



مركز الإحصاء  
STATISTICS CENTRE

# Consumer Price Index Methodology

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## Overview

Statistics Center - Abu Dhabi (SCAD) is the official authority responsible for calculating and issuing the Consumer Price Index (CPI) in the Emirate. SCAD collects monthly data on the prices of goods and services in the Emirate of Abu Dhabi, in order to compile the CPI and measure the inflation rate in the Emirate.

Due to the utmost importance of this data, an integrated system has been put in place that covers all aspects, in terms of price collection methods and sources, and their geographical distribution. The process of studying prices and setting appropriate systems for them is associated with the Household Income and Expenditure Survey (HIES), the results of which are used in updating the CPI basket of goods and services and calculating their weights. The HIES is therefore considered the backbone on which Consumer Price Index system is based .

At the level of the Emirate of Abu Dhabi, price data are collected from about 150 main sources distributed all over the regions of the Emirate, The data are classified using the Classification of Individual Consumption according to Purpose (COICOP) issued by the United Nations according to the recommendations of the 1993 National Accounts System. The number of goods and services in the index basket has reached 630 goods / services while the number of goods and services in the consumer basket has exceeded 1,400 goods / services. Statistics Center - Abu Dhabi has recently updated the base year for the Consumer Price Index Number by adopting 2014 as the base year for prices and weights. The weights used in the new index have been calculated through the results of HIES 2014, which was conducted in the Emirate of Abu Dhabi during 2013/2014.

The methodology used to calculate the CPI is consistent with international best practices and recommendations in this field .

## Importance

The Consumer Price Index provides monthly estimates on the rates of change in the prices of the consumer basket. The key uses of CPI are outlined below :

- The Consumer Price Index is an important indicator for calculating inflation rates. The inflation rate is considered an important input for many economic institutions, and is taken into account in monetary and economic policy-making and planning.
- Salary and wage payrolls are adjusted by international entities, large companies, and by some governments, based on changes in the Consumer Price Index.
- The Consumer Price Index Number is also used as a GDP deflator in preparing national accounts at constant prices.

## Objectives

- Providing the necessary data for calculating monthly and annual inflation rates at the emirate level and at the level of the regions of the Emirate of Abu Dhabi.
- Providing the necessary data for calculating monthly and annual inflation rates at the level of household welfare segments.
- Providing the necessary data for calculating monthly and annual inflation rates at the household type level.
- Calculating the rates of relative change in the average prices of the main and sub groups at all the levels mentioned above.
- Tracking the movement of average prices at all levels mentioned above.
- Providing the necessary indices for calculation of national income growth rates at constant prices at all of the levels mentioned above.

## Concepts and Definitions

**Consumer Price Index:** a statistical tool for measuring the relative change in the prices of goods and services of the consumer basket.

**Price:** the value paid by the consumer in return for the good/service.

**Expected Inflation:** It is the expected general rate of increase in consumer prices. This inflation is calculated based on a time series of CPI data and a study of price changes at the level of the main groups and sub-groups that make up the CPI basket, taking into account seasonal variations. It is worth noting that the expected inflation rates remain statistical estimates, subject to increase or decrease depending on unexpected market price changes.

**The Relative Importance of the Commodity / Service:** It is the percentage expenditure by all households in the Emirate of Abu Dhabi on the commodity / service compared with the total expenditure of all households on all goods and services.

**Source:** is the outlet for selling goods / services in the regions of the Emirate of Abu Dhabi, such as (shops, supermarkets, department stores, etc.).

**Survey Frequency:** the approved period of time to repeat the process of surveying the different groups for each commodity or service, and it may be weekly, bimonthly, monthly or quarterly.

**Handheld Device:** An electronic device used to collect price data such as IPAD, PDA, Galaxy Tab.

**Purchasing Power of Money:** it is the amount of goods and services that can be obtained per currency unit .

**Laspeyres Equation:** It is a mathematical equation developed by statistician (Laspeyres) to calculate the price indices, by dividing the prices of the comparison year by the prices of the base year, and by weighting by the quantities of the base year.

**Consumer Price:** It is the price that the household consumer pays in exchange for the commodity or service for household needs.

**Base Period:** the year in which the residential rental price index equals 100. The base period serves as a benchmark for future periods, allowing economists to judge rates of increase and decrease in prices compared to that year.

**Comparison Period:** the "current" or most recent period for which the index was calculated. However, the term is used to refer to any period that is being compared to the base period.

**The Consumer Basket:** It is the actual group of goods and services that the consumer spends on for living purposes.

**Weights:** are the relative importance of goods and services within the consumer basket or within the economy in general, and are used in the calculations of the index.

