

Truflation: Argentina Methodology

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Executive Summary

Sustainable economic growth can only come from a common understanding of the facts used as a basis for decision-making. To meet this need, [Truflation](#) built the first-of-its-kind infrastructure to provide unbiased financial data to ensure faster, more intelligent decision-making.

Truflation's indexes are based on market price data collected from 10+ different data sources, comprising 4+ million data points to deliver essential business intelligence around inflation and its underlying components. We use this data to provide daily transparent real-time inflation indexes and other economic metrics to financial products and applications through the Truflation Index, inflation drivers, marketplace, dashboard, and APIs.

Truflation Background

Truflation was born out of the need for more accurate and timely financial data. Traditional financial systems often rely on outdated methods, resulting in delays and inaccuracies that can significantly impact decision-making processes. The arrival of new consumer and spending data and on-chain data, alongside new technological advancements, updated consumer focussed cost of living calculations, can now be leveraged to meet the modern demands of businesses. Truflation has taken world-class data assets, put them in a secure environment and created the only verifiable daily inflation indexes in the world.

These new metrics enable individuals, investors, businesses and institutions to make more informed decisions based on unbiased and transparent real-time information. Truflation validates and calculates outputs using open source algorithms and AI to predict future inflationary outlooks. Truflation delivers a financial information platform that seamlessly plugs directly into any workstreams, in any industry and geography.



It is a foundational growth engine that enables developers and entrepreneurs to build better products faster. From Truflation's inception, the team is committed to leveraging the latest technological advancements to provide unparalleled financial insights with the development of innovative algorithms and data collection methods, laying the foundation for what will become a transformative force in the financial industry.

The purpose of this document is to focus on the methodology for developing the Truflation CPI Indexes. If you wish to receive any additional information on any of the Truflation products, tools and services please [contact us](#).

Truflation Indexes

Truflation provides a set of independent inflation indexes drawing on as many as 10+ data sources and 4+ million prices of goods and services at a country level. These indexes are released daily, making them one of the world's most up-to-date and comprehensive inflation measures.

Truflation released the first inflation index for the US in December 2021 and subsequently released the United Kingdom in June 2022 and Argentina in August 2024. More countries are coming online soon.

The methodologies of the government has not kept pace with the times we live in. The Argentina Consumer Price Index (CPI) is still only based on pricing data from 230,000 products and services. The CPI basket of goods and services is in part based on manual collection, often physical surveys with delayed collection cycles, and makes limited use of digital data collection techniques. The risk of human error and survey bias is significant.



Until now, independent measures of inflation have been challenging to develop due to regulatory influences and the heavy capital requirements to capture more relevant data sets. Additionally, those who did develop competing inflation metrics did so out of a commercial or political bias. The numbers tended to reflect those biases, and transparency was lacking.

Researchers, economists, and think tanks have been attempting to bring greater transparency to the process for decades. However, those goals have competed with the agendas of government departments producing the metrics, which are dependent on the departmental budgets that support their work.

Truflation has overcome these challenges to diversify and decentralize access to all layers of the information collected and the calculations with the intention of providing the most complete, timely, and unbiased inflation data.

Truflation's outputs stand apart for the following reasons:

- Truflation makes the indexes available 30 times faster than current measurement tools and reports the indexes daily.
- Truflation licenses robust data from 10+ data providers and aggregators, resulting in multiple data sources with different methodologies covering each category, creating a more representative and balanced measurement tool.
- Truflation leverages census-level data, enabling access to more than 5 million data points compared to the traditional index, which only includes ~230,000.
- Truflation uses open-source algorithms to make the data more transparent. These metrics deliver the unfiltered truth, not what is politically expedient.
- Truflation measures the price changes from a consumer cost of living perspective that includes cost of living expenses for owned housing for example.

