led to people having different chances of selection and, consequently, there was a difference in the weighted and unweighted response rate calculations.

7.1 UNWEIGHTED RESPONSE RATE

The unweighted response rate is calculated at the SA1 level first. The result is then averaged using a weighting of the estimated number of eligible respondents selected. Vacant dwellings and selected addresses that turn out not to contain a private dwelling (e.g., empty sections, businesses) are considered 'out of frame' and are not included in the calculations.

7.2 WEIGHTED RESPONSE RATE

The weighted response rate was calculated for each of the sample components (core, Māori/Pacific Peoples screened, Pacific Peoples-only screened, and Māori-only screened, in both the Other stratum and the Pacific Peoples stratum). The weighting variables applied to each PSU of the relevant component were the inverse of the probability of the PSU being selected within the component sample frame and the inverse of the probability of the dwelling being selected within the PSU. The product of these two variables was applied to the estimate of the eligible dwellings within the PSU. The overall response rate within each component was calculated as the average of the PSU response rates, weighted by the estimated number of eligibles within each PSU. The overall weighted response rate is the average of the component response rate, weighted by the total of the weighted estimated eligibles within each component. The weight applied to the estimated eligibles within each PSU, in this case, is the inverse of the probability of the PSU being selected within the component sample frame.

8. ACHIEVED RESPONSE RATES

As can be seen in Table 8-1, the overall unweighted response rate for the 2020 HLS is 79%. The weighted response rate is 65%.

The response rates for all HLS are presented in Table 8-1. In previous years, call outcomes have been categorised differently. For example, in 2014, Not Occupied and Not a Dwelling/Empty Section were categorised as Not eligible, and all household refusals were categorised as Eligible non-response. However, this change in categorisation has not resulted in a big difference in response rate. Using the 2014 categorisation, the 2020 HLS unweighted response rate is 75%.

Table 8-1: HLS response rates

Year	Unweighted response rate
	Adult
2008	64%
2010	56%
2012	83%
2014	68%
2016	75%
2018	75%
2020	79%

9. DATA PROCESSING

9.1 DATA CAPTURE

Questionnaire responses were entered directly onto interviewers' laptops. As interviewing progressed, completed interviews were uploaded to CBG's data server, from where they were compiled for inspection, coding and editing. Interviews were uploaded to the server by each interviewer on every day they were active in the field. Different types of questions were used in the 2020 HLS. Single-response closed-ended questions, which a respondent can only give one response to, were coded as is. Some questions allowed for multiple responses. For these questions all responses were retained, with each response shown as a separate variable on the data file. Open-ended questions were used extensively. For these, the interviewer keyed in the verbal answers, as near as possible to the respondent's spoken words. Coding of these was then done by CBG.

9.2 CODING

Coding of open-ended questions was undertaken by initially collating answers given by respondents to each question. These answers were examined by analysts at CBG to search for recurring points or themes. Each recurring point/theme was identified as a code. All answers falling sufficiently close to that point/theme, i.e., differing only in the words the person used to describe it, were assigned to that code. Note that where an open-ended question was sourced from a prior Te Hiringa Hauora survey, the code frame used previously was also used for the 2020 HLS, when appropriate, to enable comparisons between the surveys. Questions with an 'Other, please specify' code were treated in the same way as open-ended questions. In this case, the number of original codes was extended to accommodate any further recurring answers. In some instances, interviewers assigned answers that fit into a pre-coded category to the 'Other, please specify' category. Such answers were assigned to the appropriate code. All open-ended responses have been retained, to inform any further review of the code frames used.

9.3 SECURITY OF INFORMATION

Any information collected in the survey that could be used to identify individuals has been treated as strictly confidential. Data were transferred from interviewers' laptops in an encrypted format to head office at CBG by a secure internet upload facility.

Names and addresses of people and households who participated in the survey were stored separately from the response data at all stages of data collection and transmission.

9.4 CREATION OF DERIVED VARIABLES

For comparison purposes (in data analysis), a number of derived variables have been created for the 2020 HLS dataset. These included prioritised ethnicity groups, smoking status, neighbourhood socio-economic deprivation, and household equivalised expenditure on food and drinks.

