



مركز الإحصاء
STATISTICS CENTRE

Methodology

Education Price Index

Table of Contents

1. Overview.....	4
1.1. Introduction.....	4
1.2. Concepts and definitions.....	4
1.3. Abu Dhabi special considerations.....	4
1.4. Classifications and standards applied.....	4
1.5. Available breakdown	5
1.6. Importance and objectives of the indicator.....	5
2. Indicator information.....	5
2.1. Geographical coverage.....	5
2.2. Statistical population.....	5
2.3. Periodicity.....	6
2.4. Timeliness.....	6
2.5. Units.....	6
2.6. Reference period.....	6
3. Methodology.....	6
3.1. Alignment to international standards.....	6
3.2. Data sources.....	6
3.2.1. Survey data.....	6
3.2.1.1. Collection method.....	6
3.2.2. Administrative data.....	6
3.3. Data validation and editing.....	7
3.3.1. Data validation.....	7
3.3.2. Missing data adjustments.....	7
3.4. Data processing	7
3.4.1. Sample weighting.....	7
3.4.2. Statistical calculation method.....	8
3.4.3. Seasonal adjustment.....	9
3.4.4. Chain linking.....	9
4. Special cases.....	9
5. Outputs and quality.....	9

5.1. Dissemination and accessibility.....	9
5.2. Length of available dataset.....	9
5.3. Methodology changes	10
5.4. Data coherence and comparability.....	10
5.5. Data accuracy and potential sources of errors.....	10
5.6. Revision policy.....	11
5.7. Limitations of dataset.....	11
6. Institutional environment.....	11
7. Glossary.....	11

1. Overview

1.1. Introduction

The Education Price Index (EPI) is compiled by the Statistics Centre – Abu Dhabi (SCAD), based on tuition fee data collected by the Abu Dhabi Department of Education (ADEK). The education sector belongs to a set of priority sectors that policymakers in the Emirate of Abu Dhabi have identified as key engines to future growth and development. The collection and dissemination of the education price data is an important input into policymaking and monitoring education price movements.

ADEK oversees the government schools, private schools and higher education in the emirate of Abu Dhabi, aiming to uplift the quality of education to the highest international standards, as well as securing opportunities for all residents to obtain high quality education to achieve the objectives of Abu Dhabi's Vision 2030.

To compile the EPI, administrative data from ADEK is indexed according to commonly used statistical processes to form the aggregate EPI. The EPI also feeds into the broader Consumer Price Index (CPI) publication, which is issued separately by SCAD. However, the education group in the CPI is broader than the EPI, as it includes other items besides just tuition fees.

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 EPI measures the relative change in the prices of tuition fees. As a sub-group of the 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 EPI however is based on a full dataset of schools located in the emirate of Abu Dhabi and is therefore not subject to any particular constraints.

1.4. Classifications and standards applied

The classification used in the compilation of the EPI is the Classification of Individual Consumption according to Purpose (COICOP), The following table illustrates the main groups forming the EPI:

COICOP	Group
10	Education
10.1	Primary and Pre-Primary
10.2	Secondary Education
10.3	Post-Secondary Education – Non-tertiary
10.4	Tertiary Education
10.5	Education not defined by level

¹ See <https://www.imf.org/en/Data/Statistics/cpi-manual>

² See https://unstats.un.org/unsd/classifications/unsdclassifications/COICOP_2018_-_pre-edited_white_cover_version_-_2018-12-26.pdf.

1.5. Available breakdown

SCAD publishes the 2-digit COICOP EPI breakdown to all users. Similar to CPI data, SCAD also provides the following regional breakdown of the EPI, based on the same set of administrative data collected from ADEK:

- Abu Dhabi
- Al Ain
- Al Dhafra

1.6. Importance and objectives of the indicator

The decision for a separate publication of the EPI resulted from repeated demands by educational institutions to increase school fees to balance high costs of providing educational services. ADEK, in cooperation with SCAD, has worked to lay the foundations and sound standards to respond to requests for increasing fees.

As such, the introduction of the EPI and related education statistics aim to regulate the process of increasing tuition fees in private schools in the emirate of Abu Dhabi based on the relevant international best practices and through the creation of a balanced system linking the increase in tuition fees to the quality of the educational institution. It also considers inflation rates in a way that preserves the rights of all concerned parties and is considered an analytical tool for estimating the society's ability to bear the costs of education. The education price index is also included in the calculation of other indices such as CPI.

The Education Price Index measures changes in the prices of school and university fees for the various curricula followed in the Emirate of Abu Dhabi during different periods of time. The key objectives of the EPI are summarized in the following:

- Analytical tool for informing decision and policy makers about price trends and for predicting any price changes in the prices of private and government school fees as well as higher education.
- Used by the National Accounts Section as a deflator in the process of calculating GDP at constant prices.
- Input into the education sub-group of the CPI.
- Used by specialized agencies in the education sector.