**Base Period Prices:** are the prices of goods and services in a reference period, against which current prices are compared.

**Percentage of Change in the CPI:** is the amount of change in the CPI. It is calculated by dividing the CPI for a given period by the index for the comparison period, multiplied by a hundred, then subtracting a hundred.

**Geographical Index:** The Emirate of Abu Dhabi is divided according to administrative divisions into three regions: Abu Dhabi, Al Ain and Al Dhafra.

**Household Welfare Level:** Households are divided into five segments to measure the level of household welfare, based on average per capita spending in 2014.

**Household Type:** Households are divided into three groups: UAE families, non-UAE families, and collective families.

## Geographical Coverage - Statistical Units

The current scope of the Consumer Price Index methodology in the Statistics Centre - Abu Dhabi is to collect prices from selling sources and entities concerned with services in the Emirate of Abu Dhabi. It includes the geographical divisions of the Abu Dhabi, Al Ain and Al Dhafra regions.

The CPI calculation is also detailed by five household welfare levels as well as by household type.

## Frequency

The Consumer Price Index is issued on a monthly, quarterly and annual basis.

## Classifications

The classification used in Consumer Price Index is Classification of Individual Consumption according to Purpose (COICOP), issued by the United Nations for statistical purposes. The consumer price index basket of goods and services is categorized based on this classification into 12 main groups for the first digit of the classification, 34 sub-groups for the second digit, and 63 sub-groups for the third digit. The following table shows the main groups (for the first digit of the classification):

| Expenditure Group Number | Groups of Goods and Services  |
|--------------------------|---|
|                          | The General Number  |
| 1                        | Food and beverages  |
| 2                        | Tobacco   |
| 3                        | Clothes and footwear  |
| 4                        | Housing, water, electricity, gas and other fuels                      |
| 5                        | Household furnishings and equipment and routine household maintenance |
| 6                        | Health  |
| 7                        | Transport   |
| 8                        | Telecommunications  |
| 9                        | Recreation and culture  |
| 10                       | Education   |
| 11                       | Restaurants and hotels  |
| 12                       | Miscellaneous goods and services                                      |

## Main Data Sources

The data sources for the consumer price index are field surveys, with the exception of the residential rental price index, which are administrative records where documented lease contracts data are obtained through the Department of Municipalities and Transport. These sources are updated on a regular basis, with notifications sent to the team upon the closure or relocation of any source. Outlets were selected with care being taken to ensure their representativeness, meaning that they represent points of purchase for a large segment of consumers in the Emirate of Abu Dhabi. Prices are collected from (150) sources, along with a number of administrative data sources for certain types of data such as rental prices, tuition fees for private schools, etc., which are obtained from a number of local entities in the Emirate of Abu Dhabi.

It is worth noting that data sources vary between large points of sale or specialized stores and shops such as:

- Major shopping centers (hypermarkets).
- Stores that sell clothes and footwear.
- Stores that sell mobile phones and electronic devices.
- Recreational facilities (parks, museums, cinemas, etc.).
- Hotel establishments and restaurants.
- Furniture and home décor supplies shops .
- Tawtheeq system (Registration).
- Large shopping centers.

## Questionnaires

The collection price data is one of the most important and sensitive stages, requiring a lot of effort and time. The prices of the basket of goods and services are collected by a group of employees who have been trained and qualified for this purpose, through an electronic form containing all the goods and services of the consumer basket and showing the name and detailed description of each commodity. To ensure the accuracy of the prices that are collected, the prices of goods and services are checked through conducting field visits auditing a sample of goods and services or by following up the prices of goods and services through electronic sales outlets and inquiries over the phone. Each group of goods and services basket groups has its own frequency of collection, arranging between weekly, monthly, quarterly and annual .

### Goods and services price collection frequency by main groups:

| Expenditure |   | Periodicity of      |
|-------------|---|---------------------|
| Group       | Groups of Goods and Services  | Collection          |
| Number      |   |                     |
| 1           | Food and beverages  | Weekly, monthly     |
| 2           | Tobacco   | Monthly             |
| 3           | Clothes and footwear  | Monthly             |
| 4           | Housing, water, electricity, gas and other fuels                      | Monthly             |
| 5           | Household furnishings and equipment and routine household maintenance | Monthly             |
| 6           | Health  | Quarterly, annually |
| 7           | Transport   | Monthly             |
| 8           | Telecommunications  | Monthly             |
| 9           | Recreation and culture  | Monthly             |
| 10          | Education   | Monthly, annually   |
| 11          | Restaurants and hotels  | Monthly             |
| 12          | Miscellaneous goods and services                                      | Daily, monthly      |

In order to develop a mechanism for collecting prices and keep pace with information technology, Statistics Centre - Abu Dhabi has prepared a special system for indexes. The new system for calculating consumer price index n using "handled devices" aims to complete the procedures and processes for compiling the consumer price index in full, in addition to providing the required data and outputs, serving as a comprehensive and integrated that covers all stages of creating consumer price index numbers, in addition to paper forms when the aforesaid system falls out of order.