Truflation Methodology

Truflation has a seven-step process for establishing a CPI index for modern needs. This approach requires the implementation of guardrails to ensure changes in the indexes are not the result of factors outside the core data collected. A consistent, balanced approach allows Truflation to aggregate multiple data sources into one number that represents the change in consumer prices.

The steps to achieve this are outlined below:

1. Household expenditure establishment
2. Data Sources
3. Ingestion of data
4. Normalization / Indexing
5. Categorization / Relative weighting
6. Aggregation of indexes
7. Data deliverables

Step 1 - Household expenditure establishment

Prior to setting up the Truflation Argentina CPI index, one needs to understand the structure of the population and establish how households are spending. Up-to-date information about the population structure is necessary to ensure accurate representation and weighting for each household spending category. To achieve this, it is important to understand:

- What the households spend their money on and the detailed allocation of the household basket of goods and services, along with key definitions.
- Determine the importance (weighting) of each expenditure category to the household. Establish ways to cross-reference the data and then leverage this over time for forecasting capabilities.

Well-defined expenditure categories are a prerequisite to understanding expenditure baselines. The definitions should:

- be unambiguous to assure proper classification of household expenditures of goods and services.
- consider the expenditure of goods and services of the given country.
- enable the validation of the expenditure categories with alternative data sets.

Exhibit 1 highlights the 12 expenditure categories and their respective definitions that reflect the diversified set of products and services with which households engage.

Exhibit 1 – Truflation 12 categories and their definitions

Expenditure Categories	Category Definition
Food & non-alcoholic beverages	<ol style="list-style-type: none"> 1. Food at home (includes cereals & bakery products, meat, poultry, fish, eggs, dairy products, fruits & vegetables, and other food at home) 2. Food away from home.
Alcohol & tobacco	<ol style="list-style-type: none"> 1. Alcoholic beverages (beer, wine, and spirits) 2. Tobacco products (all tobacco products and smoking supplies)
Clothing & footwear	<ol style="list-style-type: none"> 1. Clothes 2. Footwear 3. Other apparel products and services
Housing	<ol style="list-style-type: none"> 1. Owned dwellings (includes mortgages, property taxes, maintenance repairs, insurance, and other household expenses) 2. Rented dwellings 3. Other lodging
Utilities	<ol style="list-style-type: none"> 1. Natural gas 2. Electricity 3. Fuel oil and other fuels 4. Water and other public services

Household durables and daily use items	<ol style="list-style-type: none"> 1. Household operations (includes personal services and other household expenses) 2. Housekeeping supplies (includes laundry / cleaning supplies, other household products, and postage and stationery) 3. Household furnishings and equipment (includes household textiles, furniture, floor coverings, major appliances, small appliances, and miscellaneous household equipment)
Health	<ol style="list-style-type: none"> 1. Health insurance 2. Medical services 3. Drugs 4. Medical supplies
Transport	<ol style="list-style-type: none"> 1. Vehicle purchases (includes new cars and trucks, used cars and trucks, and other vehicles) 2. Gasoline, other fuels, and motor oil 3. Other vehicle expenses (includes finance charges, maintenance and repairs, vehicle leases, rentals licenses and other charges, and vehicle insurance) 4. Public and other transportation
Communications	<ol style="list-style-type: none"> 1. Residential phone services, VOIP, and phone cards 2. Cellular phone services
Recreation and culture	<ol style="list-style-type: none"> 1. Fees and admissions 2. Audio and visual equipment and services 3. Pets, toys, hobbies, and playground equipment 4. Other entertainment supplies and services
Education	<ol style="list-style-type: none"> 1. Education 2. Reading
Other	<ol style="list-style-type: none"> 1. Personal care products and services 2. Miscellaneous expenses

Each of the 12 categories represents a percentage of total household expenditure, and these category definitions are consistent for all markets covered by Truflation to ensure