2. Indicator information

2.1. Geographical coverage

The EPI covers the emirate of Abu Dhabi, including its three administrative areas Abu Dhabi, Al Ain and Al Dhafra

2.2. Statistical population

The Abu Dhabi EPI reflects tuition fees for all government and private schools which use one of the following curricula:

- American Curriculum

- British Curriculum
- Indian Curriculum
- Shwefat Curriculum
- Ministry of Education Curriculum

In addition, higher education institutions are also covered.

2.3. Periodicity

SCAD issues the EPI bulletin on yearly basis.

2.4. Timeliness

The EPI report is issued one year after the reference year.

2.5. Units

The EPI is an index that equals 100 in its base year (currently 2016).

2.6. Reference period

The reference period for price data collection is the academic year. The price series reference period is the base year (currently 2016).

The weights are based on expenditure patterns on education services in the base year (2016).

SCAD is currently working on updating weights and base year to 2019, in line with the CPI.

3. Methodology

3.1. Alignment to international standards

The compilation of the EPI 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

Data and prices used in calculation of the EPI are administrative data issued by ADEK and provided to SCAD for processing, editing and use for the compilation of the EPI.

3.2.1 Survey data

EPI statistics fully rely on administrative data received from ADEK, with no survey carried out.

3.2.2 Administrative data

Prices are provided to SCAD in excel format via email.

The Department of Education and Knowledge gather the data directly for all schools and higher education institutions in the emirate. The fees remain firm throughout the school year. As such, prices are collected only once during the academic year (in the month of November).

A targeted sample is then taken from the schools and higher education institutions from ADEK dataset, covering all curricula taught in the three administrative regions of the emirate of Abu Dhabi. Work is in progress for the inclusion of all schools and higher education institutions in the EPI to raise the accuracy and minimize any sampling errors.

3.3. Data validation and editing

3.3.1 Data validation

The administrative data received from ADEK is checked for the following:

- Consistency of prices between the stages of study in the same school and comparison with the prices of previous years.
- Consistency of prices between schools by curriculum, stage, years, and prices for previous years.
- The rates of increase in school fees issued by ADEK and compared with the data received on tuition fees.
- Data on higher (tertiary) education institutions are edited in a similar manner.

3.3.2 Missing data adjustments

Dataset covers all schools in the Emirate of Abu Dhabi.

3.4. Data processing

Compiling the EPI requires applying weights to each COICOP sub-group reflecting their relative importance versus other COICOP groups in the EPI basket and creating historical EPI series (including the reference year data) to construct the index.

3.4.1. Sample weighting

Weighting refers to the relative importance of each COICOP product group and sub-group in the EPI basket. The weights are derived from expenditure patterns on education services in 2016 (the index base year). 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. “Primary Education”) divided by the total expenditure on all education products. The sum of all weights at the COICOP group level equals 100%. The current weights of the EPI (base year 2016) are as follows:

COICOP	Group	Weight
10	Education	100.0
10.1	Primary and Pre-Primary	54.1
10.2	Secondary Education	16.5
10.3	Post-Secondary Education – Non-tertiary	3.2
10.4	Tertiary Education	25.0
10.5	Education not defined by level	1.2

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 EPI which is a sub-group of the CPI. SCAD is currently working on updating the consumer basket and CPI weights to 2019 to align with international guidance and best practices and the latest HIES.

3.4.2. Statistical calculation method

The following are the main inputs used in the compilation of the Education Price Index:

- Relative importance of index basket commodities (weights)
- Base period prices
- Comparison period prices

The calculation of this Index uses the weights and prices of the year 2016 as the base period.

Calculation of the Price Index

The EPI is calculated using the Laspeyres equation and the weights of the base year (2016) as follows:

$$EPI_L = \sum \frac{P_{1i}}{P_{0i}} \times W_{0i}$$

EPI : Education Price Index

P_1 : Current Price.

P_0 : Base Year Price.

W_0 : Base Year Weight.

The calculation of elementary aggregates is carried out by using the Dutot equation:

$$PD = \frac{\frac{1}{n} \sum_{i=1}^n P_{ti}}{\frac{1}{n} \sum_{i=1}^n P_{0i}}, i = 1, 2, 3, \dots, n$$

P_D : Dutot Index

P_t : Comparison Period Price.

P_0 : Base Year Price.

$i = 1, 2, 3, \dots, n$

n : Number of commodities in elementary aggregate

To aggregate upwards in the calculation of the EPI, the elementary Dutot indices are multiplied by the corresponding basket weights.

