



# Household living-costs price indexes: Background

New Zealand Government



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## Household living-costs price indexes

This paper provides information about a new set of price indexes that measure the inflation experience of groups of households.

## What HLPIs are

Household living-costs price indexes (HLPIs) provide new insights into the inflation experienced by 13 different household groups:

- beneficiaries
- Māori
- income quintiles (five groups)
- expenditure quintiles (five groups)
- superannuitants.

We publish an all-households HLPI for comparison.

## Why HLPIs are needed

Our decision to create the HLPIs was a response to the 2013 CPI Advisory Committee recommendations (Statistics NZ, 2013) and associated submissions from public consultation in 2014 (Statistics NZ, 2014a). The committee, a customer group set up to advise on the consumers price index (CPI), reconfirmed the CPI's principal use is to inform monetary policy-setting. It also acknowledged the CPI's design is a compromise between this principal use and other uses, such as adjusting a range of public and private payments.

The committee recommended we provide extra indexes to reflect changes in the purchasing power of incomes for different demographic groups.

The CPI measures the change in prices of goods and services acquired by New Zealand-resident private households. It is an aggregate measure that represents the price change experienced **on average** by households. This makes it well suited for use as a national barometer of inflation.

The methods are aligned with the CPI's principal use as a macroeconomic indicator for monetary policy purposes. Yet, hidden behind all averages is a distribution. The distribution of inflation means the CPI does not necessarily align well with inflation experienced by different demographic groups.

## Conceptual design

For any group of households, there are two basic ingredients for measuring inflation:

- commodity-level price change
- expenditure patterns to aggregate price change.

We calculate HLPIs by using population-group-specific expenditure patterns from the Household Economic Survey. These provide the weights for the lowest-level price indexes in the CPI basket of goods and services (the coverage of HLPIs is the same as the CPI, except for owner-occupied housing and interest payments, as described below). The basket comprises about 700 commodities and is designed to be a representative sample of consumer spending. The Household Economic Survey expenditure patterns are aligned to CPI expenditure totals, to minimise known reporting bias in the survey.

We use customised commodity-level price indexes for each household group, by applying group-specific store-type and region weights. The store-type weights (needed to calculated a weighted average price for a product sold in both supermarkets and convenience stores, for instance) use the expenditure by outlet information from the Household Economic Survey. Region weights reflect the regional distribution of households in each household-group.

The conceptual design of the HLPIs differs from the CPI in two important ways.

- The treatment of owner-occupied housing and interest payments better aligns with individual household experience.
- The aggregation method we use better reflects the inflation experienced by a 'typical' household within each group.

The reasons for these variations in approach are described below. These design decisions reflect the feedback we received from the public consultation on HLPIs (Statistics NZ, 2016).

#### **Owner-occupied housing**

The coverage of owner-occupied housing in the HLPIs includes mortgage interest payments and a link to market-value property prices. This treatment aligns better with the inflation experiences of owner-occupier households. Excluding these in the CPI – which instead tracks the cost of purchasing new dwellings (excluding land) – is a design choice that aligns with the CPI's principal use for monetary policy purposes. Given that the CPI helps the Reserve Bank set the Official Cash Rate, including interest payments in the CPI would introduce a circularity to this measure.

The HLPIs include all interest payments. Interest rate changes are quality-adjusted to maintain the purchasing power of the monetary amount of debt underlying these interest payments. Mortgage debt is quality-adjusted using a market-value property price index (Quotable Value's house price index) and other debt is quality-adjusted using the CPI (as a broad measure of inflation).

This conceptual treatment of owner-occupied housing is known as a **'payment' approach**. This approach is noted by the International Labour Organisation (ILO, 2003) as often being used, "when the primary purpose of the index is for the adjustment of compensation or income". The 2013 CPI Advisory Committee recommended this approach for HLPIs (Statistics NZ, 2013). The payment approach tracks the price change for goods and services 'paid for', regardless of when they are acquired or used. In contrast, the CPI uses an 'acquisition' approach, reflecting price changes for goods and services when they are acquired. The main practical difference between these approaches is on the measurement of housing, interest, and insurance.

The acquisition-based CPI commodity-level price indicators can be translated to a payment approach with the following modifications:

- including interest payments
- excluding net acquisition of owner-occupied housing
- using gross expenditure weights for insurance.

For HLPIs, under the payment approach insurance expenditure weights are on a 'gross' basis, based on total household spending on insurance premiums. This is in contrast to the 'net' basis used in the CPI, which includes only the proportion of insurance premiums that contributes to the cost of providing the insurance service (ie premiums less claims).

