Stats NZ
Tatauranga Aotearoa

Household Labour Force Survey sources and methods: 2025

Te Kāwanatanga o Aotearoa
New Zealand Government

Citation
Stats NZ (2025). *Household Labour Force Survey sources and methods: 2025*. Retrieved from www.stats.govt.nz.

ISBN 978-1-991307-43-9

Published in January 2025 by
Stats NZ Tatauranga Aotearoa
Wellington, New Zealand

Contact
Stats NZ Information Centre: info@stats.govt.nz
Phone toll-free 0508 525 525
Phone international +64 4 931 4600

www.stats.govt.nz

Contents

List of tables and figures

List of tables

List of figures

Abbreviations list

ANZSIC	Australian and New Zealand Standard Industrial Classification
CAI	computer-assisted interview
CAPI	computer-assisted personal interview
CATI	computer-assisted telephone interview
COVID-19	coronavirus disease 2019
GSS	General Social Survey
HLFS	Household Labour Force Survey
ILO	International Labour Organization
NILF	not in the labour force
NPAD	National Postal Address Database (New Zealand Post)
NPD	non-private dwellings
NZAD	New Zealand Address Dataset
NZDep	New Zealand Deprivation Index
NZIS	New Zealand Income Survey
NZSCO	New Zealand Standard Classification of Occupations
OECD	Organisation for Economic Co-operation and Development
PPS	probability proportional to size
PNL	pre-notification letter
SRS	simple random sampling
PSU	primary sampling unit
TA	territorial authority

Purpose and about the HLFS

Purpose

Household Labour Force Survey sources and methods: 2025 provides HLFS users with a technical description of the survey's sample design and other aspects, including collection methods, estimation and imputation processes, and coding and data processing procedures. This update to the 2016 version reflects changes made to the methods and questionnaire since then.

We phased in the current sample design over two years, with the first one-eighth of the sample rotated into the field in the December 2020 quarter. By the September 2022 quarter, the entire sample was using the new design.

For details about significant changes to the HLFS, see the section Changes affecting data comparability over time.

About the HLFS

The HLFS was introduced in October 1985. It is a continuous nationwide survey of households, which measures quarterly averages of employment, unemployment, and non-participation in the labour force, as well as quarterly and annual changes in these levels. The survey helps monitor labour market, inform social policy, support research, and provides insights into employment quality and the health and general wellbeing of New Zealand's economy.

Each quarter, we aim to collect responses from around 15,000 households, representing 30,000 individuals aged 15 years and over. As a rotating panel survey, the HLFS interviews the same respondents for a set number of consecutive quarters before replacing them with new ones. Households are selected using a multistage, stratified, clustered design, and all adults in the selected households are interviewed.

HLFS objectives

The objectives of the HLFS are to:

- Measure regularly the levels, changes, and characteristics of employment, unemployment, and people not in the labour force (NILF) in New Zealand using international guidelines and best practices. Specifically, the HLFS aims to:
    - produce reliable national and subnational estimates of the employed, unemployed, and NILF groups over time
    - provide reliable estimates of changes in national and subnational estimates of the employed, unemployed, and NILF groups over time
    - collect and produce supporting information to describe, monitor, and explain the state of the labour market (for example, hours of work, status in employment, duration of unemployment, estimates of underutilisation)
    - collect and produce information about the structure and characteristics of the employed, unemployed, and NILF groups.
- Collect and produce information on topics relevant to labour market data, such as qualification levels and involvement in education and training. This may include regular and irregular modules covering labour market topics.

Output from the HLFS

Stats NZ produces quarterly information releases, approximately five weeks after the end of each quarter, on the levels of employment and unemployment, by national and subnational breakdowns. These releases include a set of standard tables that contain the following figures:

- people employed, unemployed, and not in the labour force – actual, seasonally adjusted, and trend
- total people employed, unemployed, and not in the labour force by age group, ethnic group, and regional council area
- people employed by sex, and industrial activity of place of employment
- people employed by sex and status in employment
- people employed full-time and part-time seasonally adjusted
- the underutilised
- total usual and actual hours worked
- people underemployed by sex
- people employed, unemployed, and not in the labour force by sex and formal study status
- people aged 15–24 years not in education, employment, or training (NEET)
- OECD rates of employment and unemployment alongside New Zealand rates.

In June quarters, we also produce tables on employment and underutilisation outcomes by disability status and weekly and hourly income from paid employment and government transfers. Since June 2024, the Labour market statistics (disability) release has been integrated into the national and income labour market releases to provide timelier data for disabled people. As part of this integration, the scope of disability statistics tables has been streamlined to align with other breakdowns, enhancing usability.

Demographic characteristics collected by the HLFS include age, sex, country of birth, ethnicity, educational attainment, and household members' relationships, which are used to derive family type. Labour-related characteristics include industry, occupation, status in employment, full-time/part-time employment status, characteristics of previous job, methods of looking for work, and reasons for not being in the labour force. Labour force status is compiled in accordance with the International Labour Organization's definitions (see the next section 'Key labour force definitions' for more details).

Key labour force definitions

Employment includes all individuals in the working-age population who did one of the following during the reference week:

- worked for pay or profit as part of an employee/employer relationship or self-employment
- worked without pay in work that contributed directly to the operation of a farm, business, or professional practice owned or operated by a relative
- had a job but were not working due to illness or injury, personal or family responsibilities, bad weather or mechanical breakdown, direct involvement in industrial dispute, leave, or holiday.

Unemployment includes all individuals in the working-age population who, during the reference week, were not employed, were available for work, and:

- had actively sought work in the past four weeks ending with the reference week (only looking at job advertisements does not count as active seeking) or
- had a new job to start within four weeks.

Not in the labour force (NILF) refers to individuals in the working-age population who are neither employed nor unemployed (as defined above). This category includes people who:

- are retired
- have personal or family responsibilities, such as unpaid housework or childcare
- are attending educational institutions
- are permanently unable to work due to sickness, injury, or disability
- are temporarily unavailable for work in the survey reference week
- are not actively seeking work.

Labour underutilisation refers to mismatches between labour supply and demand, resulting in unmet employment needs among the population. The HLFS measure of underutilisation includes those unemployed, underemployed, and in the potential labour force.

Potential labour force refers to:

- available jobseekers – people who are jobless, not actively seeking work, but are available and want a job
- unavailable jobseekers – people who are jobless, actively seeking work, but not currently available to start work, although they will be available in the next four weeks.

People in the potential labour force are classified as NILF but are considered closer to the labour force than those NILF who are neither actively seeking nor available to work.

Underemployment refers to individuals who are in part-time employment (working fewer than 30 hours a week) who would like to, and are available to, work more hours.

Scope and coverage

This chapter outlines the target and survey populations for the HLFS and provides guidelines for determining usual residence.

Target population

The target population encompasses the entire group from which we would ideally like to get information. The target population for the HLFS is the working-age population of New Zealand, defined as “the non-institutionalised population 15 years and over, who usually live in New Zealand”.

The target population **excludes**:

- people who have been living in New Zealand for less than 12 months and do not intend to stay in New Zealand for a total of 12 months or more
- long-term residents (six weeks or more) of rest homes, hospitals, and psychiatric institutions
- people in prison.

Survey population

The survey population comprises those within the target population who can be selected for the sample (that is, identified through the sampling frame). For practical and cost-related reasons, we apply further exclusions to the target population to create the survey population, from which we select the sample. These exclusions are a small percentage of the population and the resulting bias is minimal.

The survey population is the target population, excluding people who are:

- residing in non-private dwellings (for example, hotels, motels, hostels, or military camps)
- residing in non-permanent dwellings (for example, tents or caravans not permanently sited)
- residing at wharves or landing places (for example, ships or boats)
- residing on islands other than the North, South, and Waiheke islands (for example, Great Barrier, Kawau, Chatham, and Stewart islands).

Non-private dwellings

Dwellings are classified into two types: private and non-private.

Private dwellings are self-contained housing units not available for public use.

Non-private dwellings (NPDs) include hotels, motels and guest accommodation, residential and community care facilities, hospitals, educational institutions, and prisons.

The HLFS excludes NPDs from the survey population because:

- surveying NPDs is expensive
- sampling and non-sampling errors for NPDs were much larger (partly due to poor response rates) when surveyed before June 1995 compared with the error from modelling the data,

assuming the distribution of characteristics in the non-private sample is similar to that in the private sample.

An analysis in 2013 concluded that NPDs should remain excluded. Most NPDs house very few residents, so excluding them does not result in significant bias. Alternatively, NPDs with larger numbers of residents often include people who are only a small proportion of the people staying in these NPDs on any one night, making them costly to survey due to low eligibility.

For NPD types with a high number of residents and a larger proportion of usual residents (for example, educational institutions), the potential bias – assessed using 2013 Census data – was not large enough compared with the cost involved in surveying them, to warrant their inclusion in the HLFS sampling strategy. This decision remained unchanged after the 2018 Census.

Eurostat acknowledges the difficulties associated with sampling NPDs, stating that "for technical and methodological reasons… it is not possible in all countries to include the population living in collective households" (Eurostat, EU LFS Methods and Definitions 2001, p10). As a result, their requirement for labour force surveys is to provide results for private households only. Many labour force surveys run by European Union member states and by the United Kingdom exclude communal establishments.

The sampling frames used in the Australian, Canadian, and United States labour force surveys are designed to represent the civilian non-institutionalised population. In Australia, efforts are made to include some NPDs by using a list sample that includes hotels and motels. The United States labour force survey (Current Population Survey) also attempts to include such populations through a 'group quarter' stratum, which consists of housing units where residents share common facilities or receive formal care. In contrast, the Canadian sampling frame excludes persons living on reserves and other Aboriginal settlements in the provinces, full-time members of the Canadian Armed Forces, the institutionalised population, and households in extremely remote areas with very low population density.

Avoiding double-counting

The HLFS surveys all people at a selected dwelling who consider themselves to usually reside there.

In some situations, a person may be unclear about their usual residence, particularly if they live at more than one dwelling. To address this, the HLFS follows specific usual residence guidelines to minimise the likelihood of double-counting people.

Usual residence guidelines

The following guidelines clarify where a person is considered to usually reside if they are unable to decide for themselves.

- People who are overseas for more than six months, or plan to be overseas for more than six months, do not usually reside at the surveyed dwelling.
- People temporarily staying at the surveyed dwelling (less than six months) do not usually reside at the surveyed dwelling.
- People who spend equal amounts of time residing at different addresses usually reside at the surveyed dwelling.

- Dependent children in shared care usually reside at the place where they spend most nights. If they spend equal amounts of time at each residence, they usually reside at the surveyed dwelling.
- Dependent children who board at another residence to attend primary or secondary school usually reside at the dwelling of their parents/guardians.
- Tertiary students usually reside at the address where they live while studying. If they give up their residence during holidays and return to their family home, they are considered to reside at the family home over the period.
- If a person cannot decide where they usually reside, they are considered to reside at the surveyed dwelling.

HLFS sample design

This chapter outlines the sample design for the most recently selected HLFS sample first introduced in the December 2020 quarter.

Previous sample designs were established in 1986, 1991, 1996, 2003, and 2016. See Changes affecting data comparability over time for the main changes from the different sample designs.

The HLFS sample uses a stratified design with two stages of clustering: 1) a random sample of primary sampling units (PSUs) is selected from each stratum (first stage); 2) a systematic sample of households is selected from each PSU (second stage). Every person aged 15 years and over in selected households is eligible for the survey (see Scope and coverage for exceptions).

PSUs are aggregations of one or more meshblocks, which are the smallest geographical area units in New Zealand.

After each census held every five years, Stats NZ redesigns the samples for its household surveys to take new information from the census into account. The sample redesign in 2020 was based on new information from the 2018 Census of Population and Dwellings and updated Statistical Standard for Geographic Areas. Stats NZ also introduced stratification by the New Zealand Deprivation Index, 2018 (NZDep2018), replacing NZDep2013.

The phase-in of the new HLFS design began in the December 2020 quarter, where one-eighth of the new sample was introduced each quarter as the new rotation group. The redesigned sample was fully in place by the September 2022 quarter.

Size and allocation to strata

Sample size

The HLFS aims to interview 15,000 households, which equates to about 30,000 individuals. Each quarter, one-eighth of the households in the sample are replaced by a new set of households. This means up to seven-eighths of the same people are surveyed in adjacent quarters. This overlap improves the reliability of quarterly change estimates.

To achieve the target of 15,000 interviewed households, we selected a sample of 23,174 total private dwellings (including occupied, under-construction, and vacant private dwellings) from about 2.1 million private dwellings in New Zealand for the December 2023 quarter. We selected 1,768 PSUs with an average of approximately 12 occupied or under-construction private dwellings per PSU. The selected PSUs are used for both the HLFS and the General Social Survey (GSS) (see Panels for further discussion).

Note: While the GSS uses the PSUs selected for the HLFS, it selects a subset of these and has its own sample design.

Stratification

Stratification is the process of dividing the population (or survey frame) into homogeneous subgroups before sampling. It is used for two purposes:

- to reduce sampling errors for survey estimates and to ensure sample sizes for strata are the expected size

- to target subgroups by disproportionate sampling (or over-sampling) of certain strata.

Stratification for the new HLFS sample design includes five dimensions. PSUs are stratified by region, urban/rural status, a high-NILF (not in the labour force) status, groups based on New Zealand deprivation index values, and territorial authority (in that order).

The first four dimensions are explicit, or primary, strata (that is, the sample is split by these groups and a random sample selected from each group). The final dimension is implicit (PSUs are sorted by territorial authority within the primary strata and selected from the ordered list).

Region

This stratification dimension or layer has 12 regions, with Gisborne and Hawke's Bay forming one combined region, and the West Coast, Marlborough, Nelson, and Tasman combined into one region. We use the same regions for disseminating the survey estimates. Regions are used as the first layer in the stratification hierarchy to ensure the sample's representativeness for regions, as regional estimates are a high priority for the HLFS.

Urban and rural PSUs

The next layer of stratification is used to reduce fieldwork costs. Time and mileage data suggests that urban PSUs are less expensive to survey than rural PSUs. Incorporating this layer into the stratification hierarchy, combined with disproportionate allocation (discussed below), results in cost savings for the HLFS.

Strata are formed based on main urban areas, using the urban/rural profile (experimental) classification categories. We apply this classification at the meshblock level. If a PSU is made up of more than one meshblock, we use the modal urban/rural classification. If a meshblock in a PSU is classified as highly rural or remote, the PSU is classed as rural for the stratification.

Before 2014, a PSU was assigned as urban if most of its corresponding meshblocks were urban (main urban, secondary urban or minor urban). Since 2018, the Statistical Standard for Geographical Area 2018 changed how urban and rural areas were classified. Urban areas are now smaller in area and population relative to the previous classification as they no longer include a commuting zone. This means some areas on the outskirts of major cities, which were main urban areas in 2014, are now defined as rural.

A PSU is defined as urban if majority of the meshblocks are defined as either major urban or large urban, or at least one MB is defined as major urban. If there is a tie, the PSU is urban. All other PSUs are defined as rural, although it is important to note that these rural PSUs may contain medium and small urban areas.

NILF strata

Within region and urban/rural classifications, we divide PSUs into two groups based on the percentage of individuals within the PSU who were not in the labour force (NILF) in the 2018 Census. Including this stratum improved variances for estimates of NILF, employed, and income.

PSUs with a density of NILF individuals greater than or equal to the 75th percentile (based on all PSUs in the population, approximately 35 percent) are placed in the 'high NILF' stratum. If splitting by low/high NILF density results in a stratum with fewer than 100 PSUs (within region and urban/rural classification), the strata formed by region and urban/rural classification are not split further by NILF density.

New Zealand Deprivation Index

Finally, strata are further split into groups based on New Zealand Socioeconomic Deprivation Index (NZDep) values. As with the NILF strata, including a socio-economic stratum is beneficial for the sampling errors of labour market estimates, as area deprivation strongly correlates with labour market measures. Ensuring the sample has the correct area deprivation profile reduces sampling variance in the estimates. NZDep is calculated by the University of Otago at the meshblock level.

For stratifying PSUs, we used the mean NZDep value where a PSU contains more than one meshblock. Superstrata (region by urban/rural status by high/low NILF status) are split equally based on NZDep2018 values, with a maximum of 10 groups and a target size of 200 PSUs in each stratum. If this results in fewer than 100 PSUs in any stratum, the superstrata are not split.

Appendix table 1 shows the number of PSUs in each stratum.

Territorial authority

Producing estimates for territorial authorities (TAs) is a priority for the HLFS. However, New Zealand has 68 TAs, and explicitly stratifying by this many categories would be problematic due to the small number of PSUs in some TAs. Forcing a selection in each TA would result in a large variation of selection weights, increasing the sampling errors for national and other aggregate estimates.

Instead, we only implicitly stratify by this variable. That is, within the strata defined in Appendix table 1 (region by urban/rural status, by NILF status, by NZDep groups), PSUs are ordered by TA. We then select a systematic sample from the ordered list. This approach results in a high, although not certain, probability that at least one PSU from each TA will be selected. For the new sample we obtained at least one PSU from each TA.

Allocating PSUs to strata

Region

Any disproportionate sampling by stratum increases the sampling errors of national and cross-strata estimates (for example, age by sex breakdowns). Therefore, the sampling fraction in each region is proportional to that of the total population. That is, the number of PSUs selected from stratum h was:

$$n_h = n\frac{N_h}{\sum N_h}$$

where n is the total number of PSUs to select, and Nh is the total number of PSUs in stratum h.

Table 1 shows the population proportion per region and the number of PSUs selected per region. Note that the number of PSUs selected in each region slightly differs from that implied by the population proportions, due to allocation to other stratum layers and the overlap control methodology. (See Overlap control for details).