Calculation of Percentage Change

Percentage change in the EPI for the current year compared with the previous year is calculated according to the following equation:

$$RC = \frac{EPI_c}{EPI_p} * 100 - 100$$

RC : Annual Rate of Change (in %).

EPI_c : Current Price Index

EPI_p : Price Index of the same period of the previous year

Outputs

The following outputs are compiled by SCAD:

- Primary and Pre-Primary EPI
- Secondary EPI
- Post-secondary non-tertiary EPI
- Tertiary EPI
- Aggregate EPI

3.4.3. Seasonal adjustment

The EPI is an annual publication and therefore no seasonal adjustment is required.

3.4.4. Chain linking

SCAD does not currently produce a chain-linked EPI. However, development of a chain-linked index is a near term priority as part of a general CPI methodology overhaul with the aim to improve coherence and quality of the published data.

4. Special cases

The EPI does not present special cases of indicators.

5. Outputs and quality

5.1. Dissemination and accessibility

The EPI is disseminated in SCAD official website and available in Excel and PDF on annual basis.

It is noteworthy that the EPI publication is separate from other, education-related statistics published by SCAD

5.2. Length of available dataset

The EPI dataset consists of an annual time series at the 2-digit COICOP detail starting in 2017.

5.3. Methodology changes

The EPI was introduced in 2017 and has not been subject to any methodological changes since its inception. However, SCAD is currently working on updating the base year and weights for the CPI to 2019, which will also affect the EPI as a sub-group of the CPI. A major methodology review is also currently underway, aiming at raising the Abu Dhabi CPI-related statistics quality to meet highest international standards.

5.4. Data coherence and comparability

The Abu Dhabi EPI was first compiled in 2017, with no major revision taking place since then. Similar to the CPI approach, a new version of the EPI 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 EPI. Not many countries publish a separate EPI.

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 education price changes in Abu Dhabi. It is important to recognize that some items in the education consumption basket are more important than others. SCAD makes use of education expenditure patterns to derive relative weights that determine how the different types of education impact the overall EPI. Weights are typically revised periodically to ensure relative weights in the EPI (as well as the CPI calculation) remain relevant, however it is not practically and financially feasible to re-base the EPI annually. This means that the weights used in the compilation of the EPI may become less representative over time, however SCAD is committed to keeping any bias to a minimum.

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

- **Sampling.** SCAD is planning to move from a targeted sample approach to using the full administrative dataset to avoid any potential sampling bias.
- **Data validation.** SCAD follows 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 and available index formulas may slightly over or understate the true amount of inflation.

Overall, SCAD believes the Abu Dhabi EPI will meet a high level of accuracy once the target sampling approach is replaced. It is noteworthy that accuracy tends to increase at higher levels of geographic and product aggregation due to the larger datasets with more observations. Moreover, any distortions that can arise at elementary product indices (e.g. during price collection and editing) are more likely to cancel out on the aggregate level.

5.6. Revision policy

As per global standards, the original, non-seasonally adjusted EPI 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) is changed periodically, resulting in a fully revised historic time series.

5.7. Limitations of dataset

The EPI tracks tuition fees but does not include any other cost faced such as education materials or additional private education services outside of schools. It is therefore not a comprehensive education cost equivalent. Moreover, it only measures the tuition cost of institutions located in Abu Dhabi and therefore omits education cost to Abu Dhabi residents incurred elsewhere (for instance on studies abroad or online).

Similar to the CPI, the EPI uses a fixed basket and therefore omits some of the real-life substitution to relatively cheaper goods and services that tends to occur. Frequent updates of the education 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 statistical in Abu Dhabi Emirate.

7. Glossary

Weight (relative importance):

Is the relative importance of any product or service in the basket of the Education Price Index that expresses its importance compared with all other products in the basket. It is calculated by dividing the expenditure of all households on this item/service compared with the expenditure of all households on all goods and services in the education group.

Price:

The market value of educational services, which could be defined as the value paid by the individual or the family in return for the education received by the individual in the educational institution, with the exclusion of any government subsidies.

Average Price:

Total prices of the commodity or service gathered from several sources divided by the number of resources of such commodity or service.

Relative Change in Price:

The increase or decrease in the current average price compared with previous average price.

Education Price Index:

An indicator that measures the education prices during two periods, base period and comparison period for a selected group of schools using different curricula (British, American, Hindi, Shweifat, and Ministry of Education).

Collection Period:

The period agreed on for receiving data from the Department of Education and Knowledge.

Laspeyres Equation:

A mathematical equation developed by the statistician Laspeyres to calculate the price index by dividing the prices of the comparison period by the prices of the base period.

Percentage Change in the Price Index:

A measure of change in the price index calculated by dividing the price index of the comparison period by the price index of the base period multiplied by one hundred followed by deduction of one hundred.

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 with the base period.

Base period:

The year in which the EPI 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.



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