### Aggregation method

The aggregation method – used to combine household expenditure patterns within each household group – uses an unweighted average of the expenditure proportions for each household. This method is known as 'democratic weighting'. It better reflects the inflation experienced by a 'typical' household than does the 'plutocratic weighting' method used for the CPI.

The CPI approach, best suited to a macroeconomic indicator, involves calculating expenditure patterns from aggregate household expenditure. This latter approach means that higher expenditure households have a greater influence over the composition of the aggregate patterns.

For additional information on why we chose this method see Bentley, 2016.

## Household-group definitions

The definitions for each household-group were chosen to best meet customer needs, following a public consultation in 2015 (Statistics NZ, 2016).

Table 1	
Household-group	definitions

Group	Definition
All households	All private New Zealand-resident households.1
Beneficiary	Households where the highest-income recipient receives a benefit payment, classified as a 'main benefit' in the Household Economic Survey. <sup>2</sup>
Māori	Households where at least one member has reported Māori ethnicity (as one of their ethnicities).
Superannuitant	Households where the highest-income recipient received a New Zealand government pension.
Expenditure (quintiles)	Equivalised household expenditure. Five groups from low to high.
Income (quintiles)	Equivalised household disposable income. Five groups from low to high.
Source: Statistics NZ	

<sup>&</sup>lt;sup>1</sup> This is the target population for the Household Economic Survey (HES).

<sup>&</sup>lt;sup>2</sup> In the 2012/13 survey, the following were classified as main benefits: Student allowance, Youth payment/Young parent payment, Orphan's benefit, Unsupported child's benefit, Jobseeker support, Sole parent support, Supported living payment, Emergency benefit, and Emergency maintenance allowance.

Table 2 shows some demographic information for each of the household-groups, based on the 2012/13 Household Economic Survey.

Table 2	
Household-group	demographics

Group	Average age	Average Average Equivalised median age household annual household:		Home ownership	
	(years)	(people)	disposable income (\$)	expenditure (\$)	(percent)
All-households	37.0	2.6	33,400	29,700	66.5
Beneficiary	27.3	2.5	17,700	17,900	24.6
Māori	30.2	3.1	28,400	24,900	44.6
Superannuitant	68.8	1.7	25,400	23,500	88.1
Expenditure quintile 1 (low)	38.5	2.6	19,200	13,700	54.9
Expenditure quintile 2	35.7	2.7	25,700	22,000	58.4
Expenditure quintile 3	36.4	2.8	33,100	29,700	66.5
Expenditure quintile 4	36.5	2.6	45,600	39,800	70.0
Expenditure quintile 5 (high)	37.9	2.5	60,100	56,900	82.9
Income quintile 1 (low)	37.4	2.4	17,200	17,600	52.1
Income quintile 2	34.2	2.9	24,200	22,700	58.2
Income quintile 3	34.8	2.8	33,400	30,100	67.1
Income quintile	38.2	2.6	47,900	38,100	72.5
Income quintile 5 (high)	41.0	2.4	72,200	49,600	82.8

Note: Equivalised income and expenditure shown are for a 1-adult household. Home ownership proportion includes ownership in a family trust.

Source: Statistics NZ

#### Equivalised expenditure/income explained

Equivalisation is a technique that adjusts expenditure/income information to help compare economic standard of living across households. The basic concept is to look at expenditure/income per 'standardised' person – each person is standardised according to the household they live in. Equivalisation is based on the premise that larger households need relatively fewer resources per person to maintain the same standard of living as smaller households; there are economies of scale and pooling of resources within larger households.

The modified OECD scale is used to define the HLPI household groups. It is a simple scale that is widely used internationally. The scale assigns a value of 1 to the first household member, 0.5 to each additional adult, and 0.3 to each child (aged under 14 years). For example, this implies that a household of two adults and one child would need 1.8 times the expenditure/income as a one-adult household to obtain the same standard of living.

Table 3 shows the expenditure and income boundaries used to define the household groups in the 2012/13 Household Economic Survey (used to calculate the June 2014 quarter expenditure weights). The expenditure and income of each household has been equivalised to a 1-adult household. Boundaries for all years are in Appendix 6.

Quintile	Expenditure Income	
Quintile 1 (low)	Less than \$17,943	Less than \$19,892
Quintile 2	\$17,943 – \$25,328	\$19,892 – \$28,307
Quintile 3	\$25,329 – \$34,670	\$28,308 – \$41,112
Quintile 4	\$34,671 – \$46,137	\$41,113 – \$55,367
Quintile 5 (high)	\$46,138 +	\$55,368 +
Source: Statistics NZ		

# Table 3Quintile boundaries (equivalised 1-adult household)

Sensitivity analysis on the choice of equivalisation scale found little difference in the household-group inflation rates using the chosen, modified OECD scale, compared with the Square Root and the Jensen scales (Bentley, 2015).

