



Office of the Council for the
Ongoing Government of Tokelau
Tokelau National Statistics Office

Tokelau Consumer Price Index Technical notes, Version 2

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Introduction

The Consumer Price Index (CPI) is a measure of the price change of goods and services purchased by Tokelau households. The CPI measures the changing cost of purchasing a fixed basket of goods and services which represents the average expenditure pattern of Tokelau households at the index base period.

This document discusses background information to the construction of Tokelau's CPI, and non-period-specific data quality implications. The information in this document is aimed at a technical audience.

The first version of this document was published 12 December 2012; it was updated after implementation of a reviewed basket of goods and services in August/September 2017.

Construction of the CPI

Target population

The target population for the CPI is Tokelau residents, living in private households. This means that the target population does not include:

- overseas visitors who expect to be resident in Tokelau for fewer than 3 months
- overseas Tokelauans working for the public service in Apia
- Tokelauan residents who are temporarily overseas
- Taupulega (village councils), schools, hospitals, or other non-private institutions.

For CPI purposes, a 'household' is a group of people who share a private dwelling. They generally share food preparation and consumption, and contribute towards providing the essentials for living as a group.

Conceptual approach

The Tokelau CPI is based on a 'payment' concept. The payment approach measures price change over time for the net expenditure on goods and services by the household sector overall. The payment approach relates to the period of time when the actual payments for the product are made. This can differ from the period when it is acquired and when it is used. A CPI based on this approach will measure the change in the cost of purchasing a commodity over time.

Classification system

The Tokelau CPI uses the international standard Classification of Individual Consumption according to Purpose (COICOP), developed by the United Nations.

The following COICOP areas are not part of the Tokelau CPI:

- Health (Group 06)
- Education (Group 10)
- Restaurants or hotels (Group 11)
- Rental accommodation, and housing construction.

Primary level universal health care is provided free of charge on all three atolls. Medical issues that cannot be catered for on atoll are referred to either Samoa or New Zealand under the Tokelau Patient Referral Scheme. Therefore household expenditure on health is minimal, and is not included in the CPI.

Tokelau has a free-of-charge, compulsory education system for primary and secondary students up to the age of 16. A distance learning foundation course run by the University of the South Pacific is freely available in Tokelau for students who want to get ready for tertiary study. A scholarship scheme also offers students the chance to undertake tertiary study abroad.

There are no hotels nor any restaurants of significance within the Tokelau islands.

A housing scheme funded by the New Zealand Government began in the early 1980s. The scheme allows households in Tokelau to apply to their Taupulega for funding to improve their own housing. The scheme still runs today, and two or three houses in each atoll are approved for funding every year.

Weighting the basket

Data sources for weighting the basket

Weights show the relative importance of an item to the overall set of items.

The 2012 weight construction was based on administrative information compiled from several sources across the wider Tokelau Government. The 2015/16 Household Income and Expenditure Survey (HIES) provided accurate information for reviewing the basket of goods and services and the weights of the items; this has been implemented in 2017 from the June quarter onwards (published together with the September quarter, with a revision of March quarter results).

Weights are constructed using payment and expenditure information derived from source data.

The sources include:

- purchase and import information for the co-op stores
- sales information for the bulk stores
- record of passenger travel to, and from Tokelau
- electricity and telecommunication costs and expenditure
- costs associated with the private importation of goods
- detailed quarterly consumption diaries over a fortnight from the HIES 2015/16.

The Tokelau CPI initially had a weight reference period of the year to 30 June 2012. All data sources had a reference period that match this period, with the exception of privately imported goods. Due to data availability, the first sources used to calculate private expenditure on imported goods had a reference period of four months to 30 November 2012. This was then annualised to represent the year to 30 June 2012.

The 2017 review used data from the HIES 2015/16, particularly purchase diaries kept by about 50 percent of Tokelau households for a period of 2 weeks each, in the months May, August and November 2015, and January 2016.

The sources of information used to weight the basket vary in quality. Each source is discussed in more detail below. Furthermore, large, infrequent purchases (such as the purchase of boats, water-tanks, or cars) are not accurately represented in estimates of total household expenditure.

What the basket represents

The goods and services in the CPI basket are a sample that represents the wider range of goods and services purchased by households. Originally 92 individual goods and services were monitored; the basket reviewed in 2017 contains 96 items. These, and their changes, are listed in [Appendix 1](#).