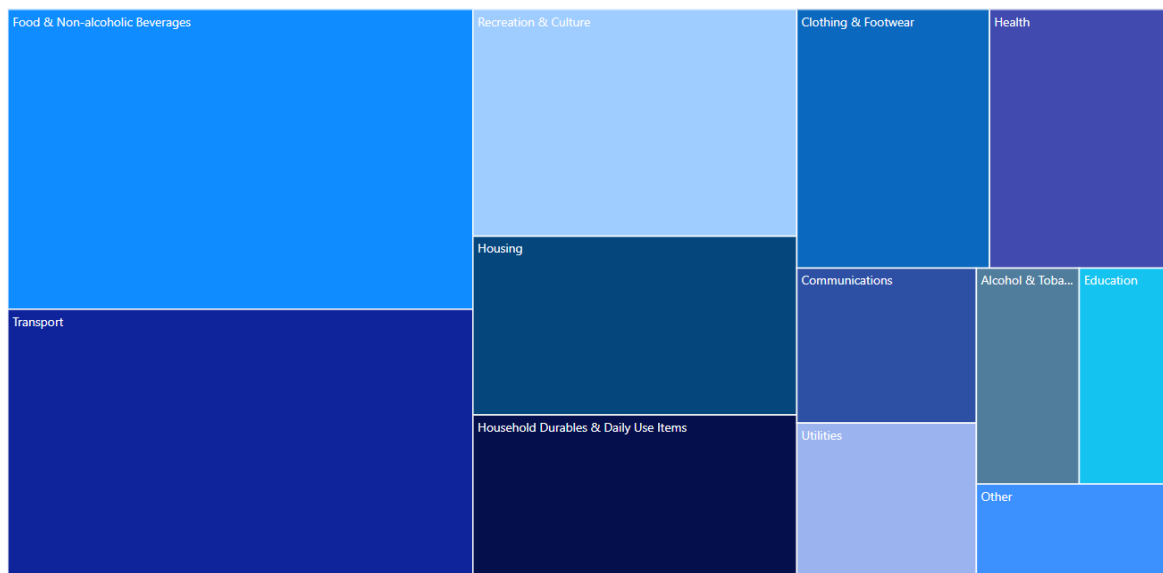


the indexes are scalable and comparable across markets. However, the relative importance of each category does vary by market.

Each category's relative importance is achieved by taking multiple sources and triangulating the impact. Data sources used for the Truflation Index include the Truflation Personal Inflation Calculator, Census and Mini Census (where available), National Statistics data, and other household establishment expenditure surveys used to create the consumer expenditure data. These data sources are then validated against assets from Truflation's data providers and other third-party sources (e.g. food spending with NielsenIQ) etc. Combining these data sources and aligning the different methodologies allows Truflation to produce a more comprehensive data set.

The relative importance / weightings are updated annually and implemented in February of each year using the previous year's data to reflect the changing consumer expenditure behaviors. In Exhibit 2 below, the relative importance of each of the 12 product categories for the Truflation Argentina Index can be seen.

Exhibit 2 – Truflation Argentina category importance for 2024



Step 2 - Data sources

Truflation works with a wide variety of data partners to ensure a diverse data pool and to establish the most accurate average prices in each category and sub-category. This approach minimizes the potential for error and avoids having any single point of failure.

Truflation licenses data from commercial and public data sources, data aggregators and research institutes. The Truflation Argentina Index licenses data from 10+ data providers and aggregators. Each of these data partnerships is tied to census-level data, meaning Truflation is accessing more than 5 million price points of goods and services compared to the traditional index, which includes only 230,000 data points.

The list of data providers is also dynamic. Truflation regularly adds data partners to the index. At present, the list of data providers includes (not exhaustive): NielsenIQ, Big Mac Index, Numbeo, Trivago, Kayak, Il Mercado, etc.

For every data partner that is ingested into Truflation, an audit process is conducted that includes:

- Documentation of the methodology.
- Determining the representation of the data i.e. geographical coverage, representation of the Argentina population, market share estimate that correlates back to our category & sub-category definitions.
- Understand and outline the quality control procedures the data partners undertake, including their validation systems.
- Administrative & legal document sign-off, which is necessary to ensure Truflation has the legal representation to repurpose the data and add it to other data sources to create the index.

