# Methodology

# Health Price Index

# 2024

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# 1. Overview

### 1.1. Introduction

Statistics Centre - Abu Dhabi (SCAD) is the official entity concerned with calculating and releasing, every quarter, the Health Price Index (HPI) in the Emirate of Abu Dhabi. This HPI has been released since 2017 in cooperation with the concerned entities in this field which provide the necessary inputs for product classifications and the calculation of index weights.

The healthcare sector is highly sponsored by the government, who regards it as a key sector for improving the quality of life in Abu Dhabi and the UAE as a whole. Consequently, SCAD has sought to develop the HPI to reflect changes in the price of health-related services, medications, and equipment to provide a comprehensive view of price developments in the healthcare sector.

### 1.2. Concepts and definitions

A price index is a statistical tool that allows the comparison over time of a common set of products or product groups. The HPI measures the relative change in the prices of health-related products and services. As a sub-group of the Consumer Price Index (CPI), it broadly follows the methodological principles outlined in Consumer price index manual, concepts and methods published jointly by the ILO, IMF and other international organizations.

### 1.3. Abu Dhabi special considerations

It should be noted that Abu Dhabi is an emirate and one of 7 emirates in UAE, therefore certain limitations apply in collecting and obtaining data. The HPI, however, is based on a survey tailored to the emirate of Abu Dhabi. Therefore, the HPI compilation is not subject to any particular constraints.

### 1.4. Classifications and standards applied

The classification used for the HPI is the Classification of Individual Consumption according to Purpose (COICOP 2018), issued by the United Nations for statistical purposes. As such, the HPI falls under the same umbrella as the CPI and other CPI-related publications (like the education price index) and is therefore governed by international standards outlined in Consumer price index manual, concepts and methods.

### 1.5. Available breakdown

The HPI is compiled on a granular basis, including the COICOP breakdown up to the 5-digits aligning with COICOP_2018 classification.

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### 1.6. Importance and objectives of the indicator

The HPI derives its significance from the fact that it represents a statistical indicator that reflects price changes in health-related products and services in the Emirate of Abu Dhabi and a tool to verify prevailing price trends of such products and services to help concerned entities and researchers develop plans and take proper decisions, in addition to its importance when comparing the cost of medical treatment across countries, being an analytical tool that estimates the financial capability of communities to bear medical costs. The Health Price Index (HPI) is also used in calculating other price indexes like the CPI and the Gross Domestic Product (GDP).

The HPI measures changes in **the consumer prices that consumers actually pay for the products and services** over specific periods of time in the Emirate of Abu Dhabi. The following is a summary of the main objectives of the Index:

- The HPI is an analytical tool that helps decision and policymakers know and understand price trends and predict price change in medical-related products, devices, equipment, and services.

- The HPI is used internally by SCAD in the calculation of other statistical indicators like short- term economic indicators and GDP at constant prices.

- The HPI is used by the entities concerned in the healthcare sector.

## 2. Indicator information

### 2.1. Geographical coverage

The HPI covers the emirate of Abu Dhabi.

### 2.2. Statistical population

The statistical population related to the health price index (HPI), as a component of the Consumer Price Index (CPI), comprises all health-related goods and services available within Emirate of Abu Dhabi typically including:

- Medical products, appliances and equipment: Prescription and over-the-counter medications are key components, including both generic and brand-name drugs, Items like surgical equipment, diagnostic devices, and other health-related products.

- Outpatient services and Hospital In-Patient services including preventive care, curative, rehabilitative services, long-term care, dental services.

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- Other health services including the diagnostic imaging services, medical laboratory services, patient emergency transportation and emergency rescue.

### 2.3. Periodicity

The HPI publication is issued annually. Data tables are produced quarterly for purposes of internal use by SCAD.

### 2.4. Timeliness

The HPI is published 45 working days after the reference period.

### 2.5. Units

The HPI is an index that does not have a specific physical unit.

### 2.6. Reference period

The weight reference year is 2019 based on the Household Income and Expenditure Survey (HIES_2019).

The price reference year is 2019.

# 3. Methodology

### 3.1. Alignment to international standards

The compilation of the HPI broadly follows, where possible, the recommendations outlined in Consumer price index manual, concepts and methods published jointly by the ILO, IMF and other international organizations. This means that procedures for data validation and statistical processing are consistent with the methodology outlined therein and is broadly consistent with other national statistical offices' best practices.

### 3.2. Data sources

The HPI relies on survey data only. No administrative data is used.