Table 1

Total number and number of PSUs selected per region				
Region	Total number of PSUs	Percentage of total population	Number of PSUs selected	Percentage of sample
Northland	876	3.8	67	3.8
Auckland	6,960	30.0	531	30.0
Waikato	2,253	9.7	172	9.7
Bay of Plenty	1,520	6.6	116	6.6
Gisborne/Hawke's Bay	1,089	4.7	83	4.7
Taranaki	647	2.8	49	2.8
Manawatū-Whanganui	1,296	5.6	99	5.6
Wellington	2,580	11.1	197	11.1
Tasman/Marlborough/Nelson/West Coast	995	4.3	76	4.3
Canterbury	3,179	13.7	242	13.7
Otago	1,213	5.2	93	5.3
Southland	566	2.4	43	2.4
NATIONAL	**23,174**	**100**	**1,768**	**100**
Source: Stats NZ				

Urban and rural PSUs

While any disproportionate sampling does affect sampling variances, it can also enable cost savings if we identify areas that are more expensive for fieldwork. For the HLFS, we found that main urban areas are cheaper for fieldwork than other areas, so they are over-sampled relative to their actual proportion in the population. That is, they are over-sampled such that:

$$\frac{n_{urban}}{N_{urban}} = 1.4\frac{n_{rural}}{N_{rural}}$$

Where 'urban' refers to PSUs that are classified as being in main urban areas.

Table 2 shows the total population of PSUs by main urban/other classification, and the resulting sample sizes in each stratum.

Table 2

Total number and type of PSUs selected by urban/rural classification			
Urban/rural classification	Total number of PSUs	Percentage of total population	Number of PSUs selected
Main urban area	14,790	63.8	1,242
Other	8,384	36.2	526
Source: Stats NZ			

Not in the labour force strata

Proportional allocation is also applied to NILF strata. Within each region and urban/rural classification, we divide PSUs into two groups based on the percentage of individuals within the PSU not in the labour force (NILF) in the 2018 Census. PSUs with a density of NILF individuals greater than or equal to the 75th percentile (based on all PSUS in the population) are placed in the 'high NILF' stratum. For the 2018 PSUs, the 75th percentile for the density of NILF was 0.35. In the 2014 design the cut-off was 0.36. So, if the proportion of NILF within a PSU was greater than or equal to 0.35 it was placed in the 'high NILF' stratum. If splitting by low/high NILF density resulted in any stratum containing fewer than 100 PSUs (within region and urban/rural classification) then the stratum was not split.

Proportional allocation is implemented for the NILF strata using the following ratio:

$$n_{h3} = n_{h2} \frac{N_{h2}}{\sum N_{h2}}$$

Where n_{h2} is the number of PSUs to select for the given region x urban/rural strata, n_{h3} is the number of PSUs to select in the region x urban/rural x NILF strata (the third level of stratification), and N_{h2} is the total number of PSUs in the given region by stratum. The denominator, $\sum N_{h2}$, is only summed over the two PSU totals for the high and low NILF strata within the given region x urban/rural stratum.

The resulting sample sizes in each stratum are in table 3.

Table 3

Total number and number of PSUs selected by NILF strata

NILF stratum	Total number of PSUs	Percentage of total population	Number of PSUs selected
Low NILF	16,258	70.2	1,235
High NILF	5,791	25.0	432
Not split	1,125	4.9	101

Source: Stats NZ

New Zealand Deprivation Index

We use Neyman allocation to the NZDep strata, based on unemployment. This method allocates the sample to strata based on the strata variances and similar sampling costs in the strata. A Neyman allocation scheme provides the most precision for estimating a population mean given a fixed total sample size. Neyman allocation assigns sample units (PSUs) within each stratum, proportional to the product of the population stratum size (Nh) and the within-stratum standard deviation (Sh), so we can achieve minimum variance for the population mean estimator. The sample size in any stratum is worked out according to the following equation:

$$n_{h4} = n_{h3} \frac{N_{h4} S_{h4}}{\sum N_{h4} S_{h4}}$$

where $nh4$is the sample size for stratum h, n is the total sample size, Nh is the population size for stratum h, and Sh is the standard deviation of stratum h of the variable for which you are trying to maximise survey precision (in this case unemployment).

Using unemployment results in an over-sampling of more highly deprived areas, which in turn leads to a higher proportion of the achieved sample being Māori (improved Māori estimates being a key priority for the HLFS), alongside improving the precision of the unemployed estimate. Simulations indicated that sampling errors of national labour market estimates were not negatively affected by this slight disproportionate allocation. Appendix tables 2–13 show the combined final allocation.

Selecting PSUs and targeting Māori

Māori statistics are a key focus for the HLFS. Targeting Māori in the sample design ensures that estimates of sufficient quality can be produced to support policy analysis.

Within strata, we selected PSUs with probability proportional to size (PPS), replacing the simple random sampling of PSUs used in previous designs. The size measure combines the number of dwellings in the PSU with a targeting factor based on the density of Māori in the PSU:

$$s_{hk} = r_{hk}(\sqrt{0.02 + p_{hk}})$$

where rhk is the number of occupied or under-construction dwellings in PSU k of stratum h, and phk is the proportion of adults in the PSU that are Māori. This method increases the selection probability for PSUs with higher proportions of Māori adults. By over-sampling Māori, we increase the estimated proportion of Māori in our sample before accounting for non-response.

The optimal targeting factor for over-sampling Māori is the square root of the proportion of Māori adults in the PSU. Over-targeting Māori beyond this level increases weight variation, which offsets the increased number of Māori in the sample. The design effects for national estimates of NILF and employed with this level of targeting are estimated to be around 1.04–1.06. The design effect for unemployed is estimated to be unaffected, as areas with high Māori density tend to have higher unemployment, and therefore a higher variation in unemployment numbers.

Overlap control

Stats NZ selects PSUs for household surveys using the overlap control system. This system is designed to minimise the sample overlap – the proportion of selected PSUs common across surveys. Minimising overlap reduces respondent burden by limiting the number of respondents selected to take part in multiple surveys.

In any overlap control scheme, stratum size and stratum sampling fractions may make sample overlap unavoidable. In such a case it is desirable to have a scheme that minimises the extent of overlap as part of its normal operation. The overlap control we use implements the conditional sampling methods of Chowdhury et al (2000), and Bell (2011), fusing the main ideas from these two methods, then extending the system to deal with frame reformation (changing the PSU boundaries), as in Lu (2012). This methodology allows us to share the household frame with other government departments, minimising overlap across organisations.

The overlap control system requires a list of PSUs, with each PSU's inclusion probability, stratum code, and TA code identified (see Territorial authority for details on why TA codes are included).

Sample rotation

Rotation groups

The HLFS is a rotating panel survey. This means that households are contacted a set number of times to take part in the survey before being replaced by new households. A staggered design is used, so that a fixed proportion of the sampled dwellings are rotated out of the survey each quarter and replaced by a new set.

The main reason for using a rotating panel design is that the precision of estimates of change over time are improved when there is overlap in the sample. That is, better estimates of quarter-on-quarter and quarter-on-same-quarter-a-year-ago change can be produced with this rotation pattern, since 70 percent or more of the sample is common in adjacent quarters. Another reason is that we can produce longitudinal datasets, which may be used for analysis of individuals' changing circumstances.

PSUs are sorted by strata, and then randomly within strata, before being assigned systematically to one of eight rotation groups.

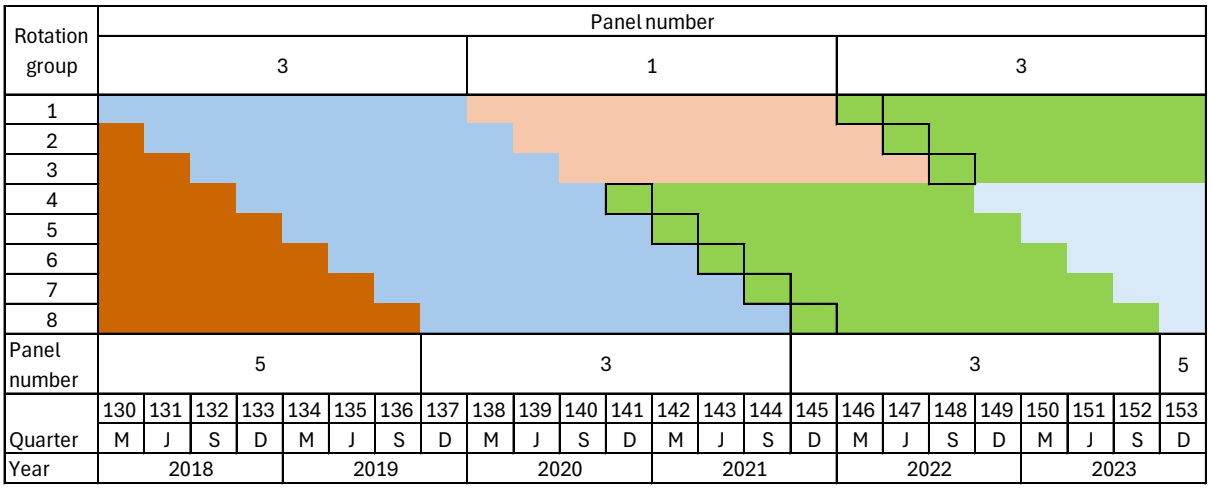
Each quarter, we replace one-eighth of the sample, or one rotation group, with a new panel of dwellings from the same PSU. At the end of any quarter, one rotation group will have been in the survey for one quarter, another for two quarters, another for three quarters, and so on. The last rotation group will have been in the survey for its eighth and final quarter. Thus, there is always an overlap of seven-eighths of the sample from one survey quarter to the next. This improves the quarterly estimates of change in the labour market.

We emphasise that it is the address (dwelling), not the particular people who live there, that is selected for eight quarters. Therefore, it is possible that while a certain address has been in the sample for more than one quarter, the people interviewed at that address may be in the sample for the first time. It is also possible for people to drop out of the sample before their eighth quarter if they move home.

Figure 1 shows the transition to the new sample. The first rotation group used in the new sample was rotation group 4 in quarter 141 (December 2020), with panel number 3 of the new sample being introduced first. This was followed by panel numbers 5 and 1. By quarter 148 (September 2022) the sample in-field was made up entirely of the new sample of PSUs.

Figure 1

HLFS rotation groups



Panels

After selection, all dwellings within the selected PSUs are enumerated. This involves interviewers visiting PSUs to create an up-to-date listing of dwellings (see Enumeration for details). These dwellings are then systematically allocated to groups (panels), based on PSU size and the total number of dwellings required. Ideally, a PPS selection of PSUs would involve taking panels of equal size across PSUs to achieve an equal selection probability design. However, an exception is made for Māori, who we over sample.

To support both the HLFS and GSS, we require that each PSU is divided into at least five full panels (three for the HLFS and two for the GSS). This is at odds with the requirement that we draw a fixed number of dwellings per PSU, since a good number of PSUs are too small.

Note**:** The number of dwellings drawn from each PSU is determined by the number of occupied or under-construction dwellings. PSUs with large numbers of vacant dwellings will yield greater numbers of dwellings in total. The expected (pre-enumeration) average number of dwellings per panel is 11.74 (occupied or under-construction dwellings).

Dwellings within panels are geographically spread across a PSU. Each panel is surveyed for eight quarters before being replaced by another panel for the next eight quarters. When a panel is replaced, it is never replaced by a neighbouring panel. This ensures that we are not replacing the current set of respondents with their next-door neighbours.

Sample reselection

Following a census, it is usual to reform the set of PSUs that comprise the sampling frame. Reformation is the aggregation of meshblocks to form PSUs. Reformation ensures PSUs are balanced in size as much as possible. PSUs can grow substantially over time, and reformation provides an opportunity to deal with those that have grown too large or become too small.

Following reformation, a new sample of PSUs is usually selected for the HLFS from the updated sampling frame. This avoids reusing panels and provides an opportunity to improve the sample by using the reformed PSUs and the new sample design, which can improve the precision of survey estimates.

Collection methodology

This chapter explains the collection methodology of the HLFS, including the questionnaires used, collection modes, and enumeration of PSUs.

Questionnaires

The HLFS has two separate questionnaires –- a household questionnaire and a personal questionnaire. One household member is interviewed for the household questionnaire. This questionnaire collects relationship information of everyone in the household and determines eligibility for the personal questionnaire. Flow charts for the current questionnaire are available at Stats NZ Store House.

Stats NZ manages questionnaire content in consultation with key external customers. The current questionnaire (with modified and additional content), introduced in the June 2016 quarter, includes questions on working from home and job security added in the June 2020 quarter.

Prior to the introduction of the current questionnaire, we appended supplementary survey topics to the HLFS personal questionnaire in some quarters. The New Zealand Income Survey was appended annually each June quarter. See Table 7: Supplements to the HLFS for details of other supplementary survey topics previously appended to the HLFS main interview.

In the current questionnaire, supplementary survey topics are embedded within the questionnaire to allow for a more seamless experience for respondents, and to avoid asking the same questions more than once. Income content (replacing the New Zealand Income Survey) was included in the June 2016 quarter and disability questions in the June 2017 quarter.

The HLFS allows interviewers to take responses from proxies if a respondent is unavailable or unable to answer the questions themselves. A proxy can be any other eligible adult in the household. See Proxies for the frequency of proxy responses. Proxy rules also apply to supplementary content embedded in the questionnaire. However, some non-proxy supplements, such as the Survey of Working Life 2018 and the COVID Wellbeing supplement 2020–2021, did not allow proxies. In the past, supplementary content used separate proxy rules.

Households consisting entirely of people aged 75 and over are interviewed only in their first quarter of participation in the survey (and in June quarters). See Estimation and imputation for more details.

Collection modes

Interviews are conducted face-to-face using computer-assisted personal interviewing (CAPI) for most first interviews. Most respondents are then interviewed for their second and subsequent interviews by telephone using computer-assisted telephone interviewing (CATI), although respondents can request CAPI mode if they prefer.

Telephone interviews were previously conducted by interviewers from our centralised telephone unit in Auckland, while face-to-face interviewers visited respondents at home. However, during the COVID-19 pandemic, face-to-face interviews were not possible, and telephone interviews were conducted from interviewers' homes.

Interviewers, whether conducting telephone or face-to-face interviews, are employed by Stats NZ and also work on other household surveys, including the consumers price index.

The questionnaires we use for face-to-face and telephone interviewing are almost identical. They are produced using the BLAISE CAI software package created by Statistics Netherlands.

Before the introduction of the current questionnaire in the June 2016 quarter, respondents also had the option of a paper self-completion questionnaire. As part of the non-response follow-up process, we sent paper self-completion questionnaires automatically to households if no response was received within the week the case was assigned for fieldwork. Since the June 2016 quarter, paper self-completion questionnaires are no longer produced.

Interviews are conducted over a quarter in one-week periods starting on a Sunday. Most questions relate to the week before the interview, known as the 'reference week'. Before the interview, we send a pre-notification letter (PNL) to every address in the selected sample, explaining that their address has been selected for the HLFS and informing respondents that an interviewer will be calling. The PNL assures respondents their information will be kept secure and confidential and provides answers to frequently asked questions.

Enumeration

When a new sample of PSUs is selected, interviewers traditionally visit those PSUs before we select the sample of dwellings within those PSUs, to create an up-to-date listing of dwellings. We call this process pre-enumeration.

Once this has occurred, each PSU is periodically 'check-enumerated' by an interviewer to ensure the dwellings list is up to date. For the HLFS, this occurs every two years in each PSU when a new rotation group of dwellings is selected into the sample.

Pre-enumeration

We identify the PSUs where the quality of the New Zealand Address Dataset (NZAD) listing is expected to be high enough that no pre-enumeration is required.

The general methodology involves:

- looking at how well NZAD compares with census counts and enumeration counts from the HLFS stored on the Household Survey Frame
- within the HLFS PSUs, matching addresses between the HLFS enumeration and NZAD to check they refer to the same addresses.

Over time, the comparison between NZAD and census counts loses relevance. We identify areas (using building consents) where growth has occurred and look to see if this growth is also captured by New Zealand Post. If not, the PSU should be pre-enumerated. This mirrors the strategy that has been developed for ongoing check enumeration.

Additionally, pre-enumeration only occurs in PSUs that are within 20 kilometres of the closest interviewer. For PSUs outside this range, we use in-office enumeration to clean NPAD address listings, which are used for the initial selection of dwellings. This listing is supplemented in the first quarter of interviewing by a check-enumeration.

Check-enumeration

For the new sample, instead of check-enumerating all PSUs, a subset of PSUs is identified to check-enumerate based on changes to NZAD and/or building consent data. The NZAD data is also used to

provide an initial listing of addresses reducing the need for interviewers to start from scratch. Geospatial methods are used to automate the production of map images, and to order the NZAD listing in a way that is sensible for interviewers to traverse the PSUs during enumeration.

Coding and processing the data

This chapter explains the editing and coding processes used in the HLFS and provides a list of variables in the dataset.

Edit checks

Editing aims to ensure that collected data meets certain quality requirements. This includes:

- providing internal consistency
- improving the validity of the findings
- reducing non-sampling errors.

Since the introduction of computer assisted interviewing (CAI) over 2005 and 2006, we perform edit checks for the HLFS as data is entered. Edit checks, including range and consistency checks, are programmed into the electronic questionnaire, and are triggered by set rules as the interviewer enters responses.

Range checks involve checking that answers to questions are within a specified range. If the respondent's answer is outside this range, the interviewer can tell immediately that there is a mistake. For example, in 2023 the date-of-birth question may have a specified range of 1913–2023. This assumes no one in New Zealand is over 110 years old.

Consistency checks involve checking the relationship between a set of answers. For example, if a person's age is 14 years, based on the date supplied, but they are identified in a parent role to a 35-year-old household member in the relationship table, this would trigger an edit.