## Choosing expenditure or income quintiles

Household expenditure and income from the Household Economic Survey, used to define the household-groups, reflects the **annual** expenditure and income during the survey reference period. In a given year, a household may have higher or lower expenditure/income than their typical amount over a longer time span.

International studies suggest total household **expenditure** may be a better way to classify households with lower economic standard of living than using household income – if the ultimate aim of the classification is to proxy economic standard of living (see OECD, 2013). Total expenditure may be preferable because households may fund some of their expenditure by decreasing their assets or increasing their liabilities.

Income quintile HLPIs can be used for consistency with other income studies. We use disposable (or net) income – that is, income available after income tax. This represents what is available to spend on consumption (or for savings).

## Expenditure patterns

The expenditure weights, which we use to aggregate price change, reflect the household-group specific expenditure patterns. Figure 1 shows the group-level patterns. These are broadly consistent over time. The largest differences in expenditure patterns between household groups are for housing and interest payments.



#### Figure 1

Consistent expenditure patterns over time

rear (June qu

Source: Statistics NZ

Figure 2 shows the differences in expenditure weights for selected household groups, at the subgroup level of the New Zealand Household Expenditure Classification (differences of less than 1 percentage point are omitted). See Appendix 3 for detailed expenditure patterns.

#### Figure 2

Housing-related costs a major difference in expenditure patterns



Source: Statistics NZ

#### Greater precision in more aggregated data

The expenditure patterns use the expenditure and demographic information from the Household Economic Survey. As this is a sample survey, with an achieved sample size of about 3,000 households, the estimates are subject to sampling variability.

The HLPI feasibility study (Bentley, 2013) found that, over the study period 2008-12, differences in expenditure patterns resulted in statistically significant differences in inflation for some household-groups – compared with all households. That is, the differences were larger than the sampling noise. We have also received customer feedback that the patterns look intuitively sensible and are of sufficient quality to make ongoing publication desirable.

Lower-level expenditure patterns will be more volatile, as the sampling error will be greater. There is a smaller chance that the surveyed households have reported expenditure on a more narrowly defined category within the survey reporting window. For example, the expenditure weight on subgroup 11.6 (other miscellaneous services) is volatile over the three weight reference periods (2008, 2011, 2014). These changes are influenced by a decrease in expenditure on class 11.6.03 (real estate fees) between 2008 and 2011. We see the decrease in the weights for all households, but it is more acute for some household groups. In part, this is likely to reflect sampling volatility since expenditure on real estate fees will be a large but irregular amount.

## Historical time series

Historical time series begin in the June 2008 quarter. This period is the earliest implementation of our current expenditure classification for price indexes. Superannuitants experienced the highest annual price change over the 7¼ years to the September quarter 2015 (shown in figures 6 & 7).

The lowest expenditure quintile had cumulative inflation of 17.5 percent (annual average price change of 2.3 percent), compared with 9.5 percent (1.3 percent annual average) for the highest expenditure quintile.

#### Figure 3



Cumulative inflation since June 2008 quarter

Source: Statistics NZ



Annual inflation

Appendix 4 shows a time series comparison for each of the HLPIs.

Source: Statistics NZ

#### Reasons for different rates of inflation

Figure 4 shows the percentage points difference in average annual price change for the June 2008 to September 2015 quarters – for each household group compared with the rate of inflation for all households. The right-hand panel shows the reasons for the different experiences of inflation. These are expressed as percentage-point contributions (contributions of less than 0.05 percentage points are omitted).

#### Figure 4



Average annual inflation June 2008 to September 2015 quarters

Source: Statistics NZ

Price change for cigarettes and tobacco, rent, and household energy tracked faster than the general increase in prices over the period. Household groups that spent a greater proportion of their outgoings on these commodities experienced these price increases to a greater extent.

Interest payments had deflation over the period, influenced by the decline in the Official Cash Rate. Household groups with a greater-than-average proportion of expenditure on interest experienced this decrease more.

Between the September 2013 and September 2015 quarters, the interest payments price index tracked upwards, reflecting the increasing market-value property prices (which is used to maintain the purchasing power of mortgage interest payments).

Appendix 5 has a visualisation of the reasons for the differences in inflation experiences over time.

## Future developments

We will publish the HLPIs quarterly, about 30 days after the reference quarter. The first publication is on Tuesday, 8 November 2016, at 10.45 am. This will have data for the June 2008 to September 2016 quarters. There will be a media conference for this first release.