The new data provider will remain in a sandbox until this is completed and they are certified.

Step 3 - Ingesting data

Each data partner updates data at different intervals, be it daily, weekly or monthly, which accordingly updates the Truflation index at the same interval. The net result is that Truflation makes its indexes available 30 times faster than current measurement tools, which only report monthly and with an average reporting of data on the 18th day in the subsequent month adding further delay. Truflation refreshes the indexes daily.

New data from each source is gathered daily at 10:30 PM Coordinated Universal Time (UTC). All the collected historical pricing data points are loaded directly into our source database. Each provider's data is then added into a separate database table.

Every time new data is ingested and collected, necessary quality control procedures must be undertaken daily. One of the most critical factors impacting quality is the accuracy and representation of the data sources themselves. Once data is updated in the system, and without any manipulation of the data, Truflation undertakes a QC process that includes:

- Historical data comparison: Compare the most recently received data with previous data in the database from the same source to assess consistency. If there are discrepancies a red flag is raised.
- Data presence: Review the most recent data to ensure at least 13 consecutive months of data are available from that source to obtain year-over-year comparisons. If this is not present, a red flag is raised (this also depends on daily / weekly / monthly data deliverables). If Truflation receives monthly data, the monthly number from the last month will be carried forward every day until the new data is received and the current month is replaced e.g. September data is brought forward into October until Truflation receives the October data in early November, which therefore replaces the old October data.

- Current data comparison: Analyze the most recent data input and ensure it is not the same as the previously logged data or establish that there is no missing data. If the latest data is no different than the latest data in the Truflation database or there is no data at all, then a red flag is raised (of course, this is dependent on the frequency of updates).
- Data variation: if the most recent data differs by more than 5%, either positively or negatively, from the previous data set from the same source then a red flag is raised and needs to be checked. If no red flag is raised, then the final data is cleared to the next stage.

If the process of dissecting and verifying the red-flagged data takes more than one day, then the most recent data in the Truflation database from that source is repeated and injected as interim data. This process is to be continued until we have the new data green-flagged and cleared, at which point the new/actual data replaces the interim data and proceeds to the calculation stage.

For each new data provider added into the system, we need to outline the amount of historical data that we receive. If it doesn't go back to January 1, 2018, the latest historical data is backcasted using the existing data that we have for this category/sub-category.

As an example, if we are adding a new data source to the Cereals sub-category of Food at Home and the new data set only has data going back to January 1, 2020, we would follow the process outlined below:

- We would extract the current Cereals index trends from January 1, 2020 and compare the new data set with the existing data to determine the correlation index between these two data sets.

- Then we extract the existing Cereals data from the January 1, 2018 to December 31, 2019 and apply the correlation index to that data, which generates the new index from January 1, 2018 to December 31, 2019.
- The new data is then checked and ingested into the system.

When we receive and verify data from new data partners, this new data is added into Truflation's database, and an additional row with a date stamp becomes the new data set for the calculation.

Apart from updating data with new data providers, there are other factors that we must take into account that influence the data trends. There are three main reasons for any changes in the data that Truflation represents:

- New/old data sets are added/removed to/from the Truflation indexes monthly during our index updates
- Existing data providers upgrade/improve their data for a number of reasons
- Any updates in Truflation's calculation model due to raw data additions/removal or updates to the relative importance of category weightings etc.

All these factors can change the trending of the Truflation indexes. The data is only updated during our monthly updates, which occur on the 15th of every month. If there is an update to be included in the current month, we conduct a parallel run to understand the impact on the indexes, trend lines and correlations. Comparing the results from a parallel run consists of the following actions:

- Explain the differences in the data if we find differences for any of the key metrics.
- Ensure each component is thoroughly checked using the right resources and methods.
- Log the impact of the change for each data set into Truflation's quality control logbook.