Questionnaire edits can be classified as 'hard edits' or 'soft edits'. We use **hard edits** only where it can be identified that the response is definitely an error. For example, a person's date of birth cannot be in the future. An interviewer cannot move past a hard edit. **Soft edits** indicate to the interviewer that a response may be an error, but these can be suppressed and moved past by the interviewer.

Post-collection editing of income content is also carried out in June quarters. Outliers are examined for income from wage and salary, self-employment, superannuation, WINZ, student allowance, and IRD, and hourly earnings for wages and salaries. If the data entered is clearly wrong (using other information collected in the survey) then the value is edited to improve data quality overall.

Coding

The HLFS collects information about a person's current or previous employer, and current or previous job characteristics. We use this information to create statistics about industry and occupation by coding the person's response to standard classifications. Country of birth is coded to the 1999 New Zealand Standard Classification at interview time. In addition, we perform some coding of ethnicity data in the HLFS (where a person indicates an 'other' ethnic group and gives further detail), and a small amount of qualification data is coded. From the June 2016 quarter onwards, the following variables are also coded where there are any text responses provided in the 'other – please state' category in the questionnaire:

- methods used to find work
- main activity of those not in the labour force

- main reason respondent was away from work in reference week
- main reason respondent worked fewer hours in main job
- main reason respondent worked fewer hours in second job
- main reason respondent worked fewer hours in other job(s)
- main reason respondent was not looking for work
- main reason respondent does not want a job
- main reason respondent was not available for work in the reference week
- main reason respondent left their last job
- main reason respondent who wants more hours is not working more hours
- methods used to get more hours of work.

Since the September 2016 quarter, the HLFS also makes use of rolling-over coded data from previous quarters. This means that more use is made of data from a previous quarter for the current quarter's interview. For example, we can confirm that a person's job or qualifications have not changed since the last time we spoke to them. For coding this means that we can use or 'rollover' the coded value from the previous quarter's interview rather than send the information through to be manually coded again.

Industry

Information about a person's employer, such as name and address, is collected in the HLFS questionnaire along with a description of the main activity of the place in which the person works. We collect this for people who are currently employed, and for the previous employment spell for those not currently employed but who worked in the previous five years (in September quarters only). Where a person has more than one job, the information is collected for their main job and second job.

Since the September 2009 quarter, we have coded industry statistics in HLFS to the Australian and New Zealand Standard Industrial Classification 2006 V1.0.0 (ANZSIC06).

Occupation

We collect information about a person's tasks, duties, and job descriptions in their main job and second job (where applicable) for those who are currently employed, and previous employment spells for those not currently employed but had worked in the previous five years (in September quarters only).

Since the September 2009 quarter, we have coded occupation statistics to the Statistical Standard for Occupation V1.0.0.

Ethnicity

In the HLFS we collect ethnicity data about all household members. Respondents can report up to 14 ethnic groups. Where 'other' ethnic groups are given and further text description is supplied, we code the data using the Ethnicity New Zealand Standard Classification 2005 V2.1.0.

Variables available in the dataset

The following is a list and brief description of variables available in the HLFS datasets. Flow charts for the current questionnaire are available at the Stats NZ Store House.

Table 4

Variables available in the HLFS dataset	
Variable	**Description**
Household_code	Household identifier number
Person_code	Household_code followed by person number – unique number for each person within a household
Quarter	Survey quarter that the dataset relates to (eg 153 = December 2023 quarter)
HQStatusCode	Response status code for the household questionnaire
Week	Week of the quarter that the case is allocated to (1–13)
DVEStatus	Eligibility status – only those with an eligibility status of 'Eligible responding' are assigned a final weight
DVSex	Sex of person – collected for all household members
Sex_Imputed	Indicator to show whether DVSex has been imputed or not
Sex_Donor_ID	Person_code of the donor used for imputing DVSex
DVDOB	Date of birth
DVAge	Age of respondent held in single year format (calculated from date of birth, or age in years if date of birth is not provided)
DVAgeGp1	5-year age band (maximum category = 80+)
DVAgeGp2	Broad age bands (under 15, 15–29, 30+)
Age_Imputed	Indicates whether age has been imputed or not
Age_Donor_ID	Person_code of the donor used for imputing age
DVCOB	Country of birth
DVYrsInNZ	Number of years person has lived in New Zealand if born overseas
EthEuropean	Indicator of European ethnicity
EthMaori	Indicator of Māori ethnicity
EthPacific	Indicator of Pacific ethnicity
EthAsian	Indicator of Asian ethnicity
EthMELAA	Indicator of Middle Eastern/Latin American/African ethnicity
EthOther	Indicator of 'Other' ethnicity
DVEthnic	Combines the above six high level classifications above into a character string without any duplication
DVEth1-DVEth14	Ethnic group(s) individual identified with stored at level 4 of the Ethnicity New Zealand Standard Classification 2005
Ethnic_Imputed	Indicator to show that ethnicity has been imputed
Ethnic_Donor_ID	Person_code of the donor used for imputing ethnicity
DVDescent	Indicator of Māori descent
DVFamCode	Family group code identifies parents and children of different family nuclei, non-family members, and single-person households
NucleusNumber	Shows what family nucleus household members belong to (ie people with the same nucleus number belong to one family nucleus) – a household may contain more than one family nucleus
DVChildEmpStat	Indicates whether children aged 15–17 are employed full-time or not
DVFam_FamNucYN	Indicates whether the person is in a family nucleus or not
DVFam_NumInFamNuc	The number of people in a family nucleus
DVFam_WithPartner	Indicates whether the person is with a partner or not

Table 4 (continued)

DVFam_NumPartner	Number of people in a partner role within a family nucleus
DVFam_Parent Role	Indicates whether the person is in a parent role or not
DVFam_ChildRole	Indicates whether the person is in a child role or not
DVFam_NumChild	Number of children in the family nucleus
DVFam_DepStat	Dependency status of a child
DVFam_NumDepChild	Number of dependent children in a family nucleus
DVFam_NumIndepChild	Number of independent children in a family nucleus
DVFam_NumChildDepNK	Number of children of unknown dependency in a family nucleus
DVHHSize_code	Total number of people in the household
DVHHType	Household composition
DVHHTen	Indicator of whether the dwelling is owned or held in family t rust by any member of the household
DVHHOver75	Identifies households where all members are aged 75 years or over
DVRegCouncil	Regional council area
DVRegion	Region (combining Gisborne and Hawke's Bay, and Nelson/Tasman/Marlborough/West Coast regions) – these regions are used for weighting and final outputs
DVMeshblock	Meshblock 2018 classification
DVTA	Territorial Authority 2018
DVUrban	Urban/rural area status 2018
HQRespondent	Indicator showing if the person was the HQ respondent
PersonSource	Shows the 'source' of the person this quarter in relation to previous quarter (eg from dependant data, a new HQ respondent that has joined the household, or a new household member)
ShortTermVisitor	Indicates whether the person was identified as a 'short-term visitor' in New Zealand or not
AnyoneTempInNZ	Indicates whether someone in the household is not permanently living in New Zealand
HHRotatingIn	Indicator showing whether the household is rotating in this quarter
HHRotatingOut	Indicator showing whether the household is rotating out this quarter
RotnGrp	The rotation group that the household belongs to
RotnNum	The rotation number of the household (ie first quarter, second quarter, etc)
IncomeQtr	Indicates whether it is an income quarter or not
SeptQtr	Indicates whether it is a September quarter or not
Supplement Ind	Indicates whether the current quarter is a supplement quarter
Mode	The mode that the case was completed in (ie CATI or CAPI)
HQInterviewDate	Date the HQ interview took place
RefWeekStart Date	Start date of the reference week
RefWeekEndDate	End date of the reference week
StillHere	Indicates whether a person recorded in a previous quarter is still living in the same household
PQStatusCode	Response status code for the PQ
ProxyYN	Indicator to show if a proxy was used
ProxyWho	Person number of individual in the household who provided the proxy response
DVLFS	Labour force status of individuals aged 15 or over, see Output from the HLFS for the definition of labour force status
DVUnderUtilise	Underutilisation status of individual includes the unemployed labour force, the underemployed labour force, and the potential labour force
OwnBus	Indicates whether the respondent did any work in their own business last week
PaidJob	Indicates whether the respondent did any work in a paid job last week
FamBus	Indicates whether the respondent did any unpaid work in a family business last week

Table 4 (continued)

AwayAllJobs	Indicates whether the respondent was away from all types of work last week because of sickness, holidays, or some other reason
AwayOwnBus	Indicates whether the respondent was away from their own business last week
AwayPaidJob	Indicates whether the respondent was away from a paid job last week
AwayFamBus	Indicates whether the respondent was away from an unpaid job in a family business last week
WhyAway	Main reason why an employed person was away from all work last week
AwayOthJobs	Indicates whether the respondent has any other work that they were away from last week
AwayOthOwnBus	Indicates whether the other work the respondent was away from last week was their own business
AwayOthPaidJob	Indicates whether the other work the respondent was away from last week was a paid job
AwayOthFamBus	Indicates whether the other work the respondent was away from last week was an unpaid job in a family business
AwayOthNone	Indicates whether the other work the respondent was away from last week was not a business, paid job, or family business
HasOwnBus	Indicates whether the person has their own business
HasPaidJob	Indicates whether the person has a paid job
HasFamBusJob	Indicates whether the person has an unpaid job in a family business
WorkType	The type of work the respondent was doing or was away from in the reference week
DVMJH	Identifies people who had more than one job last week
OwnBusNum	Number of own businesses the respondent had last week
OwnBusNumNR	Indicator of a 'Don't know' or 'Refusal' response to the question asking number of businesses the respondent had last week
PaidJobNum	Number of paid jobs the respondent had last week
PaidJobNumNR	Indicator of a 'Don't know' or 'Refusal' response to the question asking number of paid jobs the respondent had last week
FamBusNum	Number of unpaid jobs in family businesses the respondent had last week
FamBusNumNR	Indicator of a 'Don't know' or 'Refusal' response to the question asking number of unpaid jobs in family businesses the respondent had last week
NumJobs	Total number of jobs the respondent had last week
DVEmpStat Main	Employment status in main job
DVOccMain	Occupation in which people are employed in their main job
DVIndMain	Industry in which people are employed in their main job
DVEmpStat Sec	Employment status in second job
DVOccSec	Occupation in which a holder of multiple jobs is employed in their second job
DVIndSec	Industry in which a holder of multiple jobs is employed in their second job
DVFTPT	Full-time/part-time status for those employed full-time employment is classified as usually working for 30 hours or more, part-time employment is usually working fewer than 30 hours per week
DVUHrMain	Hours usually worked each week in main job
DVUHrSec	Hours usually worked each week in second job
DVUHrOth	Hours usually worked each week in other job(s)
DVUHrTot	Hours usually worked each week in all jobs
UHr_Imputed	Indicator to show that usual hours have been imputed
UHr_donor	Person_code of the donor used for imputing usual hours
SameHrsMain	Whether respondent worked the same hours, more hours, or fewer hours than usual in main job last week
SameHrsSec	Whether respondent worked the same hours, more hours, or fewer hours than usual in second job last week

Table 4 (continued)

SameHrsOth	Whether respondent worked the same hours, more hours, or fewer hours than usual in other job(s) last week
DVAHrMain	Hours actually worked last week in main job
DVAHrSec	Hours actually worked last week in second job
DVAHrOth	Hours actually worked last week in other job
DVAHrTot	Hours actually worked last week in all jobs
AHr_Imputed	Indicator to show that actual hours have been imputed
Ahr_donor	Person_code of the donor used for imputing actual hours
ReasFewHrsMain	Main reason an employed person worked fewer hours than usual hours in their main job last week
ReasFewHrsSec	Main reason an employed person worked fewer hours than usual hours in their second job last week
ReasFewHrsOth	Main reason an employed person worked fewer hours than usual hours in their other job(s) last week
DVJobTenW	Number of weeks an employed person has been working for their current employer or in their current business or have been self-employed in their main job
DVJobTenC	Length of time (in categories) employed people have been working for their current employer or in their current business or have been self- employed in their main job
DVDaysWrkMain	Days of the week the respondent worked in their main job
DVDaysWrkSec	Days of the week the respondent worked in their second job
DVDaysWrkOth	Days of the week the respondent worked in their other job(s)
Union	Whether an employee belongs to a union in their main job
EmpAgreeYN	Whether the respondent had a written employment agreement in their main job
EmpAgreeType	Type of employment agreement the respondent had in their main job
DVEmpRel	Type of employment relationship employees have in their main job
PermJob	Whether the respondent's main job is a permanent job
FixedTerm	Whether the respondent is on a fixed-term contract in their main job
Project	Whether the respondent is working until a task or project is finished in their main job
TempReplace	Whether the respondent was hired to temporarily replace another worker in their main job
Agency	Whether the respondent is paid by or through an employment agency in their main job
Casual	Whether the respondent's main job is a casual job
Seasonal	Whether the respondent's main job is a seasonal job
PrefPerm	Whether a respondent holding a temporary, non-seasonal main job would prefer a permanent job
PrefSelfEmp	Whether a respondent who is self-employed in their main job would prefer to continue being self-employed or to have a paid job working for someone else
PrefOngoing	Whether a respondent who has a seasonal main job would prefer to continue in seasonal work or to get a job that is ongoing
PrefOwnBus	Whether a respondent who has their own business as their main job would prefer to continue in their own business or in a paid job working for someone else
DVUnderEmp	Identifies people who are in part-time employment, would prefer to work more hours, and would be able to do so within four weeks of the interview date
Want MoreHrs	Whether the respondent would like to work more hours than they usually do
HrsWanted	Number of hours a week those who would like more hours would like to work in total
WhyNot MoreHrs	Main reason an employed person worked fewer hours than they would like
DVMoreHrsLook	Whether the respondent looked at job advertisements in the last four weeks to try and get more hours of work
DVMoreHrsEmp	Whether the respondent asked their employer for extra hours in the last four weeks to try and get more hours of work

Table 4 (continued)

DVMoreHrsOthEmp	Whether the respondent asked another employer in the last four weeks to try and get more hours of work
DVMoreHrsEmpAg	Whether the respondent contacted an employment agency in the last four weeks to try and get more hours of work
DVMoreHrsRel	Whether the respondent contacted friends or relatives about a job in the last four weeks to try and get more hours of work
DVMoreHrsOther	Whether the respondent did something else in the last four weeks to try and get more hours of work
MoreHrsAvail	Whether the respondent could start working more hours in the next four weeks if more hours were available
DVNEET	Ten categories of labour force and education status, with three categories indicating those respondents who are not in employment, education, or training
JobToStart	Whether the respondent has a job to start in the next four weeks
LookForWork	Whether the respondent has been looking for paid work in the last four weeks
DVLook	Whether the respondent looked at job advertisements in the last four weeks to find work
DVContact Emp	Whether the respondent contacted an employer in the last four weeks to find work
DVContact EmpAg	Whether the respondent contacted an employment agency in the last four weeks to find work
DVContactWINZ	Whether the respondent contacted Work and Income in the last four weeks to find work
DVContactRel	Whether the respondent contacted friends or relatives in the last four weeks to find work
DVSetUpBus	Whether the respondent had taken steps to set up a business in the last four weeks
DVLookOther	Whether the respondent had done something else to find work in the last four weeks
LookFTPT	Whether the respondent had been looking for full-time or part-time work
LookFTPT_Imputed	Indicator to show whether looking for full-time or part-time work has been imputed or not
LookFTPT_donor	Person_code of the donor used for imputing looking for full-time or part-time work
AvailLastWk	Whether the respondent could have started work last week, if a job had been available
WhyNot Avail	The main reason the respondent was not available for work last week
Avail4Wks	Whether the respondent could start work in the next four weeks, if a job was available
HowLongLook	How long the respondent has been looking/looked for work
WksLookNum	The number of weeks the respondent has been looking/looked for work
MthsLookNum	The number of months the respondent has been looking /looked for work
YrsLookNum	The number of years the respondent has been looking/looked for work
DVDurUnemp	The length of time a respondent without employment has been looking for work
WantJob	Whether a respondent who is not currently looking for work, would like to have a paid job
WhyNot Job	Main reason the respondent does not want a job
WhyNot Look	Main reason the respondent did not look for a job
Retired	Whether the respondent was retired last week
IntendLook	Whether the respondent intended to look for work within the next two years
WhenLook	The time within which the respondent intends to look for work
DVTimeSinceWork	The length of time since the respondent last worked in a job or business
DVOccPrev	The occupation of the respondent in their last job
DVIndPrev	The industry of the last job held by the respondent
DVPrevEmpStat	The employment status of the last job held by people of working age who were not employed in the reference week, but have been employed within the last five years
WhyLeft	The main reason the respondent left their last job

Table 4 (continued)

DVMainAct	The main activity of the respondent in the reference week, for those respondents who were not in the labour force
SchoolYN	Whether the respondent was still at school
SchQualYN	Whether the respondent had a school qualification
DVSchQual	The highest secondary school qualification obtained by the respondent
DVPSQual1-DVPSQual20	All the formal post-school qualifications obtained by the respondent
DVQualYrs1-DVQualYrs20	The number of years since each post-school qualification was gained
DVHQual	Highest qualification of the respondent
DVStudy	The study status of the respondent
StudyYN	Whether the respondent was doing any study last week
DVInHHOver75	Whether the respondent is in a household where all in-scope members are aged 75 years or older
MJPSWAH_qAnyHrsAtHome	Whether the responded worked any hours at home in main job (if main job = paid job)
MJPSWAH_qAtHomeHrs	The number of hours worked at home (if main job = paid job)
MJPSWAH_qAtHomeHrsNR	The reason for not providing the number of hours worked at home (if main job = paid job)
MJPSWAH_qUsualWrkAtHome	Whether the respondent has always worked some hours from home (if main job = paid job)
MJBSWAH_qAnyHrsAtHome	Whether the responded worked any hours at home in main job (if main job = own business)
MJBSWAH_qAtHomeHrs	The number of hours worked at home (if main job = own business)
MJBSWAH_qAtHomeHrsNR	The reason for not providing the number of hours worked at home (if main job = own business)
MJBSWAH_qUsualWrkAtHome	Whether the respondent has always worked some hours from home (if main job = own business)
JSE_qJobSecurity	Whether there is a chance that the respondent could lose their job in the next 12 months, for a reason that is beyond their control
SelWgt	Selection weight of the household (used in the calculation of the final weight)
RespWgt	Non-response weight (not used in the calculation of the final weight)
Finalwgt	Final weight assigned to individual
Finalwgt_1- Finalwgt_100	Replicate weights (used to calculate sampling errors)