The objectives of the system can be summarized as follows:

- Providing electronic programs and tools for preparing price data (the process of collecting data from the field) and transferring them to the handheld devices, as well as receiving data from them and transferring them to price database .

- Testing for verification and integration of the data and thorough testing throughout the various stages of the system's operation, starting from preparing the basket of goods until fieldwork and calculation of the indicator.
- Assisting data collectors to edit the data by linking current price databases with the previous price databases.

## Sample Design

The sample of sources representing the consumer price index is considered a target sample, as the sources for collecting the prices of consumer basket goods and services were selected from the best-selling sources for consumers in the Emirate of Abu Dhabi. The best-selling and popular sources were chosen by the general consumers.

## Data Collection

The prices of the basket of goods and services are collected by field enumerators who have received a specialized training in the process of collecting prices through dedicated field visits.

Some prices are collected from administrative records and specialized websites. The prices of residential rents, which weigh 28.8% of Consumer Price Index basket, are collected through the Tawtheeq program of the Department of Municipalities and Transport. The price index of the residential rents is calculated on a monthly basis for all contracts documented during the reference month.

## Data Editing

The editing process of price data is a very important because it is the basis of statistical work in general and the Consumer Price Index in particular, on which the process of compiling the Consumer Price Index is based so that it can be disseminated and circulated. The auditing stages can be summarized as follows:

- First - Editing during Field Work / Stage of Collecting Prices:
  - The prices input by the field researcher are followed up and monitored through the limits that have been set for changes in the prices of goods and services to permanently avoid entry errors. The rules of automatic editing have been established for changes in the prices of the commodity / service that exceeds a certain rate of change. These limits have been set based on the historical change in the prices of goods and services.
  - Follow-up and daily discussion between enumerators about the prices of goods and services during their morning meeting before proceeding to the field.
  - The record of prices is reviewed at the level of geographical regions on a weekly basis by the enumerator's assistant.
- Second - Editing at the Geographical Region Level :
  - The Consumer Price Index is calculated at the level of the geographical regions of the Emirate of Abu Dhabi (Abu Dhabi, Al Ain, and Al Dhafra). The consistency of price data



in terms of increases and decreases within the same region is checked by the field supervisor in the region.

- Third - Editing at the Level of the Emirate:
  - This process takes place in the head office of SCAD in Abu Dhabi, where the movement of prices of goods and services of consumer basket for the current month and the previous month is compared at for the three regions.
- Fourth - Seasonal Goods Adjustments:
  - The CPI calculation file of is designed so that seasonal goods for which no price has been received during the reference month are dealt with by distributing the weight of missing goods over goods for which a proportional price has been received .
- Fifth: Consistency of Consumer Price Index Number for the Third Digit of COICOP
  - The consistency of the index is reviewed by comparing the index for the current month with the previous month at the level of the geographic regions, household type and household welfare .

## Indicators Calculation

### Compilation of the Consumer Price Index

A number of key inputs are required to construct the CPI

**Weight of Commodity / Service:** the result of dividing the total expenditure of all households on commodity / service during the year by the total expenditure of all households on all goods and services .

**Consumer Price Index Number:** It is a weighted average of price change for goods and services in the index basket. The weight of the commodity / service reflects the relative importance of the commodity.

The relative importance of goods and services is established through the results of the Household Income and Expenditure Survey. The commodity / service whose importance is greater than or equal to 0.002% has been included in the basket of goods and services of Consumer Price Index. As for the goods of less importance, their weights have been distributed over the rest of the goods within the same group in proportion to size.

**Comparison Prices:** the price recorded for the commodity or service in the current time period

**Base Prices:** the price recorded for the commodity or service in a previous period against which the current price is compared, and the base year is usually updated according to the latest Household Income and Expenditure Survey, i.e. at five-year intervals. It is also preferable that the base year be a stable year free of crises .