Truflation's management of historical data ensures that our source data tables are immutable. At the time of the data source ingestion, all new data points are time-stamped and this source data remains unchanged. This data can only be changed with the addition of updated / new data points and our Truflation Oracle ensures that the historical data reflects the most current and comprehensive information about inflation. Equally, all our calculations are time-stamped, which makes it possible for us to handle updated data in a customizable way for clients with bespoke needs. We provide information on the impact of the new data to ensure full transparency.

Once the data has undergone the quality control (QC) process it is ready to progress to the calculation phase. Once the data proceeds to this stage, it undergoes a 24-hour hold period and is then locked until 00:00 UTC that day. For example, data that is added at 06:30 UTC on the 4th of the month will be held until 00:00 UTC on the 5th.

The delay in running the algorithm accommodates for any red flag resolution, if required. If there are no red flags, the data simply clears this automated process. The delay period is also designed to ensure that the activation time is independent of the time at which the data is fetched to allow for data download issues. For example, if during QC it is found that there is a download issue, the data can be re-fetched without affecting the time at which the data is activated. The calculation algorithm is deployed at the end of the delay window, and the new Truflation index for that day is created and ready for reporting. This means that on July 23, 2022, we will release the Truflation index from July 22, 2022, and so on.

Step 4 - Normalization / Indexing

At this point, each partner's data goes through a calculation where the raw data is converted into an index / normalized as a price index. This process is repeated for each data source.

The indexing calculation is as follows:

- **Base Value:** This is selected by first looking for a data point for 2018-01-01 and setting the index value at 100.0. If there is no data for 2018-01-01, the system will select the closest available value after this date for this data point. This will raise a red flag in the system and the data will undergo the usual process for when a new data provider is added.
- **Current Value:** This is the most recent data point available in the table, taking into account the 24-hour delay.
- The calculation for the current index = $\text{current value} / \text{base value} * 100$

Once the data is indexed, Truflation conducts the second round of the automated Quality Control procedure. The steps for this QC round are:

- Historical data comparison
- Data presence
- Current data comparison
- Data variation

If the data passes our quality control process again, it is then cleared to progress to the next step. If there are any red flags, the process will stop and will be reviewed with human intervention.

Step 5 - Categorization / Relative weights

This step sees each data source classified into its designated category/sub-categories. One data source can be attributed across multiple categories/sub-categories, depending on the breadth of the data. For example, NielsenIQ's data is incorporated into the following categories: Food at Home, Alcohol & Tobacco, Household Durables and Daily Items (small household appliances, household

goods, stationary, etc), Recreation & Culture (for pet food and toys) and Others (personal care).

A weighting factor is applied for each data source within each category/sub-category. This weighting factor is relative and in line with the already existing data sources and their associated weighting. This weighting is determined based on:

- The number of items tracked: The greater the number of items measured, the higher the weighting. To determine the contribution of this factor, we use a simplistic calculation of the number of items tracked by the new data source divided by the number of items tracked in that category/sub-category already.
- The representation of the data: If the data represents the Argentina on a national scale, we would ascribe it a factor of 1; if the data is not nationally representative, then we apply a factor based on the geographic representation, the coverage of the Argentina population and the contribution to the national sales in that category. These factors are all weighed equally, e.g. if a new data provider represents Buenos Aires only, we need to determine the population and the market share of Buenos Aires.

For illustration purposes:

- Geographic Representation = 14% of the Argentina population; which would give us a factor of 0.14 factor for data representation, given the national factor is 1.
- Market Share within the geographic representation is 50% - this would be 50% of the 0.14, which would equal 0.07.
- The methodology of the data collection: Each type of methodology has a different weighting factor:
 - if the data is census level / actual data, then it receives a factor of 1.
 - Data collection through a primary methodology (e.g. surveys) with quality control measures is discounted by 50%.