#### 3.2.1 Survey data

The survey questionnaire was designed by the Income and Prices Section at SCAD to collect data on health-related goods and services from providers in Abu Dhabi. It is sent to the sources on a quarterly basis. During the price collection phase, it is essential to gather the consumer prices that consumers actually pay for the products and services.

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### 3.2.1.1  Collection method

To facilitate the process of data collection for both the enumerator and the sale outlet officer, a method of data collection (field visit/ via telephone/ electronically) is agreed upon an initial field visit.

### 3.2.1.2 Sample design

The data is typically collected from various sources, including hospitals, pharmacies and other health service providers, to reflect the changes in prices over time accurately. The aim is to provide a comprehensive view of how health-related costs impact overall consumer spending.

The HPI uses a target sampling methodology to determine relevant outlets from which prices were obtained. In practice, the sample includes providers of health goods and services representing all types of providers (pharmacies, medical equipment providers, hospitals and clinics). The enumerator is responsible for periodic follow-ups and notifying the Prices and Income Section at SCAD of any closure or relocation to ensure consistency of the dataset.

It is worth mentioning that the price basket of health-related services, equipment, and products has been determined based on the results of the Household Income and Expenditure Survey (HIES) in 2019 reflected since 2022.

### 3.2.2  Administrative data

The HPI relies on survey data only. No administrative data is used.

### 3.3. Data validation and editing

### 3.3.1  Data validation

The validation and editing process of raw price data is important as it constitutes the basis for subsequent statistical analysis. SCAD has put in place various measures to ensure data accuracy and high-quality standards.

The auditing stages can be summarized as follows:

- Field work stage: The prices input by the field numerator 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 interquartile range (IQR) is used to establish the acceptable limits for price changes based on data from two years ago, and the rules of automatic editing have been established for changes in the prices of the commodity / service that exceeds a certain rate of change.

- Desk validation: This process takes place in the head office of SCAD in Abu Dhabi, where the changes of commodity prices are monitored and approved with the highest level of scrutiny and review.

### 3.3.2 Missing data adjustments

Imputation of missing prices is a crucial step to ensure accurate measurement of the inflation and cost associated with the healthcare services and products. When data on prices is missing for certain health items, statistical methods are used to estimate or "impute" those missing values based on the price change.

### 3.4. Data processing

Compiling the HPI requires validating and cleaning data from the quarterly field survey, followed by application of weights to each COICOP groups and sub-groups reflecting their relative importance versus other COICOP groups in the HPI basket, and finally creating a historical HPI series (including the reference year data) to construct the index.

### 3.4.1. Expenditure Weights

Weighting refers to the relative importance of each COICOP groups and sub-groups in the HPI basket. The weights reflect expenditure patterns for health-related products and services, based on data obtained from Household Integrated Economic Survey (HIES 2019). The calculation of weights follows a simple arithmetic procedure: Expenditure by Abu Dhabi national and non-national resident households on a certain sub-category (e.g., "Vitamins and minerals") divided by the total expenditure on the health category. The sum of all weights at the COICOP group level equals 100%.

The ILO and other global agencies recommend re-weighting the CPI and its components regularly (at least every 5 years) to maintain relevance of the CPI basket to real-life consumer spending patterns. A similar principle applies to the HPI which is a sub-group of the CPI.

### 3.4.2. Statistical calculation method

The main inputs used in the compilation of the HPI are:

- Relative importance of index basket commodities (weights)

- Base period prices

- Comparison period prices

The calculation of the HPI uses the weights and prices of the year 2019 as the base period.

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**Calculation of the health price index:**

First, calculate the elementary price for the products, i.e: assume for the product J there are K varieties then:

$$P_J = \prod_{i=1}^{K} P_{Ji}$$

$P_J$ : elementary price for product J.

$P_{Ji}$ : price for the variety i in the product J.

Then, calculate of elementary price index for the products using the Jevons formula:

$$I_J^t = \frac{P_J^t}{P_J^0} = \frac{\prod_{i=1}^{K}\left(P_{Ji}^t\right)^{\frac{1}{K}}}{\prod_{i=1}^{K}\left(P_{Ji}^0\right)^{\frac{1}{K}}}$$

$I_J^t$: Jevons index (Elementary price index) for product J.

$P_J^t$: elementary price of product J in the current period.

$P_J^0$: Elementary price of product J in the base period.

$P_{Ji}^t$: price of variety i of product J in the current period.

$P_{Ji}^0$: price of variety i of product J in the base period.

$K$: The number of varieties in the product J.