The expenditure weights assigned to each of the goods and services in the basket represent expenditure on those goods and services. But they also represent expenditure on similar goods and services not directly included in the basket but expected to exhibit similar price change. For example, apples and oranges are in the basket but bananas are not. Expenditure on bananas (and other fruit not in the basket) is allocated to apples and to oranges in proportion to spending directly on each of these two fruits.

Table 1 shows the proportion of expenditure weights as assigned to COICOP groups and selected subgroups, before and after the 2017 revision.

Table 1 Consumer price index of Tokelau: expenditure weights by group and selected subgroup

Group	Base expenditure weight June 2012 quarter Percent ⁽¹⁾	Base expenditure weight From June 2017 quarter Percent ⁽¹⁾
Food and non-alcoholic beverages group	41.94	33.71
Food	36.35	31.41
Non-alcoholic beverages	5.59	2.30
Alcoholic beverages and tobacco group	22.14	25.94
Alcoholic beverages	5.59	9.78
Cigarettes and tobacco	16.55	16.16
Clothing and footwear group	1.10	4.03
Housing, water, electricity, gas, and other fuels group	9.70	7.27
Furnishings, household equipment, and routine household maintenance group	5.73	7.20
Transport group	9.19	7.77
Communication group	4.94	6.50
Recreation and culture group	0.00	2.97
Miscellaneous goods and services group	5.24	4.60
All groups	100.00	100.00

1. Due to rounding, individual figures may not sum to stated totals.

Source: Tokelau National Statistics Office

Weighting for the co-op and bulk stores

Before application of the 2015/16 HIES, the data sources used to weight household expenditure from the co-op and bulk stores were slightly different. Both the co-op and bulk store import all of their products from overseas, generally from Samoa and New Zealand. Purchasing and shipping of imported items is organised through the Department of Transport and Support Services. There is a co-op, and a bulk store in each village.

Co-op stores

Co-op stores in Tokelau act much like supermarkets, selling items primarily for household consumption. All items imported by the co-op stores are logged in invoices generated by the Department of Transport and Support Services (TSS). These invoices include information on date of shipment, purchase and sale cost, as well as descriptive information about the items. Initially they were the primary source of information for deriving expenditure weights for the CPI.

Less detailed information is provided in the shipping manifests, also prepared by TSS for Samoa Customs. These documents also provide useful information although often smaller quantities of goods are lumped under "Assorted goods". They provide a means of verifying quantities in the stores invoices, particularly for alcohol and cigarettes, which are exported duty-free from Samoa but attract Tokelau taxes. (A detailed analysis for Tokelau imports from Samoa in 2014 has been completed.)

Not all items imported by the co-op stores are sold just to households. Some items are sold to households and/or the Taupulega, hospital, or other non-household entities. Only items sold to private households are considered in scope for the CPI.

Bulk stores

Bulk stores in Tokelau act much like hardware stores in other countries. The bulk stores provide products for use in building construction and maintenance. Many of the materials imported for sale in the bulk stores are purchased for non-household use, such as by Taupulega, hospital, or school. Originally, 6 items purchased by a private individuals from bulk stores were priced for the CPI.

The 2017 review considered that most of these private purchases were for capital development rather than maintenance, for example cement, timber, roofing iron and nails. As such they do not contribute to the CPI group 5: Furnishings, household equipment and routine household maintenance. Only the items PVC pipe and Paint were retained, with their weightings based on the HIES 2015/16.

Weighting for services

Electricity

Information on household expenditure on electricity is collected independently by each nuku. Until completion of the HIES 2015/16, assessment of data quality was difficult.

In 2012, Tokelau transformed its power generation from being entirely dependent on imported diesel, to having 1.5 times of existing capacity generated by solar panels. A loan from the New Zealand Government funded the installation of the solar panels. Due to increased demand, further expansion took place in 2016 and 2017. The Department of Energy has not changed electricity charges as a result of the switch to solar energy.

Telecommunications

Teletok is the only telecommunications company in Tokelau. Teletok is a state-owned enterprise and runs fixed line telephone and broadband Internet services. A mobile service was established mid-2017 in Tokelau and it was decided to let the service "bed in" before including it in the CPI. However subscription to satellite TV was included after the 2017 review.