- Data collection through a primary methodology (e.g. social collection) with claimed statements is then discounted by a further 50% on top of the previous 50% i.e. an additional 25%.

These three variables are then added together in equal proportion to provide a relative weighting factor to already existing data sources that are included in the Truflation category/sub-category indexes. In Exhibit 3, below shows how these weightings are applied to the data:

Exhibit 3 – An illustration of the weighting

Current Data Sources				Truflation Calculation Weight		
Data Source	Category	Sub Category	Data Frequency	Weighting on Sub Category	Relative Importance	Weighting on Truflation CPI
Commodities	Food	Food at home	Daily	5%	15.998 %	0.800 %
Nielsen	Food	Food at home	Monthly	50%	15.998 %	7.925 %
INDEC	Food	Food at home	Monthly	45%	15.998 %	7.273 %

The calculation is:

Weighting in sub-category * sub-category relative importance = weighting in Truflation CPI

Relative Importance data is stored in a separate table and the exact weights of each category / sub-category / sub-sub-category is located in Appendix A for Argentina.

Step 6 - Aggregated Indexes

Following the weighting allocation, an adjusted index is created in which the indexed / normalized data is multiplied by the relative weights:



- The 1st stage of the calculation is index adjusted = source index * weighting in Truflation CPI
- All the sub-categories are then rolled up to create the category and Truflation indexes.

Finally, we undertake a third round of the automated quality control process. These steps include:

- Historical data comparison
- Data presence
- Current data comparison
- Data variation

Again, if the data passes these quality controls, it then progresses to the delivery phase. However, if any red flags emerge it will then stop and require human review and sign-off from at least two individuals in the organization.

The use of census-level data is significantly advantageous for Truflation as it automatically deals with consumer substitutions, rather than employing an additional calculation that traditional index providers need to adjust for. Truflation's index already covers the changes in consumer baskets over time, given the high volume of pricing data that we collect across various categories. In addition to price information, we also have spend and volume information, allowing us to create average prices. As such, Truflation doesn't need to rely on creating a substitution calculation. For example, in the food categories, we collect the price of all available stock keeping units (SKUs)/items. With this information, we have volumetric data that allows us to create an average price. Truflation believes in capturing as comprehensive a snapshot of consumer experiences as possible. Therefore, we do not employ a chain-price technique.

Step 7 - Deliverables

Our standard deliverables include the delivery of the current index, the current index from a year ago, and the year-over-year (YoY) percentage change. To determine the YoY percentage change, we require the following metrics:

- Target Date: Determine the date from which we wish to measure the YoY inflation
- Current Index: Extract the index on that day
- Current Index a year ago: Extract the index on that day one year ago

The calculation for the YoY percentage change is:

$$\text{YoY \% Change} = \frac{(\text{current index} - \text{current index a year ago})}{\text{current index a year ago}} * 100$$

For example, if we're looking to calculate the YoY percentage change for May 22, 2023

- Current Index: This is the index on May 22, 2023
- Current Index a year ago: This is index on the May 22, 2022

The Argentina Truflation CPI Index is currently available on the Truflation Dashboard. There are a total of 13 Truflation price indexes currently available that are listed out in Exhibit 4.

Exhibit 4 – Truflation Argentina Price Indexes

Truflation CPI AR INDEX	
Food & Beverages Index	Alcohol & Tobacco Index
Housing Index	Clothing & Footwear Index
Transportation Index	Communications Index



Utilities Index	Education Index
Health Index	Recreation & Culture Index
Household Daily Items Index	Others

All Truflation data is available via the Dashboard, the online subscription, or via the Enterprise solution that delivers all the data in a variety of formats. Truflation reports three different numbers on a daily basis:

1. Price index of today
2. Price index one year ago today
3. Year-over-year percentage change today vs. a year ago today

The price index data allows Truflation users to calculate the percentage change in each category / sub-category at selected custom intervals such as month-over-month, day-over-day etc.