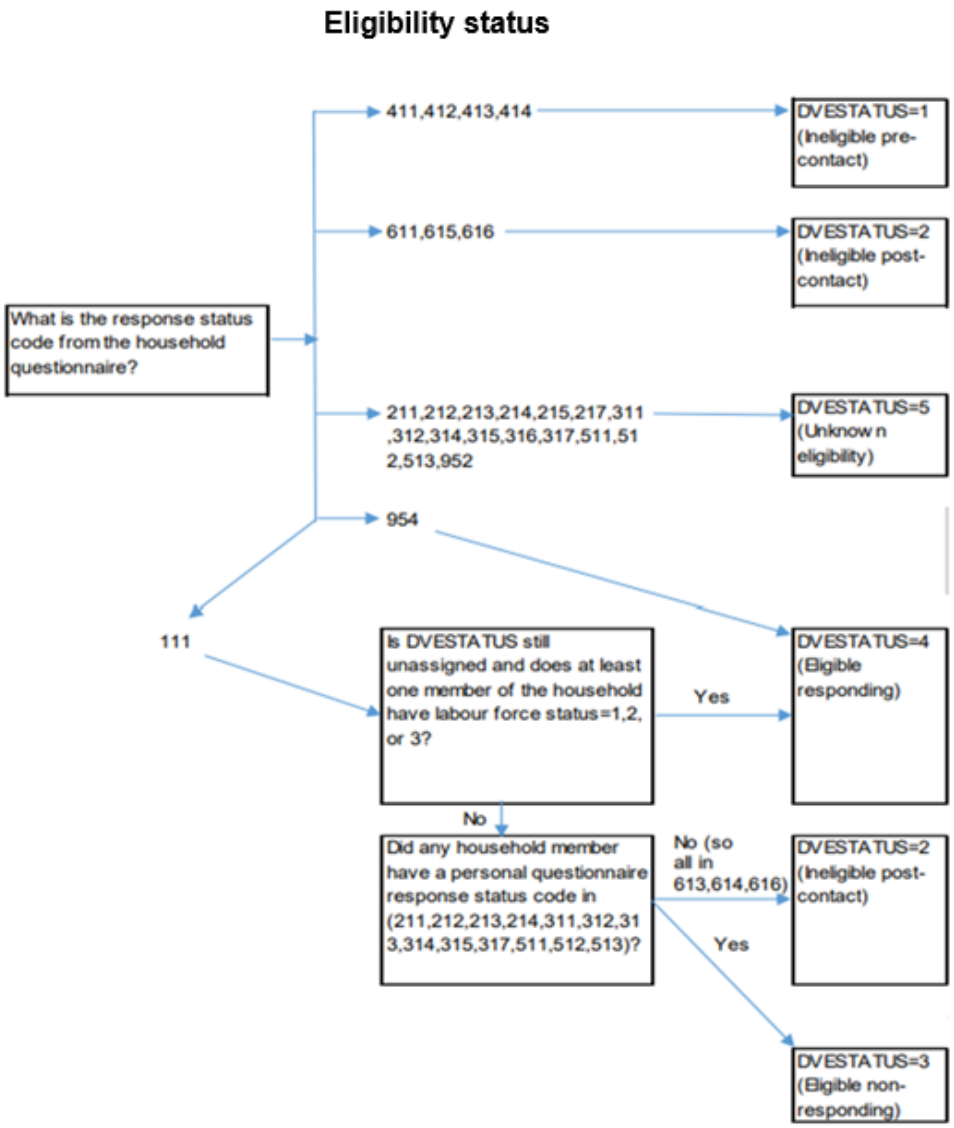
Estimation and imputation

This chapter outlines the HLFS estimation process, including assigning household eligibility, weighting households for selection, addressing non-response and undercoverage, imputing missing responses, time series estimation, and the data suppression and rounding procedures used in information releases.

Assigning eligibility

We assign each dwelling selected for the HLFS one of five eligibility statuses (see table 14 in Appendix 2) derived from the household and personal questionnaire data. A dwelling is classified as eligible if it has at least one eligible member. Eligibility status (DVEStatus) is derived from labour force status, household response status code, and personal response status code (see tables 15–17 in Appendix 2). This is represented diagrammatically by figure 2.

Figure 2



Weighting

Sample selection weights

The HLFS collects information from a sample of the population. To infer results from this sample to the entire population we must assign each responding individual a weight, which represents the number of people in the population that the individual represents.

PSU selection weight

The first stage of weighting is the selection weight (also called a design weight). The overall selection weight for a household is made up of the PSU selection weight and the household selection weight. We calculate the selection weight for each PSU as the inverse of the probability of selection, so PSUs with a lower probability of selection receive a higher selection weight. Within strata, PSUs are selected with probability proportional to size. This means that larger PSUs have a higher probability of being selected. See Appendix 3 for more details.

One consequence of introducing a new sample is that during the transition there are effectively two independent samples in operation. To account for this, we employ a transition factor, which we multiply the PSU weights by. See Appendix 3 for details.

Household selection weight

We next multiply the PSU selection weight by a household selection weight to give the overall selection weight. The household selection weight accounts for the sampling of households within PSUs. We calculate it as the inverse of the selection probability, where the selection probability is the number of selected addresses in the PSU divided by the total number of addresses in the PSU. See Appendix 3 for details on the number of selected addresses in each PSU.

Non-response adjustment

We can modify the design weight by non-response factors to account for some subgroups being less likely to respond than others. There are various strategies for doing this, including adjustment cell reweighting, propensity score reweighting, and calibration.

Before we introduced a regional benchmark (see Calibration), the HLFS employed a cell adjustment technique, where the cells were based on region and month. That is, within each region-by-month group (or cell), we multiplied the design weight by a rate-up factor to adjust for people who do not respond to the HLFS. The rate-up factor was based on the inverse of the weighted response rate within that group. That is, within each cell, we inflated the weights of respondents to account for the non-respondents.

However, with the introduction of the regional benchmark, this step became redundant. Therefore, we no longer include a non-response adjustment stage within the weighting schema. However, calibration also adjusts for non-response (along with undercoverage) and is included in the weighting for the HLFS.

Calibration

The final stage of weighting for the HLFS is the calibration to benchmarks (auxiliary information), which are the expected counts of people in the total target population. This adjusts for

undercoverage of the target population and undercounting of some groups in the population due to differential response rates. We set the calibration weights to sum to a set of benchmarks.

We use a form of calibration known as 'integrated weighting'. This ensures that all individuals in the same household have the same weight, and that household statistics derived from person-level data match the same statistic calculated directly from household-level data. See Appendix 3 for more details on the calibration methodology.

The benchmarks we use for the HLFS are five-year age groups by sex, the number of Māori adults by sex by two age groups (age 15–29 and 30+), and 12 regions. These benchmarks are based on the national 'estimated resident population' adjusted to be consistent with the scope of the HLFS. Integrated weighting is used during calibration to assign a weight to each individual in the sample. Every individual in a sampled household is given the same weight, which matches the household weight. This allows the production of household estimates which are consistent with person estimates.

After each census, we revise the population estimates, and the historical HLFS data is reweighted to these updated population totals. Reweighting (or rebasing) exercises give the opportunity to use the most up-to-date population estimates within HLFS weighting. We recalibrate historical data, which was initially weighted to population estimates, to the newly available revised population estimates.

Imputation

Imputation is the process of imputing values for missing responses in survey questionnaires.

We impute for people in eligible responding dwellings with missing values for their sex, age, ethnicity, full-time or part-time work status, and usual and actual hours worked in all jobs. If full-time and part-time seeking status is missing for unemployed people, we use donor imputation. However, this is not possible for those who reported starting work in the next four weeks, so there are some unemployed people excluded from the total labour force count. This discrepancy results in the total labour force figure in the 'employed persons, full-time and part-time by sex' series to differ from the 'labour force status by sex by age' series.

Before the redevelopment, imputation covered all unemployed people for full-time / part-time seeking status. Not being able to do this anymore resulted in a break in the series. We acknowledge the difference in definition, but the effect on the estimates is so small that we find it acceptable to keep a single time series. We have not backdated this data to meet with the current definition. We therefore recommend using the 'labour force status by sex by age' series for the official number of people in the labour force.

In June quarters, we also impute income from jobs (main and second, where income from jobs includes wages and salaries, self-employment, and business income), and income from government transfers (for example, from Inland Revenue, Work and Income, ACC, and Student Allowance) and superannuation.

All variables are imputed using nearest-neighbour donor imputation using the Canadian Census Editing and Imputation System (CANCEIS). A donor is selected by finding a respondent with similar values to the recipient on some set of matching variables, where these matching variables are correlated to the missing values. An investigation was carried out to determine appropriate matching variables for age, ethnicity, and hours imputation. In June quarters, the same donor is used for hours and income, and if income is imputed where hours were reported (and vice versa), the hours variables in the income module are overwritten using donor values (or income is overwritten

where income was reported and hours were not), to maintain consistency for hourly earnings. Additional matching variables are used for hours and income imputation in June quarters.

The most important reason for imputation is to prevent the loss of data where possible. Records with missing values should not be ignored. Consistent bias could come from certain types of respondents who are difficult to collect data from. Assigning values at the micro-level allows us to conduct analysis as if the dataset were complete. Imputation aims to produce distributions that reflect as near as possible the distributions of the total population, but it does have the potential to distort the data or introduce additional biases.

We use another form of imputation for people aged 75 and over (75+). If a household has only people aged 75+ when interviewed in its first quarter of participation, then we do not interview respondents in subsequent quarters. Instead, their current quarter responses are imputed by carrying over the data from their most recent interview. The exception to this is quarters where we also collect income and disability data (June quarters) or other additional information that requires the re-interviewing of 75+ households. In these quarters, 75+ households are again interviewed, and we use this data for imputation in subsequent quarters.

This approach reduces costs and respondent burden while estimates remain largely unchanged, as the labour force status of people aged 75+ tends to be relatively stable. These households make up approximately 9 percent of the first-time-in rotation group.

Time-series estimates

Many time series have a recurring seasonal pattern that can obscure the underlying behaviour of the series. Seasonal adjustment is the process of estimating and removing the varying seasonal effects from a time series to reveal non-seasonal features, making the underlying movements in the time series more visible.

We seasonally adjust these series in the HLFS:

- people employed, unemployed, and not in the labour force, by sex
- employment rate, labour force participation rate, and unemployment rate, by sex
- levels and rates of underutilisation, including unemployment, underemployment and the potential labour force, by sex
- levels and quarterly and annual changes of people employed, unemployed, and not in the labour force, full-time and part-time work, and total actual and usual hours worked
- labour force and education status of those aged 15–24 years (including those not in employment, education, or training).

Seasonal adjustment is produced using the X-13ARIMA-SEATS Version 1.1 package developed by the U.S. Census Bureau. This process is applied to both the latest and all previous quarters each time. This means that seasonally adjusted estimates for earlier quarters may be revised slightly.

In some cases, two or more time series make up a composite time series. For example, in the HLFS, the sum of male employed and female employed make up the ‘total employed’ series (male employed + female employed = total employed). We can also derive ‘total employed’ using the part-time and full-time series (part-time + full-time = total employed). The HLFS adjusts each series separately. That is, the components of total employed (male and female employed) are adjusted separately and then summed to produce the seasonally adjusted total employed. The seasonal patterns of the component series will influence the values of the composite series. For example:

- there is an expectation that seasonally adjusted male and seasonally adjusted female will sum to seasonally adjusted total employed
- there is no expectation that seasonally adjusted full-time and seasonally adjusted part-time will sum to seasonally total employed.

The standard seasonal model assumes that the actual (observed) series is composed of three different components:

- the trend cycle
- the seasonal component (this includes calendar effects)
- the irregular component.

For the HLFS, we assume the relationship between these components is multiplicative. This means the seasonal effect varies in size with the level of the series. The seasonally adjusted series refers to the actual series with the seasonal component removed.

The seasonal component is the seasonal pattern found in many sub-annual economic series. It is reasonably stable in terms of annual timing, direction, and magnitude. It can be caused by, for example, natural factors (for example, seasonal weather patterns), administrative measures (for example, start and end dates of the school year), and social/cultural/religious traditions (for example, fixed holidays such as Christmas).

The trend cycle reveals the smooth, relatively slowly changing features in a time series. It merges any cyclical movements present with the long-term underlying trend. The underlying trend is often associated with some basic characteristic of the economy, such as population growth, and reveals the underlying direction of movement in a series. Cyclical movements are composed of cumulative, reversible, short-, or medium-run movements. They are characterised by alternating periods of expansion and contraction as they reflect general economic activity.

The irregular component is the part of the observed value that is not included in the trend cycle or the seasonal effects (or in estimated trading day or holiday effects). Its values are unpredictable for timing, impact, and duration, and can arise from influences such as sampling error, non-sampling error, unseasonable weather, natural disasters, or strikes. Much of the testing done in seasonal adjustment is seeing if there is any structure left in the irregular component. Many of the quality diagnostics are based on comparing the variability of the other identified components with that of the irregular component.

We monitor our data to make sure our seasonal adjustment is robust. The X-13ARIMA-SEATS programme is highly customisable and can produce a wide variety of possible adjustments for any particular input series. Consequently, the programme produces diagnostics that are useful in assessing the quality of the chosen adjustment. We publish these diagnostics quarterly within the labour market statistics releases.

When COVID-19 hit in April 2020, adjustments were made to address its impact on our time series. See Seasonal adjustment and additive outliers during COVID-19 for additive outliers work done during COVID-19. Although the impact of COVID-19 has largely diminished for our time series, some series still need direct intervention to ensure they are appropriately handled by the model before they can be published. Without treatment, seasonally adjusted values do not fit well into the underlying seasonal adjustment model, leading to incorrect revisions. For details on current seasonal adjustment and automated outlier detection approach, see Seasonal adjustment and automatic outliers in time series after COVID-19.

Stats NZ has updated the standard approach for seasonally adjusting survey estimates, see Seasonal adjustment in Stats NZ.

Adjusting for the Survey of Working Life

The March 2008, December 2012, and December 2018 quarters coincided with the Survey of Working Life (SoWL) supplement. In the March 2008 and December 2012 quarters, we found evidence of response bias, likely due to running the SoWL supplement alongside the HLFS.

To adjust for the effect of the SoWL on responses, we applied a prior adjustment, which is an explicit form of treating an outlier. Using a regression model, we estimated a replacement value for the March 2008 and December 2012 quarters. We prior-adjusted these time series to account for the SoWL:

- female employed
- male employed
- total actual hours
- total usual hours
- female not in the labour force
- male not in the labour force.

In the December 2018 quarter, we made a prior adjustment, in addition to seasonal adjustment, to the following high-level data series (in addition to the series in 2008 and 2012) to improve the accuracy of, and coherence between, the trend series and seasonally adjusted series:

- full-time employed
- part-time employed
- employed 15 to 64 years
- NILF 15 to 64 years.

Adjusting for the Easter effect in the total actual hours series

Fewer actual (worked) hours are reported for the quarter in which Easter falls, due to public holidays and the tendency for employed people to take leave during this period. If Easter consistently occurred in the same quarter, this effect would be captured by the seasonal component. However, because Easter can fall in either the March or the June quarter, adjustments are required.

We found evidence of an Easter effect on total actual hours – the number of hours reported for a given quarter varied on whether Easter fell within that quarter. To account for the changing date of the holiday, we applied an Easter effect to the time series using the Genhol utility, an executable tool that works alongside the X-13ARIMA SEATS programme.

Data suppression and rounding procedures

In the labour market information release each quarter, we suppress cells with estimates of fewer than 1,000. These suppressed values are shown as ‘S’ in the tables, as they are subject to sampling errors too great for most practical purposes.

Figures in the release are rounded to the nearest hundred or thousand for seasonally adjusted and trend estimates. This rounding may cause totals to differ slightly from the sum of individual items shown in any table. Where figures are rounded, the unit is shown as (000) for thousands.

We calculate quarterly and annual changes for figures, including percentage point changes for rates, on unrounded numbers.

Reliability of the estimates

In this chapter we describe sampling and non-sampling errors that affect the reliability of HLFS estimates and present some estimates that are indicators of aspects of non-sampling errors.

Sampling errors

Sampling error occurs because the sample survey collects information from only a fraction of the population, rather than the entire population. The extent of the error depends on many factors, including:

- sample size – increasing the sample size (all else being equal) reduces sample error; however, there is a point beyond which we gain little by further increasing the sample size
- variability of the characteristics of interest – the greater the variation in the population the greater the sampling error
- sample designs that use information known about the population (and that relate to the characteristics of interest) reduce the sample error.

We calculate sampling errors for our main survey results and mean incomes using the replication-based delete-a-group jackknife method.

Replication methods for variance estimation draw multiple replicates (or subsamples) from the full sample by following a specific resampling scheme. The parameter of interest is estimated from each replicate, and we use the variability among the replicate estimates to estimate the overall variance of the parameter estimate.