The Internet in Tokelau is run through a central firewall, where all users log-on through their Internet browsers. This means that a user can log on at any access point, or computer, and have their usage charged to their own account.

Initially Teletok provided administrative records to the TNSO for use in weight construction; this was then adjusted in 2017 using HIES 2015/16 data.

Transport - private cargo

The Department of Transport manages the shipping of all goods in and out of Tokelau. Mark-up for items sold in the stores is included in the invoices. Absent in prior CPI calculations, the 2107 review led to the inclusion of a standard charge of private imports, for items under 20 kilograms.

Transport - passengers

The Department of Transport and Support Services records the number of passengers on all sailings to and from Tokelau as a part of its administrative business processes. No information was initially available on whether a passenger is travelling privately, or non-privately (i.e. for government, or nuku purposes). The initial estimates from 2012 were superseded in 2017 using data from the 2015/16 HIES.

Excluding out of scope spending

A key step in constructing CPI expenditure weights is to ensure that the estimates include expenditure made by the CPI reference population. Expenditure by others is out of scope of the CPI and needs to be excluded from the expenditure weights. In addition to people not covered by the CPI, expenditure by businesses and government also needs to be excluded.

In 2012 the TNSO estimate what proportion of a particular expenditure was in scope of the CPI when using the information to derive expenditure weights. This was superseded in 2017 using 2015/16 HIES data.

Selecting the basket

The items making up the CPI basket represent the much wider range of goods and services that households purchase. The initial sample proved to be by and large correct when the HIES 2015/16 data were implemented. Some changes to more accurately reflect more recent spending patterns were however made, as show in Appendix 1.

Non-period-specific data quality information

Collection methods

Prices used in the CPI are collected through three main methods: price collection from retail outlets, emailing and telephoning respondents, and contacting the Samoan Bureau of Statistics.

Co-op store managers act as price collectors for the TNSO. They also collect prices at the bulk stores.

At the beginning of each pricing period, the TNSO makes contact with the store managers, and sends out pricing sheets. The store managers undertake item pricing, and send the completed sheets back to the TNSO in Apia, Samoa. The store managers need regular training by the TNSO.

Because of the varying availability of trained on-atoll staff, prices are often collected over the phone, or via email. This is undertaken by a trained member of the TNSO.

Not all goods common to households can be purchased in Tokelau. Some goods are purchased directly in Samoa by Tokelau households and are priced in Apia. For clothing, the corresponding price index in the Samoa Bureau of Statistics' CPI is used to represent the costs faced by Tokelau households. For laptop computer and flatscreen TV, we use price indices from the StatsNZ website.

Pricing frequency

Prices are collected once each quarter: on or close to the middle day of the middle month - except for services such as transport, telecommunications, and energy. These prices are monitored, and updated when change occurs. Change in the price for these services is rare. Notably communication costs changed dramatically in December 2016, fortuitously just before the basket review and reweighting took place.

Imputation

Imputation refers to the statistical practice of replacing missing variables, such as item prices with estimated values. Because of Tokelau's geographic isolation, product availability fluctuates significantly between pricing periods.

Due to item unavailability at the time of price collection, about 15 percent of prices are imputed each quarter. This is generally done by either carrying forward the previous quarter's price, or by applying the movements of similar categories of items.

Care required when using the CPI to adjust monetary values

The CPI can be used to adjust monetary values, such as those in legislation and contracts. Some goods and services in the CPI are not subject to tax, and tax regimes vary across the nuku, and across time. This change in tax can have an impact on a reported change in CPI. Generally, it would not be appropriate to adjust monetary values not subject to tax, by a CPI value change that has been affected by tax change.

Accuracy of the data

Elementary aggregate formula

Average prices in the CPI are called elementary aggregates. These elementary aggregates are the first level of the index aggregation. The geometric mean, or Jevons, formula is used by many national statistical offices to calculate the elementary aggregate indexes for items where outlet substitution is possible. The 'ratio of arithmetic mean prices', or Dutot, formula is used by national statistical offices for items where households cannot easily substitute the outlet they purchases from, or where prices are subsidised and may fall to zero.

In Tokelau, outlet substitution is generally not a possibility for households as there is largely only one outlet on each atoll for each type of good or service. For this reason, prices are aggregated directly to a national elementary aggregate in the Tokelau CPI using the Dutot formula.