Ethnicity

In the HLS, respondents had the opportunity to select as many ethnic groups as they identified with. The ethnic groups of interest in the analysis of the HLS were: Māori, Pacific Peoples, Asian and NZ European/Other. In the 2020 HLS, participants predominantly identified with one of these four ethnic groups (*n* = 2,400, 78%), while 638 (21%) identified with two ethnic groups, and a small number identified with three or more ethnic groups (*n* = 49, 2%). Meanwhile, one person (0.0003%) did not select any ethnicity. They were assigned to the NZ European/Other group in data analyses.

Total response ethnicity, prioritised ethnicity, and equity ethnic groups have been derived for the HLS. Total response ethnicity refers to whether or not a respondent identified with an ethnic group. A single respondent may fit into more than one total response ethnicity group.

Prioritised ethnicity is where each respondent is allocated to a single ethnic group, in the prioritised order of Māori, Pacific Peoples, Asian, then NZ European/Other. For example, if someone identified as being both Chinese and Māori, their prioritised ethnicity is Māori for the purpose of analysis. The way that the ethnicity data is prioritised means that the group of prioritised NZ European/Other effectively refers to non-Māori, non-Pacific Peoples and non-Asian people. Prioritisation is a method outlined in the Ethnicity Data Protocols for the Health and Disability Sector as a useful method for grouping people into independent ethnic groups for analysis (Ministry of Health, 2004).

Equity ethnic groups involve each participant being assigned to an ethnic group in a prioritised order for strength-based comparisons. Māori equity is created by assigning in the order of Māori, non-Māori Pacific Peoples and then everyone else (non-Māori non-Pacific Peoples). Pacific equity assigns Pacific Peoples, non-Pacific Peoples Māori and then everyone else.

Smoking status

The definitions used for smoking status are as follows:

- *Never smoker:* has never smoked tobacco.
- *Past experimental:* has smoked tobacco, but never started smoking regularly.
- *Current smoker:* has smoked tobacco, and now smokes at least once a month or more often.
- *Recent/past quitter:* has smoked tobacco, but has now stopped smoking.

Vaping status

The definitions used for vaping status are the same as smoking status for those who have never or have tried an e-cigarette or vaping device.

Gambling type

Gambling types are often classified into two categories, those where winnings can be immediately 'reinvested' and those where they cannot. The former is referred to as 'continuous' and the latter 'non-continuous' (Abbott & Volberg, 1996). For the HLS these two groupings were combined with frequency in the same way they were presented for the 2006/07 Gaming and Betting Activities Survey (National Research Bureau, 2007). In HLS previous to 2020, 'frequent gambling' was defined as 'weekly or more often'. In 2020, frequent gambling changed to 'every week or almost every week':

- *Non gamblers:* did not participate in any gambling activities in the previous 12 months.
- *Infrequent gamblers:* participated in any gambling activities less often than once a week or almost once a week in the previous 12 months.
- *Frequent, non-continuous gamblers*: participated every week or almost every week in non-continuous forms of gambling in the previous 12 months. Non-continuous forms of gambling include lottery games, going to casino evenings/buying raffle tickets for fundraising, participating in sweepstakes, making bets with family/friends and other gambling activities.
- *Frequent, continuous gamblers:* participated every week or almost every week in continuous forms of gambling in the previous 12 months. Continuous forms of gambling include playing electronic gaming (pokie) machines, betting on horse or dog races, or sports events, table games at casinos, housie and bingo, mobile phone games for money, online activities for money or prizes through an overseas website.

Problem Gambling Severity Index

The Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) is a nine-item scale that is used to assess people's experiences of gambling-related harm in the last 12 months. An example of an item on the questionnaire is, ''Thinking about the last 12 months, how often have you bet more

than you could really afford to lose?' Participants rated themselves on a four-point scale from 0 (never) to 3 (almost always).

Response values from each participant were added to calculate the total score and 'refused' or 'don't know' was coded as 'never' (0). Possible scores range from 0 to 27 with higher scores being indicative of greater problem gambling.