Beyond delivering the Truflation CPI indexes, we also leverage the same data set to generate the core inflation rate (price change of goods and services minus food and energy), non-core (price change of food and energy only), the price change of goods and the price change of services indexes, which we deliver as part of the overall service.

Custom Indexes for Specific Needs

At Truflation, we have accumulated exceptional expertise in designing and calculating traditional weighted indexes as well as alternatively-weighted indexes. Some of our users require a unique index. To deliver these custom indexes, we tap into the full scope of our indexing capabilities and extensive data. Our custom indexes apply the same



index construction, maintenance discipline, data reliability, and support as our core Truflation CPI index offering.

Building the custom indexes requires the following three steps:

1. Define your benchmarking needs beyond Truflation's core CPI Indexes
2. Translate this via our customization options (specialized calculations and weightings based on the index definition)
3. Choose your preferred deployment option

Conclusion

Truflation's Argentina CPI indexes offer an unmatched set of real-time data for macroeconomic analysis. We provide users with previously unavailable data that can be deployed to enable better-informed decisions. Truflation is built on the following foundations:

1. Data Sources: 10+
2. Data points: 5+ million
3. Frequency of Updates: Daily
4. Last Household Expenditure Update: 2024

These groundbreaking new indexes can be used for everything from smarter, faster market hedges, to helping offset costs in new product development.

For further detail, please contact us:

- Contact us: <https://truflation.com/contact-us>
- X/Twitter: <https://twitter.com/truflation>
- Telegram: <https://t.me/truflation>
- LinkedIn: <https://www.linkedin.com/company/truflation>



APPENDIX A

Relative Importance for the Argentina

Below is the Relative Importance data, including the exact weights of each category, sub-category, and sub-sub-category for Argentina.

Truflation Category	Truflation Sub-Category	Weighting
Food & Non-alcoholic Beverages		21.1%
Food & Non-alcoholic Beverages	Food at home	15.9%
Food & Non-alcoholic Beverages	Food away from home	5.2%
Housing		8.8%
Housing	Other lodging	0.5%
Housing	Owned dwellings	3.8%
Housing	Rented dwellings	4.5%
Transportation		18.7%
Transportation	Gasoline, other fuels, and motor oil	7.3%
Transportation	Other vehicle expenses	1.9%
Transportation	Public and other transportation	4.9%
Transportation	Vehicle purchases (net outlay)	4.6%
Utilities		4.1%
Utilities	Electricity	2.1%
Utilities	Fuel oil and other fuels	0.1%

Utilities	Natural gas	0.9%
Utilities	Water and other public services	1.0%
Health		7.2%
Health	Drugs	1.8%
Health	Health insurance	2.6%
Health	Medical services	1.3%
Health	Medical supplies	1.5%
Household Durables & Daily Use Items		7.9%
Household Durables & Daily Use Items	Household furnishings and equipment	3.3%
Household Durables & Daily Use Items	Housekeeping supplies	4.6%
Alcohol & Tobacco		3.3%
Alcohol & Tobacco	Alcoholic beverages	1.5%
Alcohol & Tobacco	Tobacco products and smoking supplies	1.8%
Clothing & Footwear		7.5%
Clothing & Footwear	Children under 2	0.5%
Clothing & Footwear	Footwear	1.2%
Clothing & Footwear	Men and boys	1.9%
Clothing & Footwear	Other apparel products and services	1.2%
Clothing & Footwear	Women and girls	2.7%
Communications		4.2%
Communications	Cellular phone service	2.8%

Communications	Residential phone, VOIP & phone cards	1.4%
Education		3.1%
Education	Education fees	1.9%
Education	Reading	1.2%
Recreation & Culture		11.1%
Recreation & Culture	Audio and visual equipment and services	5.0%
Recreation & Culture	Fees and admissions	5.1%
Recreation & Culture	Other entertainment supplies, equip services	1.0%
Other		2.7%