The jackknife method deletes groups of PSUs from the full sample to create the replicates and modifies the original weights to obtain replicate weights. We calculate replicate weights at each stage of the estimation (design weights and calibrated weights). One hundred replicates are created. Deleting groups of PSUs, instead of one PSU at a time, saves a considerable amount of computing time and allows us to calculate any sampling errors relatively quickly. Once the replicate weights are created, the variance can be calculated using the following formula:

$$V(\hat{y}) = \frac{G-1}{G}\sum_{g=1}^{G}\left[\left(\hat{y}_{(g)} - \hat{y}\right)^2\right]$$

where G is the total number of groups and g the replicate group.

Sampling errors (with 95 percent significance) are published quarterly for each cell in the published tables and for estimates of change between adjacent quarters. Figures 3–5 show time series of confidence intervals for employed, unemployed, and not in the labour force estimates.

Figure 3

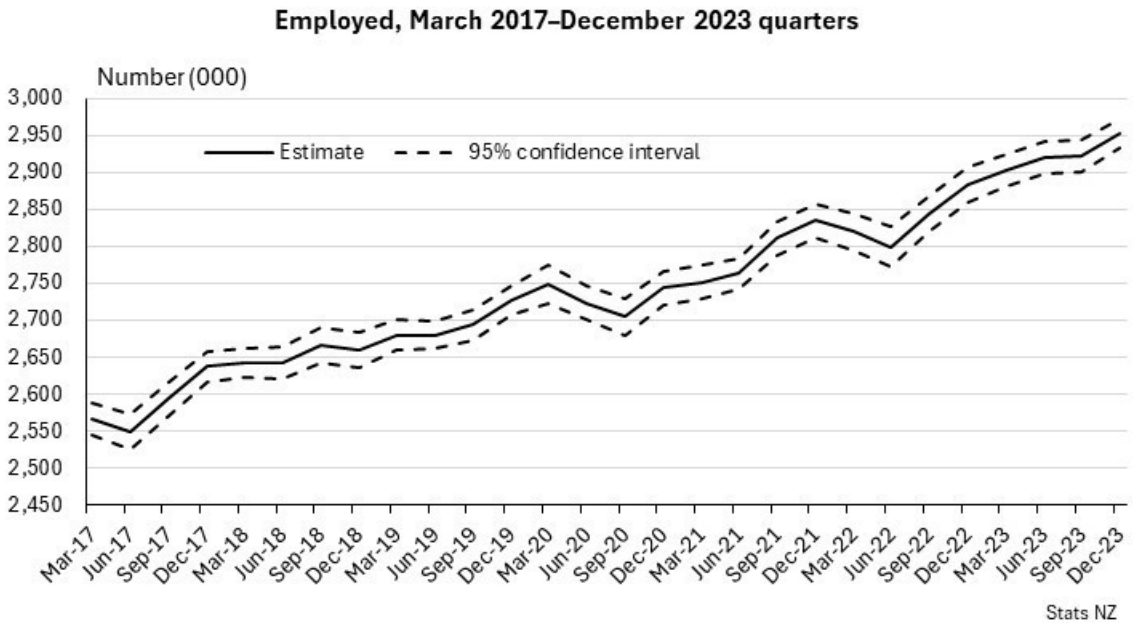


Figure 4

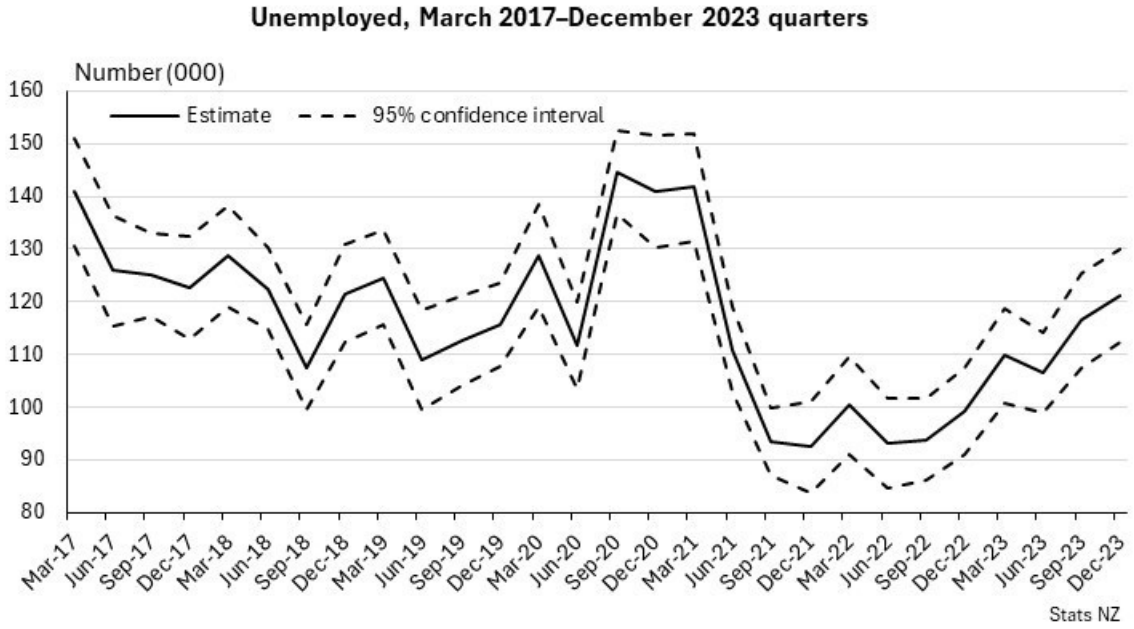
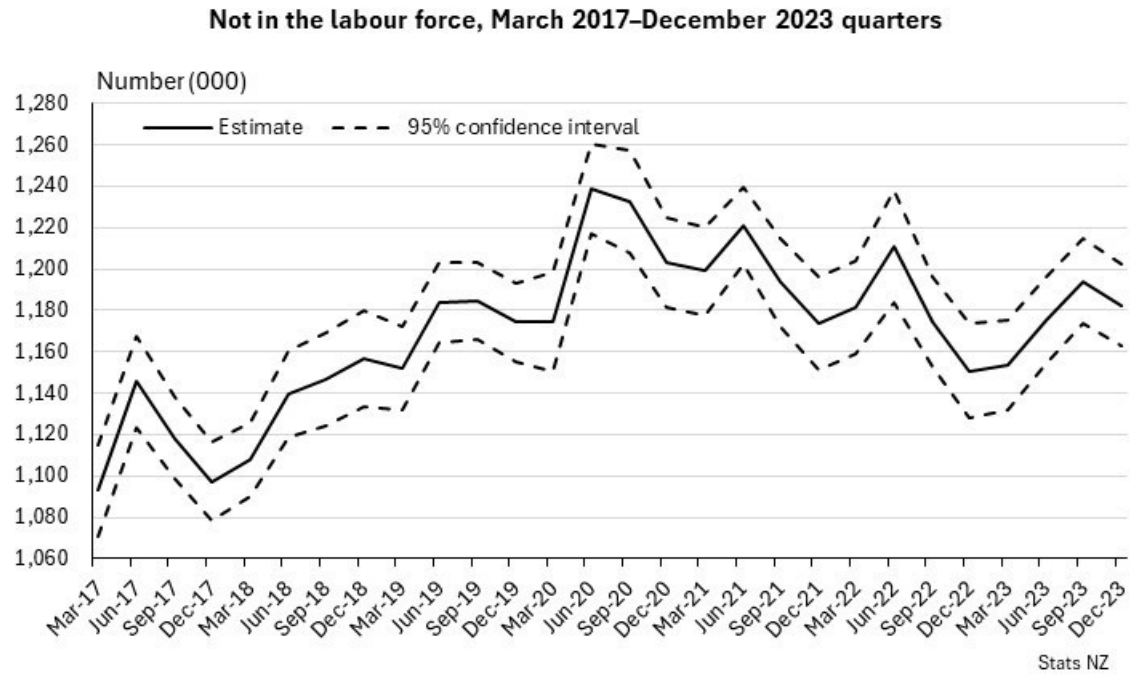


Figure 5



Non-sampling errors

Non-sampling error occurs due to inaccuracies in collecting, measuring, and processing the data, and can arise at any stage of the survey process. Measuring non-sampling error is much more difficult than measuring sampling error (see Sampling errors). In many cases the reasons for the non-sampling error are not known, whereas sampling error is a direct result of the survey design and is under the control of the sample designer.

Non-sampling error may be related to:

- the definition of the target population – excluding groups within the scope of the survey or including groups outside the scope will cause non-sampling errors
- selection of the sampling frame – a frame that does not match the target population causes bias if the excluded units have different characteristics from the included ones (coverage error)
- the sample design should give everyone in the target population a known chance of selection
- non-response – if people who do not respond are different to those who do respond, then estimates from the achieved sample may be biased estimates of population values (this can be corrected to some extent by weighting the sample)
- questionnaire development – if the questionnaire does not ask exactly what is required, in a way that is easy for the respondent to understand and answer, the resulting data quality will not be as high as required
- social desirability effects – respondents may be unwilling to admit to socially undesirable behaviour, but this should be minimal in a questionnaire about labour force characteristics
- collection of information (for example, mode effects, proxies) – bias from mode effects may arise when questions are asked or interpreted differently between different modes (for example, computer-assisted face-to-face mode and a telephone interview).

- Error from using proxies may arise if the quality of proxy data is not as high as that collected from the actual intended respondents
- inadequate interviewer training – if interviewers are less successful at gaining responses, or influence the answers of respondents, bias and variability can be introduced into the survey; a respondent should answer the same way irrespective of the interviewer (and regardless of whether it is by phone, or face-to-face)
- data coding and entering – for example, data may be classified incorrectly or mistakes made inadvertently when editing the data.

Coverage error is minimised by using an accurate and up-to-date sampling frame. An out-of-date sampling frame can have the following effects on data quality:

- bias in survey estimates if new elements differing from elements already on the frame are not added to the frame
- increase in the variance of estimates if auxiliary information used for stratification or estimation is inaccurate.

Non-response bias is introduced when non-respondents differ in characteristics from respondents. We make every effort to minimise non-response by implementing these strategies: including call-backs, alternative mode options, interview times, pre-notification letters for CAPI interviews, assurances of confidentiality, interviewer training, and questionnaire design. Additionally, we use weighting adjustments to try and adjust for the bias (see Estimation and imputation).

Efforts to reduce error arising from questionnaire development, information collection, and interviewer effects include carefully designing questionnaires with cognitive testing and pilot surveys before implementation, as well as providing intensive training and supervision for interviewers. We only use proxy interviews when it is not possible or practical to obtain answers from the actual intended respondent.

With ongoing technological and economic changes, questionnaire design needs to evolve to keep up to date with changes to information sources, methods of capturing responses, terminology, business concepts, legislation, and shifts in the economy or new industries.

Processing errors (including data coding and editing errors) are minimised by using high-quality editing and imputation procedures. We thoroughly test all programming code used for editing and coding responses. We also have a substantial array of checks (see Coding and processing the data) to identify and fix most, although not all, errors. Additionally, survey edits are incorporated into the computer-assisted interviews so the respondent can be asked about suspect responses.

For the HLFS, we report on two estimates that are indicators of aspects of non-sampling errors. These are response rates and undercoverage rates. They are discussed in more detail in the sections below.

Non-sampling error in economic surveys at Statistics New Zealand has more detail on non-sampling error. Much of this content applies to the HLFS.

Response rates and achieved sample characteristics

The response rate measures the percentage of eligible households that responded to the survey. Non-response bias is one source of non-sampling error; the response rate provides a measure of one component of non-response bias. The other component is the difference between the true answer to a question for respondents and non-respondents. Even if the response rate is high, large

differences in the true answer may lead to substantial non-response bias. However, this component is not often available to measure.

The response rate is a survey estimate and is reported each quarter. It is generally consistent over time but can be affected by changes in coding practices. The response rate can be calculated as:

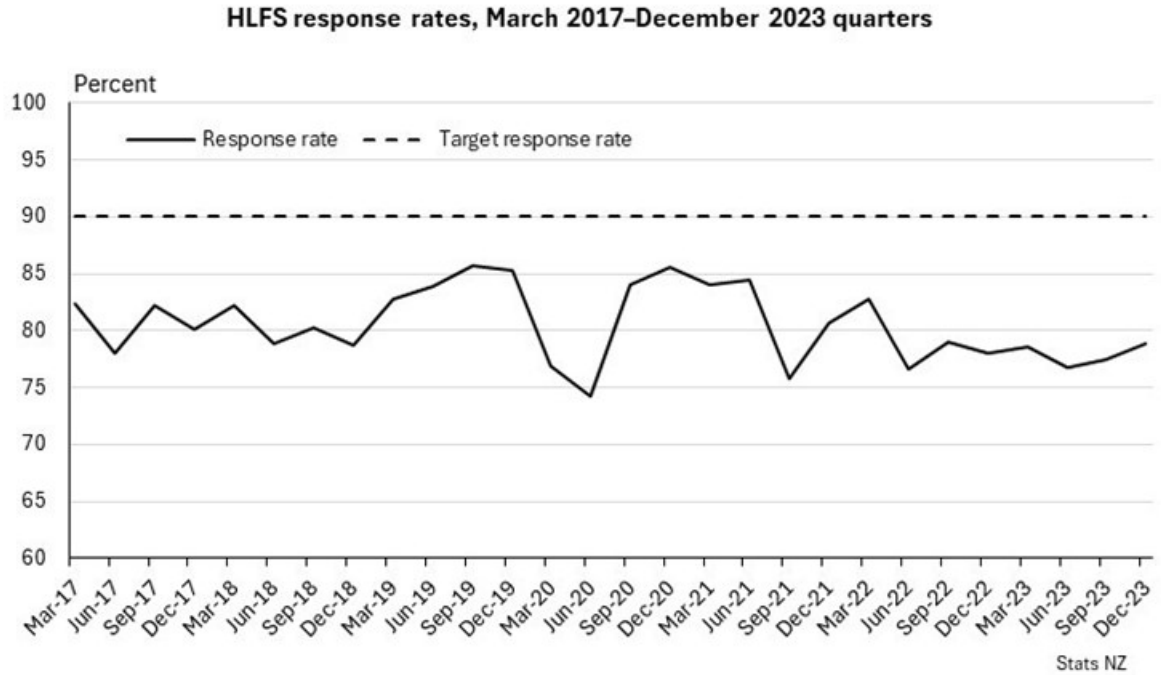
$$\frac{D}{D+C+E \quad (\frac{C+D}{B+C+D})}$$

where:

A = $sum\ of\ the\ design\ weights\ from\ all\ ineligible\ pre-contact\ households$
B = $sum\ of\ the\ design\ weights\ from\ all\ ineligible\ post-contact\ households$
C = $sum\ of\ the\ design\ weights\ from\ all\ eligible\ non-responding\ households$
D = $sum\ of\ the\ design\ weights\ from\ all\ eligible\ responding\ households$
E = $sum\ of\ the\ design\ weights\ from\ all\ unknown\ eligibility\ households$

The HLFS target response rate is 90 percent. Achieved response rates from 2017 to 2023 have fluctuated between 75 and 85 percent.

Figure 6

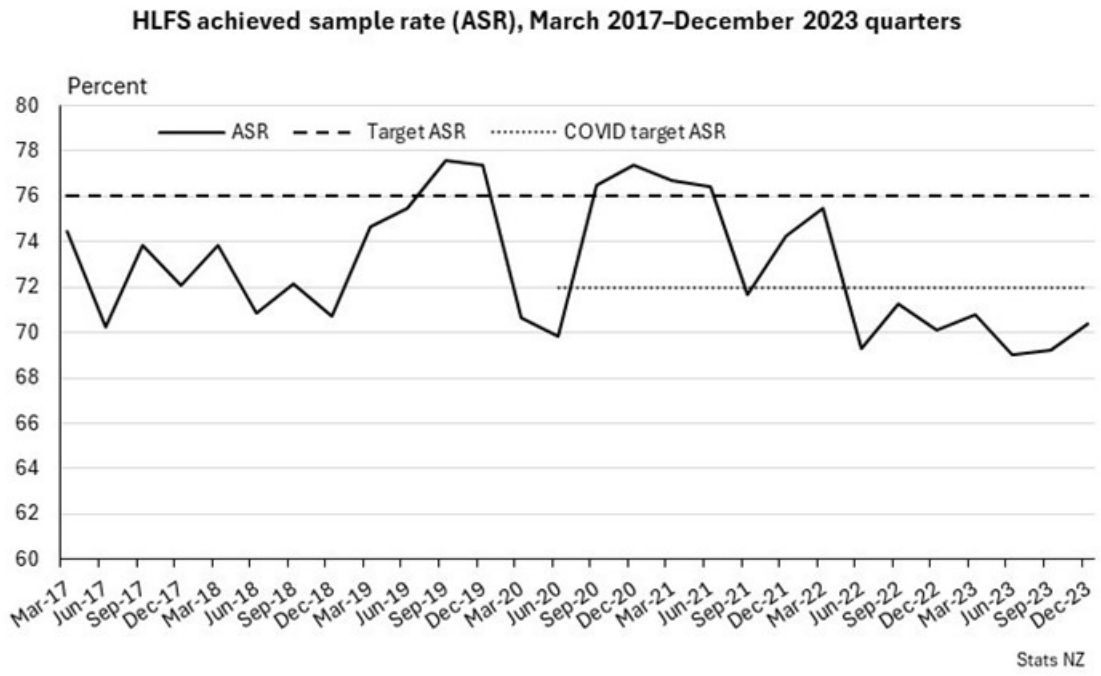


The response rate is sensitive to how we classify household eligibility. It can vary when the overall sample and the achieved sample are constant. The HLFS therefore now has a target based on the percentage of the total sample classified as 'eligible responding households' (also called the achieved sample rate). This is calculated as:

$$\frac{D}{A+B+C+D+E}$$

The HLFS has a target achieved sample rate of 76 percent. In 2020, restrictions brought about by COVID-19 made it difficult to reach the 76 percent ASR target and a temporary 'COVID' operational target was set at 72 percent.