Neighbourhood socioeconomic deprivation

The New Zealand Index of Socioeconomic Deprivation 2018 (NZDep2018) has been linked to the 2020 HLS as a measure of neighbourhood socioeconomic deprivation and a proxy for individual socioeconomic position. A series of factors from the 2018 Census was used to create the NZDep2018, with a decile value calculated for each SA1 (Atkinson, Salmond & Crampton, 2019). These factors were receiving a means-tested benefit, low household income, not owning the home you live in, single-parent family, unemployment, no school qualifications, household overcrowding, no access to internet at home, and living in a damp or mouldy dwelling. For some analyses of the 2020 HLS, these deciles have been grouped, so that deciles 1 to 3 are referred to as low deprivation, 4 to 7 as moderate (or mid) deprivation, and 8 to 10 as high deprivation.

Where NZDep2018 was missing for a SA1, the deprivation index was estimated from the Census Area Unit containing the SA1.

10. WEIGHTING AND POST-SURVEY ADJUSTMENTS

Most national surveys have complex survey designs, where different groups have different probabilities of being selected in the survey (refer to Section 3 for details of the survey design). To ensure no group is under or over-represented in estimates from a survey, a method of calculating estimates that reflects the sample design must be used.

Estimation weights are used to achieve this, and can be thought of as the number of people in the population represented by a given survey participant. A weight is calculated for every respondent and these weights are used to calculate estimates of population totals (counts), averages, and proportions. Typically, members of groups who have a lower chance of selection are assigned a higher weight, so that these groups are not under-represented in estimates. Conversely, groups with a higher chance of selection (eg, Māori and Pacific Peoples populations who are included in the increased samples) receive lower weights. Also, groups that have a lower response rate (e.g., older men) are usually assigned a higher weight so that these groups are correctly represented in all estimates from the survey.

Weights are designed to:

- reflect the probabilities of selection of each respondent

- make use of external population benchmarks (typically obtained from a population census) to correct for any discrepancies between the sample and the population benchmarks. This improves the precision of estimates and reduces bias due to non-response.

The weights for the 2020 HLS were constructed on the basis of sampling methods which were addressed in Section 3 and were computed in accordance with current guidance from experts in surveys (see for examples: Force, 2010; Kalton & Flores-Cervantes, 2003; Pike, 2008). The data weighting was performed in R Studio, version 4.02, using five settings: Sampling units, Strata, Sampling weight, Post-strata and Post-stratum weight. These are summarised in Table 10-1.

The following section describes how the variables used in the weighting are derived, how the weighting is applied, and how the weighting is used to calculate survey estimates.

Table 10-1: Weight variables used in the 2020 HLS

Survey data setting in Stata	Description
Sampling units	An identification of the SA1 where the respondent was interviewed, aggregations of meshblocks optimised to be of similar population sizes based on the 2018 New Zealand Census.
Strata	A categorical variable that is composed of the Pacific Peoples and Other stratum.
Sampling weight	The inverse probability of a participant to be selected to participate in the survey. This was adjusted for the response rate and under-coverage of SA1s.
Post-strata	An identifier of age, gender and ethnicity grouping, also called benchmark groups.
Post-stratum weight	The New Zealand estimated resident population for each post-strata group.

10.1 SAMPLING UNITS

The identification number of SA1s from the 2018 Census was treated as the sampling unit variable. Based on the 2018 Census data there were 29,203 eligible SA1s that met the HLS selection criteria (discussed in Section 2.3) and 350 were selected into the survey.

10.2 STRATA

The 350 selected SA1s were grouped into two strata, the Pacific Peoples-dense stratum (containing SA1s where at least 20% of the households are Pacific Peoples), and Other (all other SA1s).

The survey stratification was set in R Studio using a categorical variable that flagged SA1s in the Pacific Peoples-dense stratum and Other stratum.