Index formulae

The index is calculated using the price relative form of the base weighted Laspeyres formula.

Laspeyres index

$$\text{Index} = \frac{\sum (P_{it} Q_{io})}{\sum (P_{io} Q_{io})} \times 1000$$

Where P_{it} = Price of item i ($i = 1, \dots, m$) in period t

P_{io} = Price of item i ($i = 1, \dots, m$) in the base period

Q_{io} = Quantity of item i purchased in the base period

The Laspeyres index measures the change in cost of purchasing the same basket of goods and services in the current period as was purchased in the specified base period. The prices are weighted by quantities in the base period.

The price relative form of the Laspeyres index is used by TNSO, and by many national statistical offices around the world.

Laspeyres price relative index formula

$$\text{Index} = \frac{\sum E_{io} \frac{P_{it}}{P_{io}}}{\sum E_{io}} \times 1000$$

Where P_{it} = Price of item i ($i = 1, \dots, m$) in period t

P_{io} = Price of item i ($i = 1, \dots, m$) in the base period

E_{io} = Expenditure on item i purchased in the base period

= $P_{io} Q_{io}$

It produces the same results as the basic Laspeyres formula but means that expenditure data can be used directly in the index formula.

Population weights

Population weights are used to allocate the national expenditure weights of goods and services to the CPI pricing centres, Atafu, Fakaofu, and Nukunonu.

For example, the population weights ensure that a price change in Fakaofu (which had 39.3 percent of the population weight in 2012) would have almost 1.5 times the effect on the national CPI than the same price change in Nukunonu (which had 27.0 percent of the population weight then).

From the Tokelau Census of Population and Dwellings, the *de jure* usually resident population present in Tokelau on census night count is used to represent the target CPI population. Initially this was the 2011 Census, but for the 2017 review, 2016 Census data were used.

More information on this count can be found in the *Profile of Tokelau (2011 and 2016 editions)*, available at <http://TokelauNSO.tk> or tinyurl.com/TokelauCensus

Table 2
Population weights for the CPI

Atoll	Weight (%) from Census	
	2011	2016
Atafu	33.7	35.8
Fakaofu	39.3	33.4
Nukunonu	27.0	30.9

Index reference period

Initially the CPI indexes had an index reference period of the June 2012 quarter (=100.0). After the review, the price index reference quarter became March 2017 = 1.000.

The new CPI series was chain-linked to the old series in order to create long-time series, so the publication of the CPI could continue uninterrupted, with base quarter June 2012 (=1.000).

Interpreting the data

Rounding of index numbers and calculation of percentage changes

Percentage changes are published to one decimal place and are calculated from index numbers rounded to one decimal place.

Timing of published data

The first release of the CPI was published on 12 December 2012, for the June and September 2012 quarters. The December 2012 quarter was published in February 2013. After this, publication of each quarterly CPI was by the end of the month following the quarter's end. The publication date of the CPI is generally announced on the TNSO website, three weeks before publication.

The 2017 review caused a slight delay, resulting in combined publication of the June and September 2017 quarters in October. Subsequent publication is to resume by the end of the month following the reference quarter.

Liability

While all care and diligence has been used in processing, analysing, and extracting data and information in this publication, The TNSO gives no warranty it is error-free and will not be liable for any loss or damage suffered by the use directly, or indirectly, of the information in this publication.

Timing of delivery

Our information releases are delivered electronically by third parties. Delivery may be delayed by circumstances outside our control. The TNSO does not accept responsibility for any such delay.