The formula for calculating Consumer Price Index Number

The relative index number weighted by weights of the base year (Laspeyres Index Number), one of the most commonly used indices:

Based on the weights of the base year, it is defined mathematically as follows:

$$R.L.I.N = \sum \frac{P_{1i}}{P_{0i}} \times W_{0i} \dots\dots\dots (3)$$

Where *R.L.I.N* : Relative Laspeyres Index Number

Assuming that this figure is to measure the change in prices, then:

$P_{li}$  : Price of Commodity  $i$  Year of comparison,  $P_{0i}$  : Price of Commodity  $i$  Base year

$W_{0i}$  : Weight of Commodity  $i$  Base year,  $i = 1, 2, \dots, k$  and  $k$  : The number of goods

The current CPI is calculated based on the year 2014 prices at the level of the Emirate of Abu Dhabi. The current index basket consists of 630 goods and services, while the consumer basket consists of 1,417 goods and services. The new index also included imputation of the sub-index for housing units occupied by owners, by adding the weight of this item to the weight of rented dwellings and calculating a single sub-index for rents includes rented housing units and housing units occupied by owners .

The average price of the commodity is calculated at the level of the elementary aggregates (an elementary aggregate is the lowest level of the commodity with available weight) using the geometric mean.

$$P_J = \prod_{i=1}^n \left( \frac{P_t^i}{P_0^i} \right)^{\frac{1}{n}} = \frac{\prod_{i=1}^n (P_t^i)^{\frac{1}{n}}}{\prod_{i=1}^n (P_0^i)^{\frac{1}{n}}}$$

As for the price relative and the new weight, the price relative is calculated by dividing the comparison price by the base price, and to obtain the new weight of the commodity, the price relative is multiplied by the base weight of the commodity.

To calculate the index number at the level of sub-groups, the new weight of all goods and services belonging to the sub-group is added, and then the new weight for the sub-group is divided by the base weight of the same group. In the same manner, the index number is calculated for the main groups and finally for the general index number .

#### CPI Basket and Consumer Basket

After the process of calculating weights and determining the goods and services that represent the CPI, which amounted 630 goods and services, the consumer basket has been determined, whereby one or more commodity / service within the index basket are is determined for each commodity to be a representative for it, and accordingly, the consumer basket is larger than the CPI basket, and the size of consumer basket amounted.

#### Classification used for Expenditure Groups in Consumer Price Index Number

The classification used in Consumer Price Index is Classification of Individual Consumption according to Purpose (COICOP), a classification issued by the United Nations for statistical purposes. According to COICOP the CPI basket of goods and services is categorized into 12 main groups and 34 sub-groups for the second digit and 63 sub-groups for the third digit of classification. The following table shows the main groups (at the first digit level) and their weights:

| Group   | Weight     |
|---|------------|
| Food and beverages  | 12.3       |
| Tobacco   | 0.2        |
| Clothes and footwear  | 5.4        |
| Housing, water, electricity, gas and other fuels                      | 31.2       |
| Household furnishings and equipment and routine household maintenance | 7.2        |
| Health  | 1.6        |
| Transport   | 14.7       |
| Telecommunications  | 5          |
| Recreation and culture  | 4.8        |
| Education   | 6.9        |
| Restaurants and hotels  | 3.8        |
| Miscellaneous goods and services                                      | 7          |
| <b>Total</b>  | <b>100</b> |

Classification used for Segments of Household Welfare Level in Consumer Price Index Number

According to this classification, households are divided into five segments based on average per capita expenditure in 2014, the year in which the last Household Income and Expenditure Survey on was carried out. The first "lowest" segment represented the lowest income segment, while the fifth "upper" segment represented the highest income segment.

The classification used for the household type in the Consumer Price Index Number

Classification used for Type of Household in Consumer Price Index Number

In this classification, households are into three categories: citizen households, non-citizen households, and share households.

- **Citizen Household:** It is one or more UAE citizen(s) who normally reside in the Emirate of Abu Dhabi. It has a head of family, with members who may or may not be relatives, sharing housing and food .
- **Non-citizen Household:** It is one or more non-UAE national, and they share housing and food, and the individuals may or may not be relatives, and it has a head of family, and the family is considered a non-UAE family if the head of the family is not a UAE national, and the wife is not a UAE national, even if the wife has UAE children from a previous marriage.
- **Share Household:** it denotes a group of unrelated individuals (two or more, regardless of their nationalities). It does not have a head of family. Members share housing but do not often share food, and made up of either males or females.

## **Timeliness**

The Consumer Price Index is issued fifteen working days as of the end of the reference month, and the date of disseminating data corresponds to General Data Dissemination System (GDDS) .

## **Dissemination**

The CPI data are disseminated as follows:

- The website belonging to Statistics Centre - Abu Dhabi
- Smart applications
- Interactive tools / calculators



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