10.3 SAMPLING WEIGHT

The sampling weights were calculated in a series of stages to compensate for unequal selection probabilities, and adjusted for non-response. The 2020 HLS sampling weight was defined as the inverse probability of the SA1 being selected into the sample, multiplied by dwelling selection probability, and multiplied by the respondent selection probability:

$$Selection\ weight = \frac{1}{P(SA1) \times P(dwelling) \times P(respondent)}$$

This reflects the three-stage sampling procedure described in Section 3.2. The three components of the sampling weight are the probability of SA1 selection, probability of dwelling selection and, finally, the probability of the respondent being selected from within the household. The details of these probabilities are provided as follows:

Stage 1: SA1 selection

The 2020 HLS comprised two strata — Pacific Peoples-dense and Other. For each stratum, the probability of a SA1 being selected into the survey was defined as:

$$P(SA1) = \left[\frac{Number\ of\ selected}{SA1s\ in\ the\ stratum}\right] \times \frac{\left[\frac{Number\ of\ dwellings}{in\ the\ SA1}\right]}{\left[\frac{Total\ number\ of\ dwellings\ in}{all\ NZ\ SA1\ in\ the\ stratum}\right]}$$

The number of dwellings in each SA1 was obtained from the 2018 Census.

For the 2020 HLS, the number of selected SA1s was 56 in the Pacific Peoples stratum and 294 in the Other stratum. The total number of dwellings in all New Zealand SA1s (not only the selected SA1s) was 130,542 for the Pacific Peoples stratum and 1,532,742 for the Other stratum.

Stage 2: Household selection

Because of screening, different households in each SA1 have different probabilities of being selected into the sample. There were four screening components:

- Core (COR), where anyone aged 16 years and over was eligible to be selected.
- Screened Māori and Pacific Peoples (SMP), where people of either Māori or Pacific Peoples ethnicities were eligible to be selected.
- Screened Pacific Peoples (SPI), where only people of Pacific Peoples ethnicity were eligible to be selected.

- Screened Māori (SMO), where only people of Māori ethnicity were eligible to be selected.

This means that a NZ European/Other person could only be selected into the sample if they lived in a core household, a Pacific person could be selected if they lived in either a screened Pacific Peoples or core house, and a Māori person could be selected if they lived in either a screened Māori or core house. The number of houses selected for each component is determined before the interviewer goes into field and used the re-enumerated count of dwellings.

The probability of a dwelling being selected into the study depends on the ethnicity of the respondent and is defined as:

$$P(dwelling) = \frac{[Number\ of\ dwellings\ where\ respondent\ would\ be\ \ eligible\ for\ selection]}{[Total\ number\ of\ re-enumerated\ dwellings\ in\ the\ SA1]}$$

Explicitly, the probabilities of dwelling selection for respondents of Pacific Peoples, Māori and Other/Asian/NZ European ethnicities are as follows.

For Pacific Peoples respondents:

$$P(dwelling) = \frac{[Total\ number\ of\ selected\ dwellings\ (COR + SMP + SPI)\ in\ the\ SA1]}{[Total\ number\ of\ re-enumerated\ dwellings\ in\ the\ SA1]}$$

For Māori respondents:

$$P(dwelling) = \frac{[Total\ number\ of\ selected\ dwellings\ (COR + SMP + SMO)\ in\ the\ SA1]}{[Total\ number\ of\ re-enumerated\ dwellings\ in\ the\ SA1]}$$

For Other/Asian/NZ European respondents:

$$P(dwelling) = \frac{[Number\ of\ COR\ dwellings\ in\ the\ SA1]}{[Total\ number\ of\ re-enumerated\ dwellings\ in\ the\ SA1]}$$

Stage 3: Respondent selection

One person was selected from the lists of those who were eligible in each household. Each eligible person in the household had the same probability of being selected into the sample:

$$P(Eligible\ respondent) = \frac{1}{Total\ number\ of\ eligible\ people\ in\ the\ household}$$

Stage 4: Checking for extreme weights

The selection weight for each participant was then checked for an extreme weight using the formula below:

$$Median + 6 \times (Q_3 - Q_1)$$

Where Q_1 and Q_3 are the 25th and 75th percentiles of the selection weight respectively.