Figure 7



As part of HLFS production, Stats NZ also monitors the achieved sample characteristics every quarter, pre- and post-calibration weights. Obtaining a sample that represents the population is essential when it comes to producing reliable labour market estimates.

Non-response is made up primarily of households where interviewers fail to make contact (full non-contact households) and those who are contacted but refuse to take part in the survey (full refusal households). The refusal rate is calculated as:

$$\frac{R}{D+C+E\quad\left(\frac{C+D}{B+C+D}\right)}$$

where R = $sum\ of\ the\ design\ weights\ from\ all\ full\ refusal\ households$

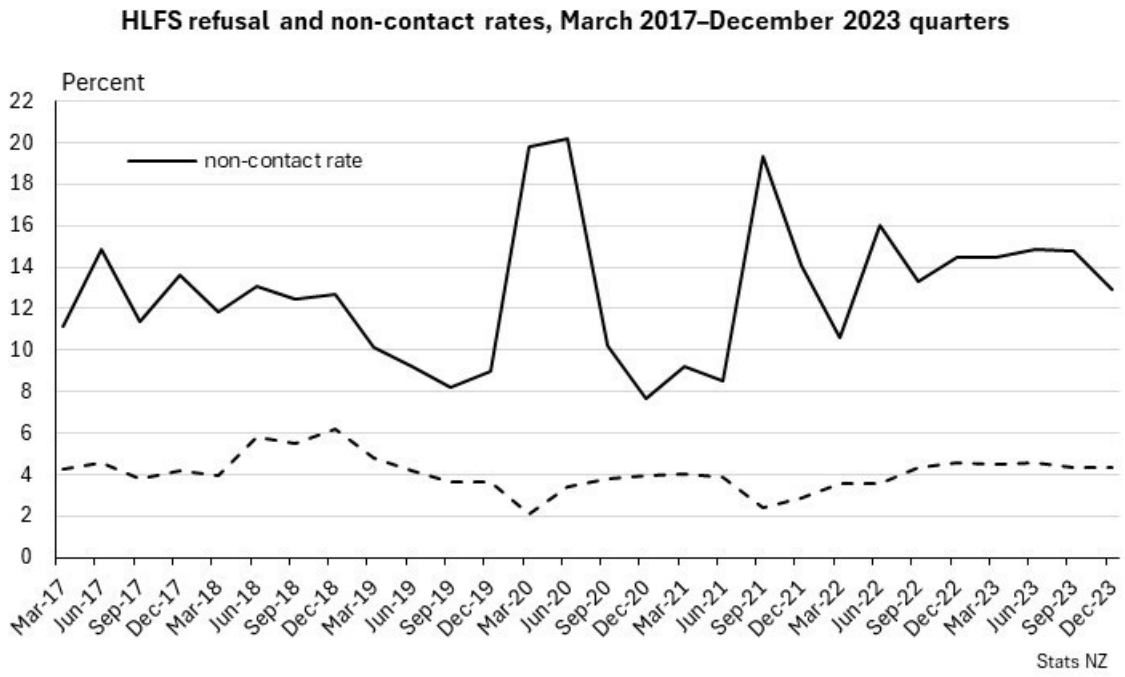
Similarly, the non-contact rate can be calculated as:

$$\frac{NC}{D+C+E\quad\left(\frac{C+D}{B+C+D}\right)}$$

where $NC = sum\ of\ the\ design\ weights\ from\ all\ full\ non\text{-}contact\ (verified\ and\ non\text{-}verified)\ households$

Figure 8 shows the non-contact rate has been around 15 percent over the last three years, while the refusal rate has been around 3 percent. During the COVID-19 lockdowns, it was not possible to conduct face-to-face interviews, but we were able to conduct interviews through telephone interviewing, hence the low non-contact rates during this period.

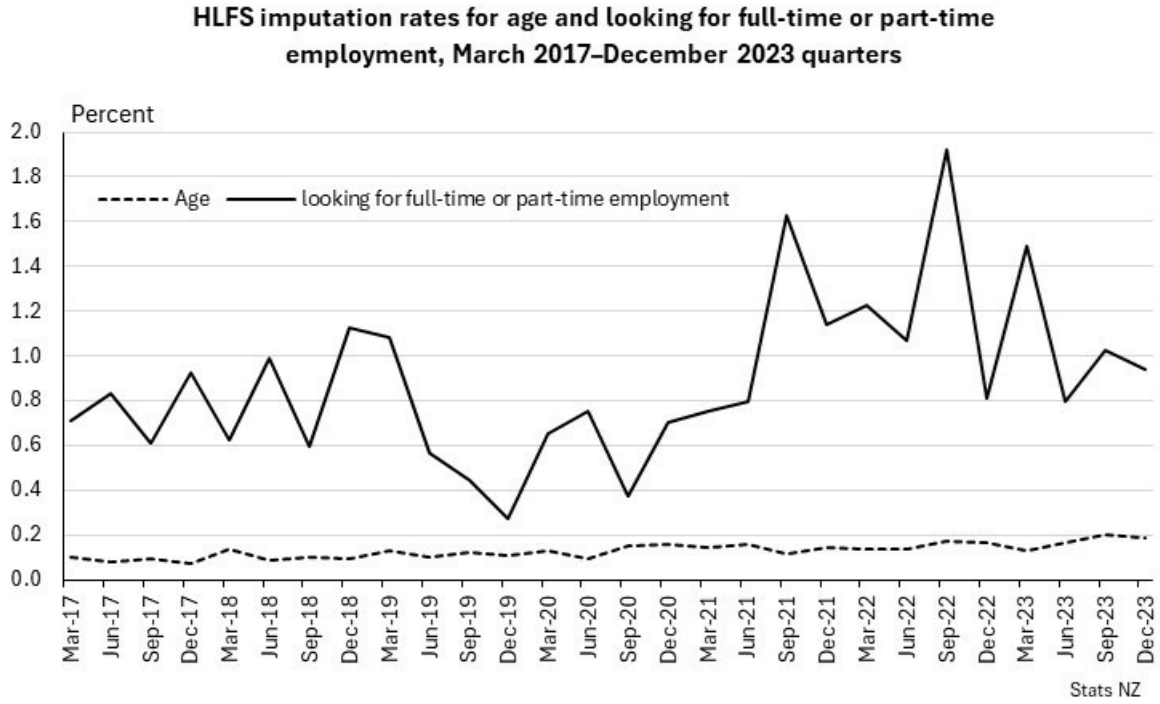
Figure 8



Imputation

We impute values for sex, age, ethnicity, looking for full-time or part-time employment, and actual and usual hours worked where they are missing for people who belong to eligible responding dwellings (see Estimation and imputation). Very few respondents have missing values for sex. Figure 9 shows the imputation rates for age and looking for full- or part-time employment).

Figure 9



Imputation aims to produce distributions that closely reflect those of the population. However, without access to the true population data we cannot compare the survey distribution to the population. Therefore, we can only compare the distributions of the original (pre-imputation) and final (post-imputation) data. The imputation process should not make dramatic changes to the distribution of the original data.

Table 5 shows that the distributions of full-time and part-time employment status, after imputing hours worked, remain very similar to the distributions before imputation.

Table 5

Pre- and post-imputation distributions of full-time and part-time employment, December 2020–December 2023 quarters				
Quarter	Pre-imputation distribution		Post-imputation distribution	
	Full-time	Part-time	Full-time	Part-time
Dec 2020	80.67	19.33	80.26	19.74
Mar 2021	80.34	19.66	79.89	20.11
Jun 2021	79.70	20.30	79.31	20.69
Sep 2021	80.05	19.95	79.77	20.23
Dec 2021	80.40	19.60	80.10	19.90
Mar 2022	81.18	18.82	80.90	19.10
Jun 2022	81.37	18.63	80.95	19.05
Sep 2022	80.40	19.60	80.22	19.78
Dec 2022	81.12	18.88	80.59	19.41
Mar 2023	81.30	18.70	80.93	19.07
Jun 2023	80.32	19.68	79.99	20.01
Sep 2023	80.06	19.94	79.89	20.11
Dec 2023	80.67	19.33	80.58	19.42

Source: Stats NZ

Proxies

The HLFS allows interviewers to take responses from proxies if a respondent is unavailable or unable to answer the questions themselves. Currently the HLFS has reasonably relaxed rules around who can and cannot proxy for another person (see Collection methodology for more details).

Using proxies can increase the response rate and potentially reduce non-response bias. However, it may introduce measurement error, as capable self-respondents are generally expected to provide higher-quality data than proxies. People may remember first-hand events more accurately than second-hand information because they experience them in a more vivid and detailed form than events they merely hear or read about (Sudman et al, 1994, in Tourangeau, 2000).

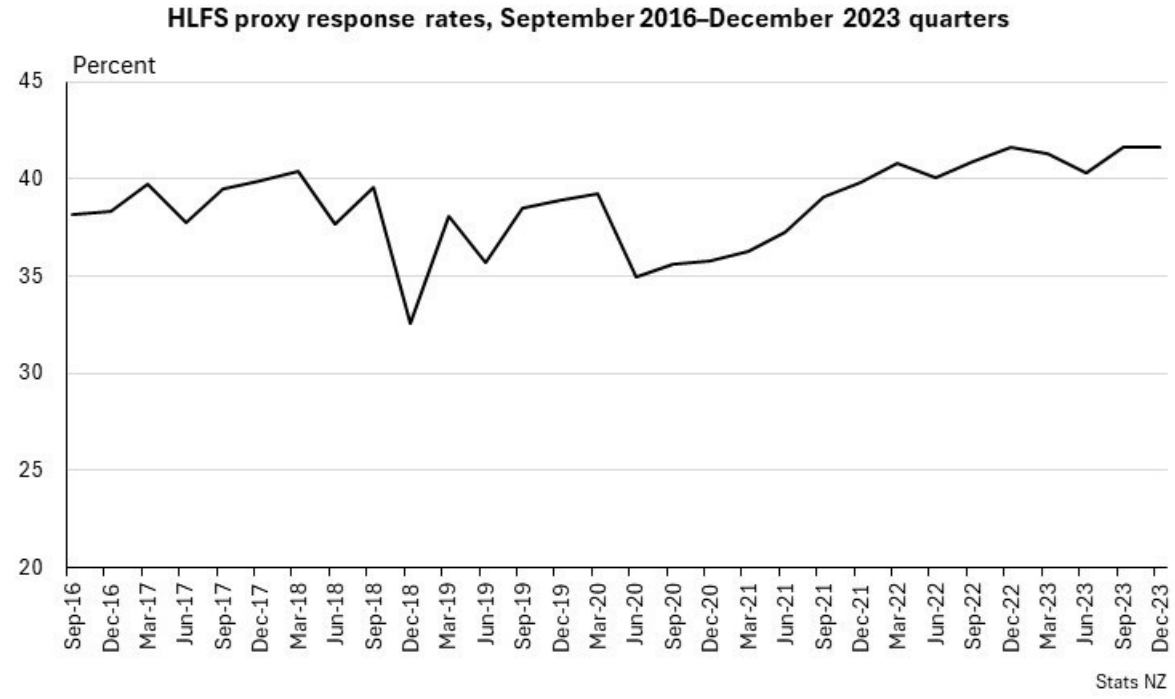
The literature on proxy and self-respondents provides mixed results. Some studies find no difference in responses between the two, while others find significant differences. Where significant differences were found, they do not exhibit a consistent bias of proxy responses relative to self-respondents and/or administrative data (for example, Maruyama & Uehara, 2020; Katz & Krueger, 2019; Tamborini & Kim, 2013; Hill, 1987; Boehm, 1989, Moore, 1988; Martin & Butcher, 1982).

Although the evidence is mixed, we expect proxies may not be as accurate as self-responses. Therefore, the HLFS monitors the rate of proxy responses to gauge the quality of responses. The proxy rate is calculated as the percentage of respondents who had someone else respond on their behalf divided by the total number of respondents.

Figure 10 shows the proxy rates by quarter for the HLFS. Generally, the proxy rate is lower in quarters where a supplement is run than in non-supplement quarters, as previously stricter rules have applied to individuals acting as proxies for most supplements. This can be seen in figure 10 for

the December 2018 quarter, when the Survey of Working Life was attached, and for the June 2020 to March 2021 quarters, when the COVID-19 wellbeing supplement was attached.

Figure 10



Undercoverage

Undercoverage is another source of non-sampling error. We estimate the undercoverage rate as the difference in survey estimates before and after calibration. This indicates the level of possible undercoverage but does not measure its effect on survey estimates.

Typically, estimates pre-calibration are too small reflecting undercoverage. The undercoverage rate indicates how representative the pre-calibrated sample is; the higher the rate, the less representative it is.

Figure 11 shows that the overall undercoverage rate for the HLFS has been, on average, around 19 percent, and that males have a higher rate than females. Figure 12 shows the youngest age group (15–34 years) is underrepresented in the sample before calibration.

The lowest points observed in both figures occurred during the COVID-19 lockdowns in the June 2020 quarter. This is likely because fewer households were marked ineligible, as survey interviewers were restricted from traveling and unable to assess selected dwellings in person.

Figure 11

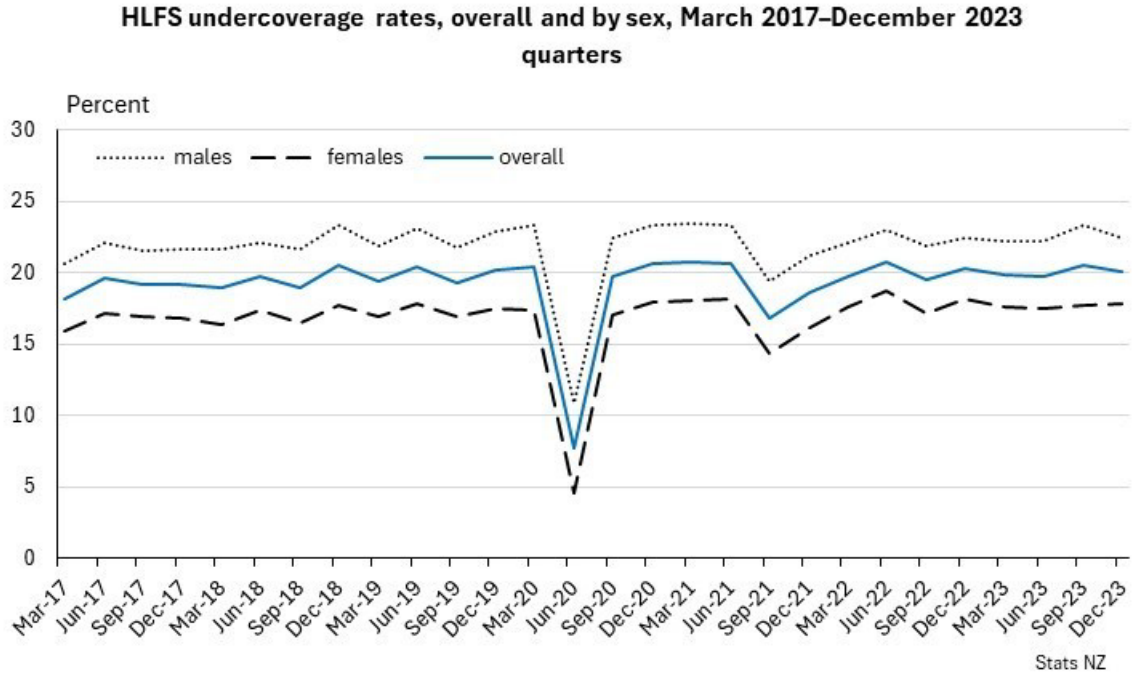
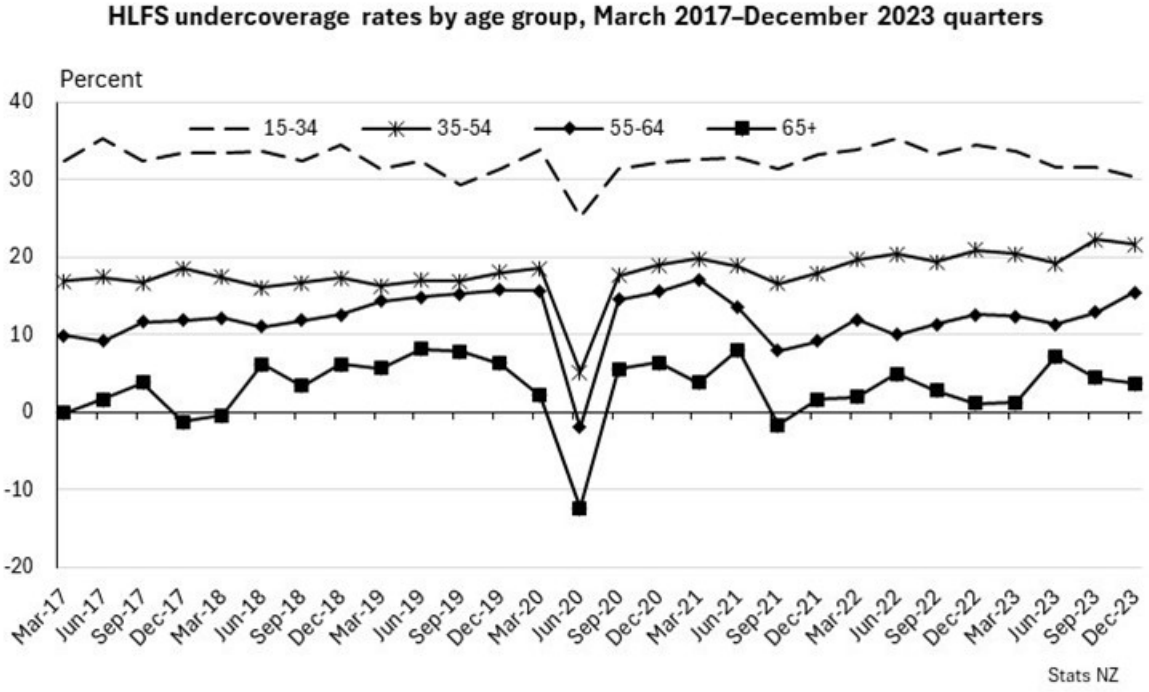


Figure 12



Changes affecting data comparability over time

This chapter outlines the major changes made to the HLFS, both historically and as part of the recent sample redesign.