#### Three-yearly review

We will update the expenditure patterns every three years using the latest information from the Household Economic Survey. This will ensure the indexes reflect contemporary expenditure.

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# Appendix 1: Brief history of household-group inflation measurement in New Zealand

## Long-considered question

Consideration of household-group inflation is as old as consumer price measurement itself. It is closely related to questions about the purpose and construction of the headline measure of consumer price change. Bentley (2014) describes the evolution of CPI use in New Zealand, the implications for the reference population, coverage of goods and services, and the availability of household inflation measures for specific groups of households.

Over the 100-year history of the CPI, the index has evolved from being a necessities index (initially limited to food and house rent) for wage determinations by the Arbitration Court, through being a wider measure of household inflation, to its present-day focus as a macroeconomic indicator for monetary policy targeting.

In 1948, an advisory committee for revising the CPI from 1949 recommended widening the scope so the index was no longer restricted to necessities. In reality, it took until 1955 for there to be sufficiently liberal thinking to include private motoring and beer in the CPI basket of goods and services, and a further 20 years for wine and spirits to be included. Both the 1978 and 1985 CPI advisory committees discussed having a special-purpose price index limited to 'basics' or 'necessities', but they rejected the notion – due to the practical difficulties of classifying items as either necessities or luxuries.

Successive reviews of the CPI in the mid-20th century considered the variation in expenditure patterns between New Zealand households was likely to be less than in some other countries. This view, combined with the lack of a comprehensive household budget survey, meant no formal attempts were made to construct group-specific indexes until 1975.

## Data availability

Since the first modern Household Economic Survey in 1973/74 (then the Household Survey) constructing special indexes for particular household groups has been technically feasible. We published a beneficiaries price index in 1975, and Jackson (1978) considered indexes for several household groupings, including income, age, occupation, and family type. Jackson found the clearest pattern of differential rates of inflation was for households grouped by 'income of head of household'. Expenditure weights for the beneficiaries price index were noticeably different from those used in the CPI for food and rent. Despite this, the 1978 and 1985 CPI advisory committees concluded that movements in the beneficiaries price index over its one-year life-span were not significantly different from those of the CPI. The index was discontinued in 1976.

A longer-lived household-group price index was the superannuitants price index, published in the mid–late 1990s and sorting superannuitants by home-ownership status. A faster rate of inflation was found for renters than owner-occupiers, the latter more closely tracking the CPI. This index was discontinued in 1999 when we removed interest payments from the CPI (making the CPI more suitable as an inflation target and less amenable to household-group-specific measures).

## Customer needs

In the recent past, CPI advisory committees have recommended special consumer price indexes for particular groups of households. The 1997 committee stated that the extent to which the CPI represents the expenditure patterns of different socioeconomic groups should be considered. The 2004 and 2013 committees explicitly recommended producing supplementary indexes for different population groups, such as government transfer recipients (including superannuitants), income groups, wage and salary earners, and (by the 2013 committee) ethnic groups.

## Appendix 2: International comparability

Internationally, the scope and coverage of measuring household inflation varies across countries in two important ways:

- 1. The treatment of owner-occupied housing
- 2. Availability of measures of consumer price change for groups of households.

In both these aspects the New Zealand approach is most similar to Australia. We use the same 'acquisitions' approach to owner-occupied housing in our CPIs. This tracks the cost of purchasing new dwellings (excluding land), and is aligned with a principle use of the CPI for monetary policy purposes.

The HLPIs are conceptually very similar to the Selected Living Cost Indexes (SLCIs) produced in Australia (Australian Bureau of Statistics, 2016). Both sets of living-costs price indexes use the 'payment' approach, which uses interest payments to capture owner-occupied housing costs. This makes the indexes conceptually suited to indexation of monetary payments.

The household-groupings used in Australia, for SLCIs, are:

- 1. Employee
- 2. Self-funded retiree
- 3. Age pensioner
- 4. Other government transfer recipient
- 5. Pensioner and beneficiary (combining groups 3 and 4).

The aggregation method we use for the HLPIs is a notable difference from the Australian SLCIs. The HLPIs use an unweighted average of the expenditure proportions for each household ('democratic weighting'). This approach, chosen following public consultation (Statistics NZ, 2016), better reflects the inflation experienced by a 'typical' household within each household-group. The use of this approach, and analysis of the impact, was tabled at the joint United Nations Economic Commission for Europe/International Labour Organisation 2016 Meeting of the Group of Experts on Consumer Price Indices. The paper *Household-group inflation: methods to combine expenditure patterns* (Bentley, 2016) includes details on the approaches used in several other countries.