Any value that exceeded the threshold was considered extreme. As a result, five extreme weights were detected. These values were mainly caused by the use of the dated 2018 Census count of dwellings. The problem was more noticeable for those SA1s with very high growth. For example, the number of households in a SA1 recorded in the 2018 Census was 135 households, and the actual number of households in 2020 observed by an interviewer in the same SA1 was 617 households. That is, for this particular SA1 the number of households was more than four times greater in 2020 compared to 2018. Using more recent household count data could potentially minimise this issue. Nevertheless, to the best of our knowledge, the 2018 Census count of dwellings was the most updated available at the time when the survey was conducted.

Extreme weight is a common issue in survey weighting procedures. One way of dealing with extreme weights is trimming. Trimming the extreme weights can substantially reduce the overall variation in weights. This consequently increases the reported precision of the estimates. For that reason, the five extreme weights were replaced by the threshold value. This method is commonly used in complex surveys internationally (see for example Chowdhury, Khare, & Wolter, 2007).

10.4 NON-RESPONSE ADJUSTMENT

Each selection weight was adjusted using the response rate of the SA1 the respondent was selected from. This adjustment was done to compensate for any non-response bias that may have arisen from people refusing to participate in the survey. The adjustment was made by dividing the selection weight by the response rate (see Section 7 for details on the response rate). Applying this adjustment at the SA1 level accounted for any bias that may have arisen due to differences at the area level (eg, differing levels of deprivation in different SA1s). The adjustment was done using the following formula:

$$Response\ rate\ modified\ selection\ weight = \frac{selection\ weight}{response\ rate\ for\ SA1}$$

10.5 BENCHMARKING

Benchmarking is a post-stratification adjustment that ensures the proportion of particular groups in the sample matches the proportion in the population. Benchmarking refers to an adjustment of the data to ensure they are representative of the New Zealand population after selection weights have been applied. The 2020 HLS sample was benchmarked using the following:

a) Gender (male and female)

b) Prioritised ethnicity (Māori, Pacific Peoples, Asian and NZ European/Other)

c) Age group (15 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, and 55 and over).

Age, gender and ethnicity were included because these variables are related to health behaviour and to non-response and were a key output classification for the survey. In total, there are 40 gender/age/ethnicity groups.

The survey is designed to represent the resident population of New Zealand aged over 16 years. The most recent New Zealand Census was conducted in March 2018, but since then the demographics of the New Zealand population have changed (Stats NZ, 2020). Therefore, the 2021 estimated resident population was used as the reference population. Projections produced by Stats NZ, according to assumptions specified by the Ministry of Health, were used to benchmark the population. The size of the target population was 4,071,000 individuals.

The magnitude of the post-stratification adjustment for each benchmark group was calculated as the ratio of the 'expected' population (the estimated resident population) to the 'observed' population (the sum of the response rate and under-coverage adjusted selection weights for each benchmark group). The adjustment ranged from 0.83 to 3.09. The full list of benchmark adjustments for the adult sample is presented in Table 10-2.

Table 10-2: Benchmark adjustments for the 2020 HLS sample

Age	Māori		Pacific Peoples		Asian		NZ European/Other	
group	Male	Female	Male	Female	Male	Female	Male	Female
16-24	1.79	1.46	2.55	2.31	2.53	2.62	1.06	0.95
25-34	1.53	1.01	1.42	1.31	1.63	2.07	1.8	1.64
35-44	1.63	0.83	2.01	1.08	2.66	1.43	1.91	1.40
45-54	1.61	1.27	2.81	1.53	1.83	1.51	1.73	1.13
55+	1.01	1.00	1.60	1.13	3.09	2.42	1.44	1.19

10.6 REPLICATE WEIGHTS

Standard errors are a measure of the precision of an estimate and replicate weights are a method for obtaining standard errors for any weighted estimate. Replicate weights were necessary for the HLS because its complex survey design meant that basic variance estimation methods, which assume simple random sampling, could not be used.

To remove bias in the estimate from any particular PSU, the 'delete-a-group' jackknife was used. This means that the estimate is first calculated from a sample of all respondents except those in a PSU, and then this calculation is repeated excluding a different PSU each time. The standard error of the population estimate is based on the variation of the replicate estimates.