Despite the over-arching desire for long-term comparability of the series, careful and continuing maintenance and development of a survey are essential to maintain the integrity of the data and the efficiency of the collection. Since it began in 1985, the HLFS has had changes to or development of the frequency of collection, collection and sampling methods, concepts and definitions, classifications, and time-series analysis techniques.

Changes due to questionnaire redesign since 2016

The June 2016 quarter redevelopment of the HLFS marked the first substantial change to the survey since its introduction in December 1985 and remains its foundation in 2025. Since then, additional questionnaire changes were implemented in the June 2017, 2020, and 2023 quarters.

The Washington Group Short Set on Functioning (WG-SS) questions was added to the HLFS in June 2017 to measure labour market outcomes for people with disabilities. It was decided to add them in June quarters only, because:

- The June quarter is when households with only people aged 75+ are interviewed. Given the strong link between severe limitations measured by the WGSS and age, surveying this group was considered crucial for obtaining a complete measure. Using the rollover approach for this group in other quarters would have significantly impacted data quality.
- The June quarter is when income questions are asked, which are critical for understanding disability-related disadvantages more broadly. Income questions are best answered by respondents directly rather than through proxies. As such, the June quarter was already aligned with this expectation for the WGSS.

In the June 2020 quarter, new questions on working from home and perceived job security during the COVID-19 pandemic were added. In addition, all ‘reason’ questions (for example, why people don’t want or aren’t looking for work) had additional coding applied to separate COVID-19-related reasons from pre-existing options. This was only for new pandemic responses (such as lockdown or mandated isolation), not sickness from COVID-19, which was included in the pre-existing general ‘own sickness/illness/injury’ category.

In the June 2023 quarter, the scoping question was changed from “Are you living in New Zealand for 12 months or more?” to “Are you a visitor from overseas who’s intending to stay in New Zealand for less than 12 months?” This change addressed reports from collection staff that the previous question was unclear about including people who had not yet been in New Zealand for 12 months but intended to stay for 12 months or more.

Other changes introduced in the 2016 redevelopment related to active job seeking, total usual hours, not in employment, education or training (NEET), and self-employment.

Looking at job advertisements on the internet was correctly classified as not actively seeking work. This resulted in fewer people being classified as actively seeking work and a decrease in the number of people unemployed. All other key labour market indicators that involve unemployment were also affected. There was a decrease in the unemployment rate, the labour force, and the labour force participation; the number of people not in the labour force increased.

Where historical information on usual hours worked was missing, it was imputed. This led to improved estimates of total usual hours worked and counts of full-time and part-time workers. Consequently, there were decreases in the number of people in part-time employment and the number of people underemployed.

For more details on series affected by changes introduced in the June 2016 quarter, see Household Labour Force Survey – Revisions to labour market estimates. For an overview of the key changes made to the questionnaire at that time, see Household Labour Force Survey – summary of 2016 redevelopment.

Changes due to the latest sample redesign

The HLFS 2020 sample design uses the 2018 PSUs established after the 2018 Census, updated information from the 2018 Census, and the updated Statistical Standard for Geographic Areas. Other than these, the design retains the following innovations introduced in 2016:

- refining stratification and allocation to urban versus rural
- changing to PPS sampling based on Māori density
- moving from Kish allocation to proportional allocation by regions
- introducing a new overlap control method, including managing overlap with selected surveys from other organisations
- using 'not in the labour force' (NILF) densities and NZ Deprivation Index (NZDep) quintiles in stratification.

The redesign includes proportional allocation to 12 regions (the regions currently used in HLFS dissemination); over-sampling in main urban areas only; proportional allocation to a new stratification layer based on the proportion within PSUs not in the labour force; and a Neyman allocation (based on unemployment) to a stratification layer based on NZDep quintiles.

These results in 122 strata established, slightly higher than the 108 strata in the previous sample design.

Historical changes

Table 6 outlines the key changes made to the HLFS since its inception, while table 7 shows the supplements that have been included over time.

Table 6

Main historical changes to the HLFS		
Quarter	**Date**	**Description of change**
2	Mar 1986	Interviewer coding of industry using NZSIC at a 2-digit level introduced. Occupation estimates coded using NZSCO68 (interviewer coded to a 2-digit level).
8	Sep 1987	Data collection practices changed to minimise respondent burden for older respondents. Respondents aged 65+ now only supplied information (after their first interview) if their labour market position altered, and if they met other criteria in the previous interview.
19	Jun 1990	Sample size doubled to 24,000 households (1,080 more PSUs sampled) to produce more accurate regional estimates and enable us to publish monthly national estimates (previous results published quarterly). Minor changes to questionnaire.
19	Jun 1990	Coding for industry changed to central coding using NZSIC to a 3-digit level. Coding for occupation changed to central coding of NZSCO68 to 3- digit level.
22	Mar 1991	Occupation estimates changed to central coding of NZSCO90 to 3-digit level.
24	Sep 1991	Sample size reduced to 16,000 households; HLFS reverted to quarterly collection. Estimates produced for 10 regional council areas rather than 15.
25	Dec 1991	Changes made to ethnic classification: 'Other Pacific' category added (previous categories were: European, NZ Māori, Samoan, Cook Island Māori, Niuean, Tongan, Chinese, Indian, and Other).
33–36	Dec 1993	Sample redesigned and phased in over four quarters. 1,752 PSUs now sampled, with nine households surveyed in each (2,400 PSUs in previous design; 6.5 households per PSU). Improved regional estimates (regional councils now the basis of stratification), for 12 regional council areas rather than 10.
39	Jun 1995	Non-private households excluded from survey population (still included in target population).
42	Mar 1996	Occupation estimates changed to central coding of NZSCO95 to 3-digit level.
45	Dec 1996	HLFS processing system migrated from mainframe to LAN environment.
45	Dec 1996	Coding for industry changed to 4-digit NZSIC code. The 4th digit ensured a unique concordance to ANZSIC at 3-digit level.
51	Jun 1998	Integrated weighting replaced post-stratification (applied back to June 1995 quarter; later backcast to include quarters 2–38).
53	Dec 1998	ANZSIC industry estimates from HLFS published back to December 1996 quarter. NZSIC industry coding phased out.

Table 6 (continued)

54–57	Mar 1999	Redesign implemented (over four quarters). 1,760 PSUs sampled with nine households surveyed in each. No rural strata cross regional council boundaries. Asian stratum added.
63	Jun 2001	Total actual hours worked series revised (correcting misalignment between survey and calendar quarters).
70	Mar 2003	Industry coding changed from NZSIC/ANZSIC dual coding to ANZSIC- only coding (centrally coded to 3-digit level) may have introduced a slight discontinuity to industry series.
74–81	Mar 2004	Redesign implemented (over eight quarters). Several questionnaire changes made to determine formal study status and enable us to derive and 'extended unemployment' estimate.
79	Jun 2005	Data collection converted from pen and paper interviewing (PAPI) to computer-assisted personal interviewing (CAPI). The rotating-in group for this quarter was interviewed using CAPI. Testing for a CAPI effect based on this one rotation group revealed no significant effect on the unemployment rate, labour force participation rate, estimate of underemployed, or the estimates of actual and usual hours of work.
80	Sep 2005	CAPI group in quarter 79 converted to computer-assisted telephone interviewing (CATI). All other rotation groups stayed with PAPI. CATI group had a statistically significant higher unemployment rate than PAPI groups. Other variables tested not affected. Immediate investigation could not explain the increase, so we dropped results from CATI group from September 2005 quarter estimates.
81	Dec 2005	CATI group in quarter 80 remained CATI and two new groups converted to CATI. The newly rotated group converted to CAPI. Final results from December quarter indicated the two new CATI groups had slightly elevated unemployment rate; original CATI group remained high. We concluded the high figure for original CATI group was a characteristic of that group – leaving it out biased the result downwards. We revised the previous September 2005 estimate in the December 2005 release.
82	Mar 2006	No additional groups converted to CAI (either personal or telephone) - 50 percent of the sample interviewed using CAI and the rest using PAPI. The CAI effect on the unemployment rate exhibited in the previous two quarters disappeared.
85	Dec 2006	Whole sample now interviewed using CAI modes.
89	Dec 2007	Changes made to ethnicity classification, using the single/combination output method. This caused a break in ethnicity series.
96	Sep 2009	Dual coding using ANZSCO06 and NZSCO99 for occupation introduced, and dual coding using ANSZIC06 and ANZSZIC96 for industry introduced.
113	Dec 2013	Imputation of 75+ households in quarters subsequent to their first time introduced (excludes June quarters, see Estimation and imputation for details).
117–124	Dec 2014	Sample redesigned and phased in over eight quarters – includes updated stratification variables, changes to allocation, and change from simple random sampling of PSUs within strata to probability proportional to size sampling within strata.
117	Dec 2014 (re-release Mar 2015)	Regional benchmark introduced and non-response adjustment step in the weighting removed.
123	Jun 2016	Introduction of new questionnaire. Some of the more significant changes come as a result of: • improved accuracy in identifying active jobseekers – looking at job advertisements on the internet is now correctly classified as not actively seeking work • better identification of both the number of people employed and their employment status due to the ways in which people are asked about employment • the change in the target and survey populations to include defence force personnel living in private dwellings

Table 6 (continued)

		• income questions from the NZ Income Survey were integrated in the HLFS questionnaire for June quarters
127	Jun 2017	Disability introduced as an annual (June quarter) demographic option, identified through the Washington Group Short Set of questions. It was added to June quarter questions to align with income questions and was aimed at measuring labour market outcomes for those who are disabled in a way that aligns with the functioning question set, not as a prevalence measure.
136	Sep 2019	New outcomes-based migration measures reflected in national population estimates and HLFS benchmarks. Working-age population estimates are now subject to revisions for seven quarters before being finalised.
141–148	Dec 2020 - Sep 2022	Sample redesigned and phased in over eight quarters – includes updated stratification variables, changes to allocation, and probability proportional to size sampling within strata.
151	Jun 2023	Scope of working-age population question changed to improve identification of people who have been in New Zealand for a year or longer OR intend to be in New Zealand for a year or longer.
155	June 2024	The Labour market statistics (disability) release, which was previously a standalone release, was integrated into the national and income labour market releases to provide labour data for disabled people in a timelier fashion. As part of this integration, disability statistics tables were scaled back to align with other breakdowns and improve usability.
Source: Stats NZ		

Table 7

Supplements to the HLFS		
Quarter	**Date**	**Supplement attached**
44	Sep 1996	Education and training
47	Jun 1997	New Zealand Income Survey (annual basis until 2015)
52	Sep 1998	New Zealand Childcare Survey
58	Mar 2000	Survey of Older People
66	Mar 2002	Cultural Experiences Survey
85	Dec 2006	Household Use of Information and Communication Technology (ICT) Survey
86	Mar 2007	Survey of Dynamics and Motivation for Migration in New Zealand
90	Mar 2008	Survey of Working Life
96	Sep 2009	New Zealand Childcare Survey
97	Dec 2009	ICT Survey
108	Sep 2012	ICT Survey
109	Dec 2012	Survey of Working Life
125	Dec 2016	Work related health module
128	Sep 2017	New Zealand Childcare Survey
131	Jun 2018	Volunteer work module
133	Dec 2018	Survey of Working Life
139–142	Jun 2020–Mar 2021	COVID-19 wellbeing supplement
Source: Stats NZ		

References

Bell, P (2011). *Conditional selection for business and household surveys*. Department of Public Health, University of Otago, Wellington. Retrieved from New Zealand Socioeconomic Deprivation Index.

Boehm, L E (1989). The reliability of proxy response in the current population survey. In Proceedings of the American Statistical Association, Survey Research Methods Section (pp 486–489).

Chowdhury, S, Chu, A, & Kaufman, S (2000). *Minimizing overlap in NCES surveys.* Proceedings of the Survey Methods Research Section, American Statistical Association, 174–179. Retrieved from http://www.asasrms.org/Proceedings/papers/2000_025.pdf

Eurostat (2001). *The European Union labour force survey methods and definitions*. Luxembourg: EC. PDF available from EU labour force survey methodology.

Hill, DH (1987). *Response errors in labor surveys: Comparisons of self and proxy reports in the survey of income and program participation*. Third Annual Research Conference, Washington D.C.

Katz, LF, & Krueger, AB (2019). *Understanding trends in alternative work arrangements in the United States. RSF: The Russell Sage Foundation Journal of the Social Sciences*, *5*(5), 132–146.

Lu, K (2012). Minimizing sample overlap with surveys using different geographic units. Applied Statistics Education and Research Collaboration (ASEARC). Conference papers. PDF available from http://ro.uow.edu.au/asearc/

Martin, J, & Butcher, B (1982). The quality of proxy information: Some results from a large scale study. *The Statistician, 31*(4), 293– 319.

Moore, J (1988). Miscellanea, self/proxy response status and survey response quality, a review of the literature. *Journal of Official Statistics, 4*(2), 155–172.

Maruyama, T., & Uehara, K. (2020). Validating inferred proxy response using rounding of departure/arrival times in travel surveys. *Asian Transport Studies*, *6*, 100027.

Tamborini, C, & Kim, CH (2013). Are proxy interviews associated with biased earnings reports? Marital status and gender effects of proxy. *Social Science Research, 42*(2), 499–512.

Tourangeau, R, Rips, L, & Rasinski, K (2000). *The psychology of survey response*. Cambridge University Press.

Appendix 1: Total PSUs and number of PSUs selected per stratum

Appendix table 1

Stratification dimensions and total number of PSUs within each stratum								
Region	**Stratum Code**	**Urban/ Indicator**	**High NILF Indicator**	**NZ Dep Group**	**Region total**	**Urban/ other total**	**NILF total**	**Number of PSUs**
01 (Northland)	10001	0	0	1	876	614	286	143
	10002			2				143
	10101		1	1			328	164
	10102			2				164
	11001	1	0	1		262	119	119
	11101		1	1			143	143
02 (Auckland)	20001	0	0	1	6827	662	662	166
	20002			2				166
	20003			3				166
	20004			4				164
	20101		1	1			133	133
	21001	1	0	1		6165	4946	495
	21002			2				495
	21003			3				495
	21004			4				495
	21005			5				495
	21006			6				495
	21007			7				495
	21008			8				495
	21009			9				495
	21010			10				491
	21101		1	1			1219	174
	21102			2				174
	21103			3				174
	21104			4				174
	21105			5				174
	21106			6				174
	21107			7				175

Appendix table 1 (continued)

Region	Stratum Code	Urban/ Indicator	High NILF Indicator	NZ Dep Group	Region total	Urban/ other total	NILF total	Number of PSUs
03 (Waikato)	30001	0	0	1	2253	1481	986	197
	30002			2				197
	30003			3				197
	30004			4				197
	30005			5				198
	30101		1	1			495	165
	30102			2				165
	30103			3				165
	31001	1	0	1		772	620	155
	31002			2				155
	31003			3				155
	31004			4				155
	31101		1	1			152	152
04 Bay of Plenty	40001	0	0	1	1356	574	359	180
	40002			2				179
	40101		1	1			215	108
	40102			2				107
	41001	1	0	1		782	495	165
	41002			2				165
	41003			3				165
	41004			4				164
	41101		1	1			287	144
	41102			2				143
05 Gisborne/Hawke's Bay	50001	0	0	1	1089	374	264	132
	50002			2				132
	50101		1	1			110	110
	51001	1	0	1		715	482	161
	51002			2				161
	51003			3				160
	51101		1	1			233	116
	51102			2				117
06 Taranaki	60001	0	0	1		347	220	110
	60002			2				110
	60101		1	1			127	127
	61201	1	2	1		300	300	150
	61202			2				150

Appendix table 1 (continued)

Region	Stratum Code	Urban/ Indicator	High NILF Indicator	NZ Dep Group	Region total	Urban/ other total	NILF total	Number of PSUs
7 Manawatū-Whanganui	70001	0	0	1	1296	669	388	194
	70002			2				194
	70101		1	1			281	140
	70102			2				141
	71001	1	0	1		627	358	179
	71002			2				179
	71101		1	1			269	134
	71102			2				135
8 Wellington	80001	0	0	1	2580	566	298	149
	80002			2				149
	80101		1	1			268	134
	80102			2				134
	81001	1	0	1		2014	1790	199
	81002			2				199
	81003			3				199
	81004			4				199
	81005			5				199
	81006			6				199
	81007			7				199
	81008			8				199
	81009			9				198
	81101		1	1			224	112
	81102			2				112
9 Tasman/Marlborough/ Nelson/West Coast	90001	0	0	1	995	736	484	161
	90002			2				161
	90003			3				162
	90101		1	1			252	126
	90102			2				126
	91201	1	2	1		259	259	130
	91202			2				129

Appendix table 1 (continued)