Finally, Health price index (HPI) is calculated using Laspeyres index, based on the weights of the base year (2019), by multiplying the elementary indices by their corresponding weights the overall final index is:

$$HPI = \sum_{J=1}^{n} I_J^t * W_J^0 = \sum_{J=1}^{n} \frac{P_J^t}{P_J^0} * W_J^0$$

HPI: Health price index.

$I_J^t$: Jevons index for product J.

$W_J^0$: Corresponding weights for the product J in the base period, $\sum_{J=1}^{n} W_J^0 = 1$.

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$P_J^t$: Elementary price for product J in the current period.

$P_J^0$: Elementary price for product J in the base period.

When calculating the indices for higher-levels, new weights should be determined so that the total sum of the weights at the higher-level equals 100%.

**Calculation of Percentage Change (Inflation)**

The percentage of change in the HPI for the current year compared with the previous year is calculated according to the following equation:

$$RC = \frac{HPI_c}{HPI_p} * 100 - 100$$

RC = rate of annual change (in %).

HPIc= current price index.

HPIp = price index for the same period of the previous year.

### 3.4.3. Seasonal adjustment

Seasonally adjusted estimates are not produced for this publication, the HPI is issued on an annual basis.

### 3.4.4. Chain linking

SCAD does not currently produce a chain linked HPI.

# 4. Special cases

HPI does not present special cases.

# 5. Outputs and quality

## 5.1. Dissemination and accessibility

The HPI Data is disseminated in SCAD official website and available in Excel and PDF on an annual basis.

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It is noteworthy that the HPI publication is separate from other health-related statistics published by SCAD.

## 5.2. Length of available dataset

The HPI dataset starts in 2017.

## 5.3. Methodology changes

The HPI was introduced in 2017 and has not been subject to any methodological changes since its inception. However, SCAD updating the base year and weights for the HPI to 2019 in 2022. In addition, in 2024, the health price index classification is realigned to reflect the latest version of the Classification of Individual Consumption According to Purpose (COICOP 2018), weights at the sub levels were calculated. A major methodology review is also currently underway, aiming at raising the Abu Dhabi HPI-related statistics quality to meet the highest international standards.

### 5.3.1. Recommendation

As a recommendation for methodological enhancement, it is suggested that data collection processes incorporate the use of administrative data to improve the quality of the output. By leveraging existing administrative datasets, the accuracy and reliability of the findings can be significantly enhanced. An experimental phase should be initiated to assess the feasibility of relying on administrative data as a source for Health Price Index (HPI) compilation. Prioritization of the use of administrative data in comparison to survey results should be determined following a thorough analysis of the outputs derived from the administrative data. This approach will ensure that decisions are based on a comprehensive evaluation of data quality and reliability.

## 5.4. Data coherence and comparability

The Abu Dhabi HPI was first compiled in 2017, with no major revision taking place since then. Similar to the CPI approach, a new version of the HPI would be linked to the old version to form a continuous time series with consistent inflation rates.

In general, SCAD follows internationally recommended classification and indexation methodologies to facilitate cross-country comparisons of CPI and its sub-groups such as the HPI. Not many countries publish a separate HPI.

## 5.5. Data accuracy and potential sources of errors

Data accuracy describes how closely the statistical indicator resembles the true value of the concept it measures, in this case price changes of health-related services and products in Abu Dhabi. It is important to recognize that some items in the consumer basket are more important than others. SCAD

makes use of the HIES to derive relative weights that determine how certain products impact the overall HPI. The HIES is revised periodically to ensure relative weights in the HPI calculation remain relevant, however it is not practically and financially feasible to carry out the HIES on a high-frequency basis such as annually. This means that the weights used in the compilation of the HPI may become less representative over time, however SCAD is committed to keeping any bias to a minimum.

Similar to the CPI, several sampling and non-sampling errors can arise along the design, collection, and calculation stages of the HPI. SCAD takes several measures to mitigate errors as follows:

**Sampling**: While a certain degree of sampling error cannot be avoided when taking a sample of observations as opposed to recording all prices or all items in Abu Dhabi, raising the sample size can mitigate the bias substantially.

**Data collection**: SCAD tries to minimize collection errors by employing well-trained enumerators that are considered specialists in their field. Those collectors know the products well and have experience in checking quality and price changes of products. Enumerators follow a strict validation procedure that requires passing several data checks before the data is submitted to the statistical office, where further automated checks are carried out.

**Data processing**: SCAD is continuously aligning the methodology with international standards and best practices, but certain scope for errors remains as it is difficult to fully isolate quality from price changes in certain product groups, and available index formulas may slightly over or understate the true amount of inflation.