An advantage of using jackknife is that it makes no assumptions about the shape of the underlying probability distribution. Another advantage is that the selection weight (adjusted for non-response) and post-stratification weight (benchmarking) can be incorporated into the replicate weights. Analysing data using jackknife does have some disadvantages, as suggested by Abdi & Williams

(2010). The jackknife method requires that the observations are independent of each other. When the independence assumption is violated, the jackknife method underestimates the variance in the dataset, which makes the data look more reliable than they actually are. The HLS satisfies this assumption because all observations are independent.

The jackknife replicate weights were implemented in the 2020 HLS as part of the survey estimation procedures in the R Studio version 4.02 statistical software package. For technical information on replicate variance estimation in surveys, see Rao and Wu (1988) and Shao and Tu (1995).

11. SURVEY ESTIMATES

Proportions

The proportion of the population who belong to a particular group (eg, the proportion of the population who smoke daily) is estimated by calculating the sum of the weights for the respondents in the group, divided by the sum of the weights of all respondents.

Proportions within population groups

The proportion of people in a population group who belong to a subgroup (eg, the proportion of Māori who smoke daily) is estimated by calculating the sum of the weights for the respondents in the subgroup (Māori who smoke daily), divided by the sum of the weights for the respondents in the population group (Māori).

Totals (population estimated count)

To find totals, multiply the weighted proportion by the population size. For example, for the number of daily smokers in the New Zealand population, multiply the weighted proportion of daily smokers by the population size (4,071,000 in 2021).

Averages (means)

The population averages (eg, the average number of gambling activities participated in by New Zealand adults) are estimated by calculating the sum, over all respondents, of the weight multiplied by the variable of interest divided by the sum of the weights.

Averages within population groups

Sometimes the average within a group is of interest (eg, the average estimate of the number of smokers in New Zealand among males). The estimate is given by calculating the sum, over respondents, in the group of the weight multiplied by the variable of interest, divided by the sum of the weights of respondents in the group.

Suppression due to small numbers

To ensure the survey data presented are reliable and that the confidentiality of the participants is protected, data are only presented when there are at least 30 respondents in the denominator (the

population group being analysed). This ensures that no participant can be identified from the results.

Confidence intervals

Ninety-five percent confidence intervals have been used to represent the sample error for estimates. A 95% confidence interval means there is a 95% chance the true value of the estimate (if the whole population was sampled) lies between the lower and upper confidence interval values. Differences between estimates are said to be 'statistically significant' when the confidence intervals for each rate do not overlap. However, even when there are overlapping confidence intervals the difference between the groups can be statistically significant. Any differences between two variables where the confidence intervals overlapped were tested using the most appropriate statistical test for the data. The significance of many different statistical tests is represented by a probability value, or *p*-value. If a *p*-value is below 0.05, then it indicates that there is strong evidence for rejecting the null hypothesis, and that a significant difference exists.

12. DATA INTERPRETATION NOTES

In 2018, there were lower response rates than in 2016 and 2020 among young (15 to 24 years) male Māori, young male NZ European/Other, young female Asian, and older (55+ years) male Asian respondents. We recommend to use caution when making comparisons of 2018 data with 2016 and 2020 and to focus on longer-term trends where possible.

13. ACCESSING DATA

The results obtained from the HLS can be accessed via data explorer tools and a publication page. Te Hiringa Hauora confidential microdata including the HLS is potentially available for statistical purposes to researchers working within academic institutions, government agencies and the wider health sector, subject to certain conditions.

13.1 KUPE DATA EXPLORER

Users can explore results from the HLS at https://kupe.hpa.org.nz Kupe provides a snapshot of New Zealanders' views and experiences across a range of subject areas for each survey year. Where possible, data were compared to see time trends across years. The first phase of this project was launched in December 2018. Kupe contains HLS findings from 2006/07 – 2018. Results from 2020 will be added later in 2021.