# Appendix 3: Detailed expenditure patterns



## Appendix 4: Comparison with all households



# Appendix 5: Reasons for differences in inflation



Difference in annual inflation, compared with all-households

Source: Statistics NZ

# Appendix 6: Quintile boundaries

Quintile	2006/07	2009/10	2012/13
Quintile 1 (low)	Less than \$14,779	Less than \$16,591	Less than \$17,943
Quintile 2	\$14,779 - \$21,188	\$16,591 – \$23,697	\$17,943 - \$25,328
Quintile 3	\$21,189 - \$29,296	\$23,698 - \$31,471	\$25,329 - \$34,670
Quintile 4	\$29,297 - \$40,961	\$31,472 - \$42,499	\$34,671 - \$46,137
Quintile 5 (high)	\$40,962 +	\$42,500 +	\$46,138 +

#### Expenditure boundaries (equivalised 1-adult household)

#### Income boundaries (equivalised 1-adult household)

Quintile	2006/07	2009/10	2012/13
Quintile 1 (low)	Less than \$15,666	Less than \$18,039	Less than \$19,892
Quintile 2	\$15,666 - \$22,746	\$18,039 - \$26,272	\$19,892 - \$28,307
Quintile 3	\$22,747 - \$31,399	\$26,273 - \$36,070	\$28,308 - \$41,112
Quintile 4	\$31,400 - \$43,819	\$36,071 - \$49,379	\$41,113 - \$55,367
Quintile 5 (high)	\$43,820 +	\$49,380 +	\$55,368 +

# Appendix 7: Bulk data files (.csv format)

Bulk data files are available for you to explore the data further.

## Group facts

## File: hlpi\_groupfacts.csv

The data is from the Household Economic Survey

Variable	Description
hlpi_name	Household group
year	Weight reference year:
	2008 relates to 2006/07 Household Economic Survey
	2011 relates to 2009/10 Household Economic Survey
	2014 relates to 2012/13 Household Economic Survey
hlpi	Household group 5-character identifier
tot_hhs	Total number of households
011/0	Number of households that own their home (including ownership
OWI	
own_wm	Number of households that own their home with a mortgage
own_prop	Percentage of households that own their home
own_wm_prop	Percentage of households that own their home with a mortgage
prop_hhs	Proportion of households (in household group)
age	Average age of household members
size	Average people per households
income	Median annual household disposable income (dollars)
expenditure	Median annual household expenditure (dollars)
eqv_income	Equivalised median annual disposable income (dollars, equivalised 1-person household)
eqv_exp	Equivalised median annual expenditure (dollars, equivalised 1- person household)

## Expenditure weights

## File: hlpi\_weights.csv

The data is based on the Household Economic Survey. Expenditure patterns are aligned to CPI expenditure totals, to minimise known reporting bias in the survey.

Variable	Description
hlpi_name	Household group
year	Weight reference year: 2008 relates to 2006/07 Household Economic Survey, and June 2008 quarter for price index calculations 2011 relates to 2009/10 Household Economic Survey, and June 2011 quarter for price index calculations 2014 relates to 2012/13 Household Economic Survey, and June 2014 quarter for price index calculations
hlpi	Household group 5 character identifier
nzhec	New Zealand Household Expenditure Classification (NZHEC)
nzhec_name	NZHEC description
nzhec_short	NZHEC short description (limited to 29 characters)
level	Level of NZHEC
weight	Expenditure weight (this is a 'democratic weight' to reflect expenditure for a 'typical' household in each group).
nzhec1	Group level NZHEC
nzhec1_name	Group level NZHEC description
nzhec1_short	Group level NZHEC short description
exp_pw	Typical weekly expenditure in dollars (median annual household expenditure per week, multiplied by expenditure weight)
eqv_exp_pw	Equivalised typical weekly expenditure in dollars, equivalised 1- person household (equivalised median annual household expenditure per week, multiplied by expenditure weight)

## Index time series

## File: hlpi\_index.csv

The data is the Household living-costs price indexes. These series are also available on Infoshare.

Variable	Description
hlpi_name	Household group
series_ref	Infoshare time series identifier
quarter	Year.quarter format
hlpi	Household group 5-character identifier
nzhec	New Zealand Household Expenditure Classification (NZHEC)
nzhec_name	NZHEC description
nzhec_short	NZHEC short description (limited to 29 characters)
level	Level of NZHEC
index	June 2014 quarter = 1000
change.q	Quarterly change (percentage change from previous quarter)
change.a	Annual change (percentage change from same quarter of previous year)