Overall, SCAD believes the Abu Dhabi CPI is sufficiently accurate for most practical purposes. Accuracy tends to increase at higher levels of geographic and product aggregation due to the larger sample sizes of price data. Moreover, any distortions that can arise at elementary product indices (e.g. during price collection and editing, or in making quality adjustments) are more likely to cancel out on the aggregate level.

## 5.6. Revision policy

As per global standards, the original, non-seasonally adjusted HPI series are revised only in special circumstances, such as correction of significant errors. However, the index reference/base period (i.e. the period in which the index equals 100) may be changed periodically, resulting in a fully revised historic time series.

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### 5.7. Limitations of dataset

Similar to the CPI, the HPI uses a fixed basket and therefore omits some of the real-life substitution to relatively cheaper or newer goods and services that tends to occur. Frequent updates of the health expenditure basket and its weights can mitigate this limitation.

# 6. Institutional environment

Statistics Centre – Abu Dhabi (SCAD), as the competent government entity in charge of organizing statistical activities in the emirate, plays a pivotal role in supporting decision-makers, and policymakers in Abu Dhabi. The statistical activities in the emirate are organized by SCAD, with its strategic partners in the Statistical System of Abu Dhabi. The Law entrusts SCAD with the task of developing and organizing statistics in Abu Dhabi Emirate.

# 7. Glossary

**Price**
Price is the monetary value of goods, services and assets, expressed as an absolute figure or as an index.
(Source: Eurostat glossary)

**Consumer Price (Purchaser's price )**
The amount payable by the purchaser to acquire a good or service. The purchaser's price includes any charges incurred in order to take delivery at the time and place required by the purchaser.
(CPI manual theory and practice)

**Consumer Price Index (CPI)**
The CPI is an index that measures the rate at which the prices of consumption goods and services are changing from month to month (or from quarter to quarter).
(Source: Consumer price index manual)

**Weights**
The weights are generally actual or hybrid expenditure shares that sum to unity by definition. They are used to average price relatives or elementary price indices.
(Source: CONSUMER PRICE INDEX MANUAL Concepts and Methods)

**Outlet**

A shop, market, service establishment, internet site, mail order service or other place from where goods and/or services can be purchased and from where the purchasers' or list prices of the products sold can be obtained.

(Source: OECD Glossary of Statistical Terms)

**Comparison Time (Current period, or comparison period)**

In principle, the current period should refer to the most recent period for which the index has been compiled or is being compiled. The term is widely used, however, to mean the comparison period; that is, the period that is compared with the base period

(source: CPI manual theory and practice)

**Base Time (Base period)**

The base period is usually understood to mean the period with which all the other periods are compared. The term may, however, have different meanings in different contexts.

(Source: CPI manual theory and practice)

**Price index**

The price index reflects an average of the proportionate changes in the prices of a specified set of goods and services between two periods of time.

(Source: OECD Glossary of Statistical Terms)

**Basket**

The term commonly used for the list of goods and services, together with their relative values of output or input, for which a sample of prices is collected for the purpose of compiling the PPI.

(Source: OECD Glossary of Statistical Terms).

**Inflation**

A sustained increase in the general price level, often measured by an index of consumer prices. Inflation is the percentage change in the price level in a given period.

(Eurostat)

**Weight reference period**

The period whose value shares serve as weights for a set of price relatives or elementary price indices. It does not have to have the same duration as the periods for which the index is calculated and in the case of a PPI is typically longer, a year or more, rather than a month or quarter. Nor does it have to be a single period as in the case of symmetric indices such as the Marshall Edgeworth, the Walsh and the Törnqvist price indices.

(OECD)

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**Price reference period**

The prices of a period with which the prices in the current period are compared. The period whose prices appear in the denominators of the price relatives.

(OECD)

**COICOP**

The Classification of Individual Consumption by Purpose. It is the internationally preferred classification for CPIs, household budget surveys, and the International Comparison Program.

(Source: CONSUMER PRICE INDEX MANUAL Concepts and Methods)

**Jevons price index**

An elementary price index defined as the unweighted geometric average of the sample price relatives.

(Source: CONSUMER PRICE INDEX MANUAL Concepts and Methods)

**Laspeyres price index**

A basket index in which the basket is composed of the actual quantities of goods and services in the earlier of the two periods compared, the price reference period. It can also be expressed as a weighted arithmetic average of the price relatives that uses the expenditure shares in the earlier period as weights;. The earlier period serves as both the weight reference period and the price reference period.

(Source: CONSUMER PRICE INDEX MANUAL Concepts and Methods)

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STATISTICS CENTRE

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