13.2 TOBACCO CONTROL DATA REPOSITORY

To see an overview of smoking prevalence, we gather New Zealand's tobacco control data in one location (www.tcdata.org.nz). The sources of data are the Census data, Youth Insight Survey, and HLSs. Key indicators from the HLS include smoking status and quitting attempts.

13.3 PUBLICATIONS

Short insights, reports, and infographics are produced that highlight interesting research covering different topics. These publications are designed to meet the needs of researchers, academics and people working in the health sector. Publications using data from previous HLSs are available on the Te Hiringa Hauora website at: https://www.hpa.org.nz/our-work/research/publications

Further publications and reports using 2020 HLS data are planned and will be available from the same location.

13.4 ACCESS TO CONFIDENTIAL MICRODATA

The analyses presented in Te Hiringa Hauora publications are only a small proportion of those that could be undertaken. Confidentialised microdata from the 2020 HLS may be available in 2021 for approved researchers to use for specific research projects. The microdata will have all identifying information about individuals removed and will be modified to protect individual information. Approval will be subject to certain criteria, terms and conditions and the researcher's organisation will have to sign an access agreement with Te Hiringa Hauora. Contact Te Hiringa Hauora for more information by emailing research@hpa.org.nz

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APPENDIX: MATERIALS PROVIDED TO PARTICIPANTS

Letter of invitation

Kia ora, Talofa lava, Mālō e lele, Ni sa bula vinaka, Nǐ hǎo, Hello,

On behalf of the Health Promotion Agency/Te Hiringa Hauora (HPA), I'd like to invite your household to take part in an important survey, which collects vital information, needed to monitor the health and lifestyles of the nation.

We are asking people about their views and experiences on a number of topics, including food and drink, smoking, vaping, gambling, wellbeing, and being out in the sun.

The information will be used to develop advice, information and practical ways to help New Zealanders live healthy lifestyles.

We hope that you'll agree to help.

Thank you in advance.

Tane Cassidy,
Chief Executive

In the next few weeks, an interviewer, wearing an ID badge, will call at your address, and may invite your household to take part.

The interviewer will explain more about the survey and will be able to answer any questions that you might have. In the meantime, if you have any questions, or would prefer to arrange a time for the interviewer to visit you, please:

- **call** the survey helpline 0800 478 783
- **email** info@cbg.co.nz
- **txt** 'SURVEY' + your name + address to 875 and we'll call you to arrange a time (20c per txt)

Printed using vegetable-based inks on paper from an environmentally certified and responsibly managed forest mill.

The information you provide will be used to improve the health and wellbeing of all New Zealanders

hpa health promotion agency
TE HIRINGA HAUORA

CBG HEALTH RESEARCH

Please share this information with other members of your household.

What is the New Zealand Health and Lifestyles Survey?

This survey is about New Zealanders' views and experiences of a number of health and lifestyle topics, including food and drink, smoking, vaping, gambling, wellbeing and being out in the sun.

This is the seventh Health and Lifestyles Survey – similar surveys have been conducted every two years since 2008.

Who is carrying out the survey?

CBG Health Research Ltd, an independent New Zealand research company, is carrying out the survey for the Health Promotion Agency/ Te Hiringa Hauora (HPA).

The survey has been reviewed by the New Zealand Ethics Committee.

Your rights

If you have any questions about your rights as a participant in this survey you can contact an independent health and disability advocate for free advice.

Phone 0800 555 050

Email advocacy@advocacy.org.nz

More information

If you want to know more about this survey, please call CBG Health Research on **0800 478 783** or visit the HPA's website at **hpa.org.nz**

We appreciate your help.

HPA is a Crown Entity that leads and delivers innovative, high quality and cost-effective programmes and activities that promote health, wellbeing and healthy lifestyles and prevent disease, illness and injury. HPA also enables environments that support health and wellbeing and healthy lifestyles and reduce personal, social and economic harm.