Region	Stratum Code	Urban/ Indicator	High NILF Indicator	NZ Dep Group	Region total	Urban/ other total	NILF total	Number of PSUs
10 Canterbury	100001	0	0	1	3179	1267	976	195
	100002			2				195
	100003			3				195
	100004			4				195
	100005			5				196
	100101		1	1			291	146
	100102			2				145
	101001	1	0	1		1912	1516	190
	101002			2				190
	101003			3				190
	101004			4				190
	101005			5				190
	101006			6				190
	101007			7				190
	101008			8				186
	101101		1	1			396	198
	101102			2				198
11 Otago	110001	0	0	1	1213	674	474	158
	110002			2				158
	110003			3				158
	110101		1	1			200	200
	111001	1	0	1		539	371	186
	111002			2				185
	111101		1	1			168	168
12 Southland	120201	0	2	1	566	287	287	144
	120202			2				143
	121201	1	2	1		279	279	140
	121202			2				139

Appendix table 2

Number of PSUs selected for Northland region by stratum			
Region	**Stratum**		
	Urban/Indicator	**High NILF Indicator**	**NZ Dep Group selection PSUs**
Northland 65	Other than Major/Large urban' 43	Low NILF 21	7
			14
		High NILF 22	8
			14
	Major/Large Urban 22	Low NILF 10	10
		High NILF 12	12

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 3

Number of PSUs selected for Auckland region by stratum			
Region	**Stratum**		
	Urban/Indicator	**High NILF Indicator**	**NZ Dep Group selection PSUs**
Auckland 530	Other than Major/Large urban' 43	Low NILF 36	9
			8
			11
			8
		High NILF 7	7
	Major/Large Urban 487	Low NILF 394	29
			33
			35
			35
			38
			42
			41
			42
			47
			52
		High NILF 93	9
			12
			11
			11
			13
			17
			20

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 4

Number of PSUs selected for Waikato region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Waikato 172	Other than Major/Large urban' 94	Low NILF 64	9
			11
			12
			16
			16
		High NILF 30	8
			9
			13
	Major/Large Urban 78	Low NILF 60	9
			13
			18
			20
		High NILF	18
		18	

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 5

Number of PSUs selected for Bay of Plenty region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Bay of Plenty 113	Other than Major/Large urban' 37	Low NILF 24	9
			15
		High NILF 13	5
			8
	Major/Large Urban 76	Low NILF 52	11
			11
			11
			19
		High NILF 24	9
			15

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 6

Number of PSUs selected for Gisborne/Hawke's Bay region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Gisborne/Hawke's Bay 90	Other than Major/Large urban' 23	Low NILF 16	6
			10
		High NILF 7	7
	Major/Large Urban 67	Low NILF 43	10
			15
			18
		High NILF 24	12
			12

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 7

Number of PSUs selected for Taranaki region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Taranaki 47	Other than Major/Large urban' 21	Low NILF 14	7
			7
		High NILF 7	7
	Major/Large Urban 26	Not Split 26	11
			15

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 8

Number of PSUs selected for Manawatū-Whanganui region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Manawatū-Whanganui 100	Other than Major/Large urban' 41	Low NILF 24	11
			13
		High NILF 17	9
			8
	Major/Large Urban 59	Low NILF 37	14
			23
		High NILF 22	10
			12

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 9

Number of PSUs selected for Wellington region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Wellington 192	Other than Major/Large urban' 34	Low NILF 17	9
			8
		High NILF 17	8
			9
	Major/Large Urban 158	Low NILF 138	11
			14
			13
			13
			15
			18
			18
			19
			17
		High NILF 20	7
			13

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 10

Number of PSUs selected for Tasman/Marlborough/Nelson/West Coast region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Tasman/Marlborough/Nelson / West Coast 81	Other than Major/Large urban' 52	Low NILF 35	8
			13
			14
		High NILF 17	5
			12
	Major/Large Urban 29	Not Split 29	12
			17

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 11

Number of PSUs selected for Canterbury region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Canterbury 244	Other than Major/Large urban' 77	Low NILF 58	9
			9
			12
			12
			16
		High NILF 19	8
			11
	Major/Large Urban 167	Low NILF 132	13
			14
			16
			16
			16
			18
			16
			23
		High NILF 35	14
			21

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 12

Number of PSUs selected for Otago region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Otago 88	Other than Major/Large urban' 44	Low NILF 30	10
			10
			10
		High NILF 14	14
	Major/Large Urban 44	Low NILF 30	14
			16
		High NILF 14	14

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix table 13

Number of PSUs selected for Southland region by stratum

Region	Stratum		
	Urban/Indicator	High NILF Indicator	NZ Dep Group selection PSUs
Southland 46	Other than Major/Large urban' 17	Not Split 17	7
			10
	Major/Large Urban 29	Not Split 29	11
			18

Note: NILF is not in labour force stratum; NZDep is New Zealand Deprivation Index.

Source: Stats NZ

Appendix 2: Eligibility tables

The tables in this appendix describe the eligibility status codes assigned to households based on labour force status, scope code, and participation code.

Appendix table 14

Eligibility status categories		
Category	**Description**	**Condition to be met**
1	Ineligible pre-contact	Response status code for household questionnaire is in (411,412,413,414)
2	Ineligible post-contact	Response status code for household questionnaire is in (611,615,616) **OR** Response status code for personal questionnaire for **all** household members is in (613,614,616)
3	Eligible non-responding	Response status code for household questionnaire is in (111) **AND** Response status code for personal questionnaire for **any** household member is in (211,212,213,214,311,312,313,314,315,317,511,512, 513) **AND** No household member had DVLFS in (1,2,3)
4	Eligible responding	(Response status code for household questionnaire is in (111) **AND** At least one household member has response status code for personal questionnaire is in (111,211,212,213,214,311,312,313,314,315,511,512, 513) **AND** DVLFS in (1,2,3)) **OR** Response status code for household questionnaire is in (954)[1]
5	Unknown eligibility	Response status code for household questionnaire is in (211,212,213,214,215,217,311,312,314,315,316,317, 511,512,513,952[2])
Source: Stats NZ		

[1] 954 refers to 75+ households. This is a temporary code that may change number or become obsolete once a new collection platform is implemented.

[2] 952 refers to the 'Do not interview' code, used exclusively by the HLFS (for example, a gang house that is unsafe to visit). It is a 'completed' code and rolls over from quarter to quarter (unlike code 213). This is a temporary code that may change number or become unnecessary once a new collection platform is adopted.

Appendix table 15

Labour force categories	
Category	**Description**
1	Employed
2	Unemployed
3	Not in the labour force
9	Labour force status unidentified
Source: Stats NZ	

Appendix table 16

HQ response status codes	
Category	**Description**
111	Complete: Response
211	Complete: Unable to contact~
212	Complete: Confirmed away for the survey period~
213	Complete: Cannot contact - Health and safety~
214	Complete: Cannot contact - Natural disaster~
215	Complete: Address not visited/phoned~
217	Complete: Unable to access building~
311	Complete: No interview Illness~
312	Complete: No interview Bereavement~
314	Complete: No interview Language~
315	Complete: No interview Disability~
316	Complete: Unable to re-contact~
317	Complete: Insufficient information to continue
411	Complete: Dwelling vacant/empty~
412	Complete: Dwelling under construction~
413	Complete: Non-private dwelling~
414	Complete: Dwelling derelict/demolished/non-dwelling~
511	Complete: Refusal~
512	Complete: Refusal during interview~
513	Complete: Refusal during interview
611	Complete: Out of scope~
615	Complete: Not main residence (holiday/second home)~
616	Complete: Out of scope
Note: ~ means interviewers are able to add comments. **Source**: Stats NZ	

Appendix table 17

PQ response status codes	
Category	**Description**
111	Complete: Response
211	Complete: Unable to contact~
212	Complete: Confirmed away for the survey period~
213	Complete: Cannot contact_Health and safety~
214	Complete: Cannot contact_Natural disaster~
311	Complete: No interview_Illness~
312	Complete: No interview _Bereavement~
313	Complete: No interview_Deceased~
314	Complete: No interview_Language~
315	Complete: No interview_Disability~
317	Complete: Insufficient information to continue
511	Complete: Refusal~
512	Complete: Refusal during interview~
513	Complete: Refusal during interview
613	Complete: Person found ineligible in interview~
614	Complete: Person removed from survey~
616	Complete: Out of scope

Note: ~ means interviewers are able to add comments.

Source: Stats NZ

Appendix 3: Weighting

This appendix provides a detailed explanation of the stages of weighting used in the HLFS.

PSU selection weight

The selection weight d_i for each PSU i is calculated as the inverse of the probability of selection π_i so that PSUs with a lower probability of selection receive a higher selection weight.

$$d_i = {}^{1}/_{\pi_i}$$

Within strata, PSUs are selected with PPS. That is, the selection probability of PSU i of stratum h is:

$$\pi_{ih} = n_h \frac{s_{ih}}{\sum s_{ih}}$$

where n_h is the number of PSUs to be selected from stratum h, and s_{ih} is the size of PSU i of stratum h. In addition, size is defined as:

$$s_{ih} = r_{ih}\sqrt{0.02 + p_{ih}}$$

where r_{ih} is the number of occupied or under-construction dwellings in PSU i of stratum h, and p_{ih} is the proportion of adults in the PSU who are Māori (see HLFS sample design for details).

Previously (ie in older designs), we selected a simple random sample of PSUs from each stratum. In this case, the selection weight was calculated as a ratio estimator because PSU sizes can vary considerably. The ratio estimator used was:

$$w_{hi} = \frac{\sum_{i=1}^{N_h} x_{hi}}{\sum_{i=1}^{N_h} \sigma_{hi} x_{hi}}$$

where

$$\sigma_{hi} = \begin{cases} 1, & if\ PSU\ i\ of\ strautm\ h\ is\ seleted \\ 0, & otherwise \end{cases}$$

and x_{hi} is some known quantity such as PSU size. Consider the sample estimate of some stratum total:

$$\hat{Y}_h = \frac{\sum_{i=1}^{N_h} x_{hi}}{\sum_{i=1}^{N_h} \sigma_{hi} x_{hi}} \sum_{i=1}^{N_h} \sigma_{hi} y_{hi}$$

If $x_{hi} = y_{hi}$ then $\hat{Y}_h$ will be estimated without any error. More generally, as long as the relationship between the x_{hi} and y_{hi} is modelled well by a regression through the origin, the ratio estimator can reduce sampling variability considerably. The stronger the relationship the greater the improvement.

For the HLFS, x_{hi} was typically the PSU size, which is a count of the number of occupied private dwellings and dwellings under construction at the time of the census.

Household selection weight

We multiply the PSU selection weight by a household selection weight to account for the selection of households within PSUs. For the new sample, the number of addresses to select per PSU is calculated as the total desired sample size divided by the number of selected PSUs.

However, as discussed in HLFS sample design, we require a minimum of five panels in any PSU. Some PSUs do not contain enough addresses to make five panels of the implied number of addresses (given the total desired sample size) to select per PSU. Therefore, we select fewer addresses per panel in these PSUs (ie the sampling interval is set to 5). This means the actual number of selected addresses falls short of the desired sample size. We therefore run the exercise again, this time excluding those small PSUs. The number of addresses to select per PSU is re-calculated in the remaining PSUs, as:

$$\frac{\text{desired total sample} - \text{selected sample size in the small PSUs}}{\text{remaining number of PSUs}}$$

This process is repeated until the actual number of addresses selected is the same as the desired total sample size. We then calculate the sampling interval (or household selection weight) as the total number of addresses in a PSU divided by the number of selected addresses in the PSU.

A simple example is presented below, where there are three PSUs and the desired total sample size is 35 addresses. PSU number 1 does not have enough addresses to meet the implied number of addresses per PSU (35/3=11.67), assuming 5 panels are needed per PSU. Therefore, the sampling interval in PSU number 1 is set to 5, with 10 addresses per panel, and the remaining number of desired addresses (35-10=25) sets the new implied number of addresses per PSU over the two remaining PSUs (25/2=12.5). Using this new implied number of addresses per PSU, PSU number 2 does not have enough addresses (again, assuming 5 panels are needed per PSU), and so the sampling interval in this PSU is also set to 5, with 12 addresses per panel. The new implied number of addresses for the final PSU is (35-10-12=13/1=13) and the third PSU is large enough to accommodate 5.4 panels of size 13.

Appendix table 18

Simple example of number of addresses selected per PSU							
PSU number	**PSU size (no. addresses)**	**Sampling interval (K)**	**No. addresses per panel**	**New sampling interval (iteration 1)**	**New no. addresses per panel (iteration 1)**	**New sampling interval (iteration 2)**	**New no. addresses per panel (iteration 2)**
1	50	5	10	5	10	5	10
2	60	5.14	11.67	5	12	5	12
3	70	6	11.67	5.6	12.5	5.4	13
Total sample size	…	…	33.33	…	34.5	…	35
Symbol: … not applicable **Source**: Stats NZ							

For the old sample, we calculated the sampling interval as:

- 6.36 for PSUs with a size of less than 100
- the PSU size divided by 16 for PSUs with a size of 100 or more.

That is, for PSUs with a size of less than 100, every 6.36th household was selected for one panel. For larger PSUs, panels of size 16 were used, resulting in a sampling interval of the PSU size divided by 16.

Calibration

The calibration methodology we employ is generalised regression (GREG), which we implement using GREGWT. GREGWT is a SAS macro, which was developed by the Australian Bureau of Statistics. The GREG estimator is derived as follows:

We want to adjust the initial weights a_i (selection weights multiplied by any non-response adjustment) to get new weights $w_i = a_i g_i$ that meet our benchmark constraints:

$$\sum_{i \in p} w_i x_i = t_{xi}$$

where x_i is an auxiliary variable available for all sampled units i, and the total of this variable for the population (t_{x_i}) is known. We want the new weights to be as close to the initial weights as possible. The GREG estimator is the set of new weights that meet the benchmark constraints above while minimising the generalised least-squares distance function given by:

$$F^{GLS} = \sum_i \frac{c_i (w_i - a_i)^2}{a_i} = \sum_i c_i a_i (g_i - 1)^2$$

Using this distance measure, there is an analytic solution to the minimisation problem, namely:

$$w_i = [1 + [(t_X - t_X)'(X'WX)^{-1}X'W]_i]a_i$$

where $t_X$is the vector of population totals for the auxiliary variables, t_X is the estimate of these totals from the sample, X is the matrix of auxiliary variables, W is a diagonal (weight) matrix whose i,i element is ai/c_i. Clearly the g-factor is the term in the outer brackets on the right-hand side. For more details refer to Devile and Sārndal (1992).

Weights over the transition

Periodically, we draw a new sample for the HLFS. The new sample does not replace the old sample immediately. Rather, we use the HLFS's rotating design to introduce the sample gradually, minimising disruption to estimates of change in the process. That is, one of the main reasons the HLFS employs a rotating design is to ensure a significant number of respondents are common in adjacent quarters, which results in more reliable estimates of quarterly movement. One consequence of introducing a new sample is that during the period of transition there are effectively two independent samples in operation; let's call them A and B – with A being the existing, or old, sample, and B being the new sample. Employing a ratio estimator, the probability of selection of a particular PSU in stratum h is approximated as:

$$\text{PR(PSU k selected)} = \frac{\text{(number of dwelling in PSUs sampled in stratum h)}}{\text{number of dwelling in stratum h}}$$

In the first quarter of the transition (for the most recent transition this is the December 2014 quarter), we retained roughly 7/8ths of the selected PSUs from sample A, so the numerator in this expression becomes smaller, while the denominator remains unchanged. Therefore, the design weights (being the inverse of the expression) should grow by a factor of roughly 8/7. (Note that if all PSUs were exactly the same size, then the factor increase would be exactly 8/7).

In contrast, in the first quarter of the transition we use only 1/8th of sample B, so the calculated design weights come out roughly eight times as large as the full-sample weights. Thus, if we naively combined samples A and B and summed the weights, we would get a figure roughly double the working-age population (assuming no non-response or undercoverage). To remedy this, we then take:

$$a * sum(A) + (1 - a) * sum(B), 0 < a < 1$$

The variance of this quantity is:

$$a^2 Var\big(sum(A)\big) + (1 - a)^2 Var\big(sum(B)\big) + 2a(1 - a)Cov\big(sum(A), sum(B)\big)$$

Let's instead assume we wish to calculate some total t, and we have as estimates t_A and t_B by summing the weights from samples A and B for people with the characteristic of interest. Let us further assume that:

$$t_A = p_A Y \text{ and } t_B = p_B Y$$

where Y is a known population total and $p_.$ is an estimated proportion. Then (assuming zero covariance):

$$var[at_A + (1 - a)t_B] \approx (aY)^2 p_A \frac{(1 - p_A)}{n_A} + \big((1 - a)Y\big)^2 p_B \frac{(1 - p_B)}{n_B}$$

Assume that p_A and p_B, being estimates of the same proportion, are roughly equivalent, then minimising (by differentiating with respect to a, and setting to zero, and taking another short cut by skipping the second-order conditions) the variance above reduces to solving the following:

$$\frac{a}{n_A} = \frac{1-a}{n_B}$$

Which gives:

$$a = \frac{n_A}{n_A + n_B}$$

The complete A and B samples are chosen to be roughly the same size, so in the first quarter of transition we have:

$$a \sim \frac{7}{8} \text{ in the first quarter, } a \sim \frac{6}{8} \text{ in the second quarter, etc.}$$

That is, the selection weights for sample A grow by roughly 8/7 in the first quarter of transition, and then are multiplied by roughly (actually, exactly in practice) 7/8. Thus, the selection weights for sample A in the first quarter of transition will be nearly equal to the full-sample selection weights.

Note: This solution minimises variance for cross-sectional estimates. We also investigated the solution for minimising variance for change, but that was not worth implementing.