Appendix 1

Items in the CPI basket, before and after the 2017 review

COICOP Group	Pricing location	Item (2012 original)	Item (2017 revised)
01 – Food and non-alcoholic beverages	Co-op store	Rice	Rice
		Flour	Flour
		Biscuits/crackers	Biscuits/crackers
		Noodles	Noodles
		Spaghetti, canned	Spaghetti, canned
		Breakfast cereal	Breakfast cereal
		Beef	Beef
		Lamb/mutton	Lamb chops
		N/A	Lamb flaps
		Chicken	Chicken
		Sausages	Sausages
		Corned beef, canned	Corned beef, canned
		Fish, canned	Fish, canned mackerel
		Fish, canned	Fish, canned tuna
		Milk - long life	Milk - long life
		Condensed milk, canned	Condensed milk, canned
		Milk powder	Milk powder
		Baby formula	Baby formula
		Eggs	Eggs
		Butter	Butter
		Cooking oil	Cooking oil
		Apples	Apples
		Oranges	Oranges
		Fruit salad, canned	Fruit salad, canned
		Pineapple, canned	Pineapple, canned
		Frozen vegetables	Frozen vegetables
		Onions	Onions
		Cabbages	Cabbages
		Potatoes	Potatoes
		Potato chips	Potato chips
		Sugar	Sugar
		Ice cream	Ice cream
		N/A	Soya sauce
		Tomato sauce, canned	Tomato sauce squeeze bottle
		Mayonnaise	Mayonnaise
		Cheese-flavoured corn snack	Cheese-flavoured corn snack
		Instant coffee	Instant coffee
		Chocolate flavoured drink powder	Chocolate flavoured drink powder
		Bottled water	Bottled water
		Fruit juice	Fruit juice
Fruit drink powder	Fruit drink powder		
Cheese	[discontinued]		
Flavoured milk drink	[discontinued]		
Chewing gum	[discontinued]		
Tea bags	[discontinued]		
02 – Alcoholic beverages and tobacco	Co-op store	Spirits - gin	Spirits - whisky
		Spirits - vodka	Spirits - vodka
		Beer - large bottle	Beer - large bottle
		Beer - small bottle	Beer - small bottle
		Cigarettes 1	Cigarettes 1
03 – Clothing and footwear	Co-op store	Cigarettes 2	Cigarettes 2
		Jandals	Jandals
	Samoa Bureau of Statistics	N/A	Boys clothing

COICOP Group	Pricing location	Item (2012 original)	Item (2017 revised)
04 – Housing, water, electricity, gas and other fuels	Bulk store	PVC pipes	PVC pipes
		Paint	Paint
		Cement	[discontinued]
		Roofing iron	[discontinued]
		Timber	[discontinued]
	Co-op store	LPG gas	LPG gas
		Kerosene	Kerosene
	Energy Department	Electricity	Electricity
05 – Furnishings, household equipment and routine household maintenance	Apia stores	N/A	Lounge chair set
		N/A	Mystery
		N/A	Mystery
		N/A	Mystery
		N/A	Bed sheets
		N/A	Batch towel
		N/A	Gas stove
		N/A	Pedestal fan
	Bulk store	Nails	[discontinued]
	Co-op store	Battery	Battery
		Washing powder	Washing powder
		Fabric softener	Fabric softener
		Disinfectant	Disinfectant
		Dishwashing paste	Dishwashing paste
		Fly spray	Fly spray
		Aluminium foil	Aluminium foil
		Mosquito coil	Mosquito coil
		Petrol	Petrol
		Torch	[discontinued]
	Samoa Bureau of Statistics	Refrigerator	Refrigerator
		N/A	Mattress
		Clothing chest	[discontinued]
Safe		[discontinued]	
07 – Transport	Air New Zealand online	N/A	Air fare Apia<->Auckland
	Co-op store	Marine/lubricant spray	[discontinued]
	Transport and Support Services	Boat transport (passenger)	Boat transport (passenger)
		N/A	Boat transport (freight)
08 – Communication	Teletok	Telephone charges – tolls	Telephone charges – tolls NZ
		Telephone charges – tolls	Telephone charges – tolls Samoa
		Telephone charges – tolls	Telephone charges – tolls Tokelau
		Telephone charges – line rentals	Telephone charges – line rentals
		Internet – prepaid	Internet – prepaid 750MB
		Internet – prepaid	Internet – prepaid 1500MB
		Internet – postpaid	Internet – postpaid 100 MB
09 – Recreation and culture	StatsNZ website	N/A	Laptop computer
	InfoShare	N/A	LCD screen television
	Teletok	N/A	TV subscription fee
12 – Miscellaneous goods and services	Co-op store	Soap	Soap
		Tooth paste	Tooth paste
		Hair shampoo	Hair shampoo
		Hair conditioner	Hair conditioner
		Deodorant	Deodorant
		Baby oil	Baby oil
		Nappies	Nappies
		Toilet paper	Toilet paper
		Sanitary pads	[discontinued]
	Lighter	[discontinued]	
	Finance Department	N/A	Transfer fee
Transport and Support Services	N/A	Passport fee	