For more information visit **hpa.org.nz**

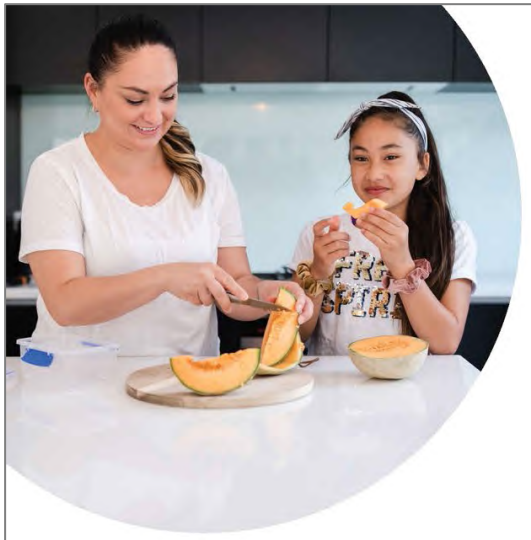
hpa health promotion agency TE HIRINGA HAUORA

CBG HEALTH RESEARCH

New Zealand Health and Lifestyles Survey

Help improve the nation's health

Take part in the New Zealand Health and Lifestyles Survey



Why should I take part?

Your views and experiences are important. Even if you have not taken part in any of the activities we are asking people about, your answers will help identify any changes in people's views and experiences since the last survey in 2018.

This survey is voluntary, however we really appreciate your participation.

What will the information be used for?

The survey will help HPA, and others like the Ministry of Health, to develop advice, information and practical ways to help New Zealanders live healthy lifestyles.

How are people chosen to take part?

Addresses throughout New Zealand are randomly selected. One person (aged 16 years and over) from your household may be randomly chosen by the interviewer and asked to take part in the survey. More than 3,000 people will take part in this survey.

Where and when will I be interviewed?

In your own home, by an interviewer wearing photo identification. The interview will take around 30 minutes. If you are busy when the interviewer visits, please ask them to come back at a day and time that suits you.

If you are out when we visit

If you are out when we visit, we would still like to speak with someone in your household.

Our interviewer will visit again to arrange a time that suits you. If you prefer, you can call the survey helpline on 0800 478 783, or email info@cbg.co.nz, to arrange a time that suits you. Alternatively, txt 'SURVEY' + your name + address to 875 and a representative will call you to arrange a time (txts cost 20c).

What sort of questions will I be asked?

You will be asked questions on different health and lifestyle topics. If you don't want to answer a question, you don't have to; just tell the interviewer.

Can I have an interpreter?

Yes, if you would like an interpreter for any language, including New Zealand Sign Language, please let your interviewer know, or call the free survey information line 0800 478 783.

What happens to my answers?

Your information will always be kept confidential and is protected by the Privacy Act 1993. No person's name or address is connected to the answers they give. Everyone's answers will be grouped to report on the survey results.

Where can I find out about the results from the survey?

Some of the results will be available from early 2021 at **hpa.org.nz**

Thank you for your time.

Thank you card

Provided to all participants following the interview.

Support options

If you would like further information or advice about any of the health topics covered in this survey, you can contact a helpline or support organisation. Some that may be useful to you are listed below

Helplines

Need to talk? Free call or text anytime **1737**
This service is for anyone who is feeling anxious, down, a bit overwhelmed, or who just needs someone to talk to.

Gambling Helpline	**0800 654 655**
Quitline (smoking cessation help)	**0800 778 778**
Alcohol and Drug Helpline	**0800 787 797**

For children and young people

Youthline	**0800 376 633** or free text **234**
The Lowdown	**0800 111 757** or free text **5626**
What's up	**0800 942 8787**

For more information

choicenotchance.org.nz
depression.org.nz
thelowdown.co.nz
vapingfacts.health.nz
smokefree.org.nz
alcohol.org.nz

If you would like more information about the Survey, or would like to become a CBG interviewer, please contact CBG Health Research on 0800 478 783 or visit www.cbg.co.nz

If sending feedback remove the top part, fill in comments below, seal closed and pop in the post – no stamp needed.

Please provide us with your feedback or any additional comments below.

Leave your contact details blank if you wish to remain anonymous.

Contact details

Name/details of interviewer .....

Your name .....

Contact number/s .....

Address .....

.....

Email .....