<u>**CONSUMER PRICE INDEX METHODOLOGY**</u>

(Updated January 2024)

1. Purpose, nature and use

The purpose is to obtain country representative data for the prices of goods and services and to compute overall and group indices of consumer prices.

The consumer price index (CPI) is a measure of the general relative change of the prices of goods and services used by households for private (non-production) consumption. It is defined as the 'pure price change' index. The total consumer price index summarizes the individual price indices of the observed goods and services.

The CPI is the chained Laspeyres-type index which reflects the 'pure price change' i.e. the index reflects only the change in prices between the current and the base period. The CPI does not measure the cost of living and it is not a cost of living index.

The consumer price index is applied in three main areas as:

- Macroeconomic indicator - as official measure of inflation in Bulgaria;

- Deflator of the values of indicators, which do not have their own price measure;

- Tool for possible indexation of salaries, pensions and other incomes from the Government when needed.

2. Structure of the CPI

The structure of the CPI is a national version of the ECOICOP classification – the European Classification of Individual Consumption According to Purpose, according **Regulation (EU) 2016/792** of 11 May 2016[1] of the European Parliament and of the Council. It is hierarchical and is built on five levels:

- Division;

- Group;

- Class;

- Subclasses;

- Elementary aggregate.

The first four levels cover the structure of ECOICOP. The national CPI covers all subclasses, which have a weight accounting for more than 1/1000 of total weight (i.e. 12 divisions, 42 groups, 96 classes and 206 subclasses).

The lowest level is national and defines the expenditures for individual consumption in the respective elementary aggregate's groups. The grouping of goods and services in both classifications ECOICOP for the needs of harmonized CPI, and for the needs of household budgets survey ensures coordinated usage of ECOICOP as the statistical standard. The national CPI for the year 2024 comprises 81.7% of the total final monetary expenditures in 2023.

3. Sample Coverage

CPI compilation is based on four samples:

- Consumer basket - sample of goods and services, offered at the consumer market;

- Geographic coverage - sample of settlements, where observation points will be sampled;

- Observation points - sample of stores, shops, restaurants, cafes, etc. in the sample of settlements;

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[1] **Regulation (EU) 2016/792** of the European Parliament and of the Council of 11 May 2016 on harmonised indices of consumer prices and the house price index, and repealing Council Regulation (EC) No 2494/95 (OJ L 135, 24.05.2016 ,p.11)

- Target number of prices – set of prices of goods and services to be priced at the sampled observation points.

3.1. Consumer basket

The consumer basket includes goods and services, which represent the final consumption of households. The following principles are observed:

- The goods and services to be priced in the CPI should be a fixed (unchanged) series of goods and services during the year, which has to reflect the average change in prices for all goods and services and has to correspond to the structure of households' consumption;

- A correspondence with the definitions in the System of National Accounts should exist in respect of private consumption and its coverage;

- Consistency with the classification of goods and services used in international comparisons of prices in accordance with the Programme for European Comparisons (PEC) should exist;

- Goods and services should include public utilities with "tariff" prices;

- Goods traded between households, and goods bought in insignificant quantities, should be excluded.

The prices of specially selected representative products (sample of goods and services representatives, so called 'consumer basket') are collected. Selection and specification of the products is done jointly by staff in central office and by price collectors in regional statistical offices.

Procedures for specifying the goods and services representatives can be described as follows:

- definition of an initial product sampling framework using HBS results;

- use of alternative data sources for the definition of the exact characteristics of the sampled products (administrative data, privately-owned data bases, etc.) , in addition to HBS data, where possible;

- use of price collectors' field experience when information from the HBS and other data sources is not enough for the definition and specification of the sampled products;

- extraction of the sample using purposive sampling techniques.

The specifications for individual goods/services are more or less detailed; indicating size, unit, materials, model, brand characteristics, etc. How tight or loose the specifications will be depends on the nature of the product. If a product has many characteristics could affect its price, the specification is more exact. There are detailed specification in case of cars, medicines, fuels and some foods and services. For the most of the products looser specifications are used.

The specific variety of the good/service (reference product-offer), whose price will be collected in the sampled outlet, is selected by price collectors. They are instructed to pick the 'typical' product variety:

- which is the most sold in the sampled outlet; and;

- which meets as close as possible the specification of the product.

At the end of each year during the annual CPI revision several letters with instructions for the price collectors are sent to RSOs. The procedures for selecting the particular product in outlets are covered in them. The issue is also discussed on the seminars/workshops with price collectors, which take place regularly.

The consumer basket for the year 2024 consists of 852 goods and services, divided into four basic groups:

- Foods - 179;

- Non-foods - 380;

- Catering - 52;

- Services - 241.

These goods and services are grouped into 12 basic divisions in accordance with the ECOICOP classification:

- Food and non-alcoholic beverages;
- Alcoholic beverages and tobacco;
- Clothing and footwear;
- Housing, water, electricity, gas and other fuels;
- Furnishings, household equipment and routine household maintenance;
- Health;
- Transport;
- Communications;
- Recreation and culture;
- Education;
- Hotels, cafes and restaurants;
- Miscellaneous goods and services.

3.2. Geographic coverage

The sample of settlements includes settlements in 27 district centers. Over 50% of the populations of the country live in the sampled settlements and over 65% of the sales are made in them.

3.3. Observation points

The number and the structure of the observed market points are selected in a way that can assure the optimum number of prices collected, which are sufficient to represent national prices for any group of goods and services in the consumer basket. The sample includes outlets, which:

- have a large volume of retail sales;
- supply a variety of goods, representative of the relevant "elementary aggregates" in the consumer basket.

The main types of retail trade are covered, including the biggest outlets such as: supermarkets, general and specialized stores, cooperative markets.

The selection is made by prices collectors and is confirmed by the director of the respective regional statistical office.

There are above 6 400 observation points for the year 2024.

3.4. Target number of prices

In 2024 the planned monthly number of observations is 41 039, distributed among the four basic groups as follows:

- Foods - 14 964;
- Non-foods - 19 774;
- Catering - 2 873;
- Services - 3 428.

4. Organization of price collection

The target number of prices for every good and service in the consumer basket is fixed. The price collection period is from 1st to 30th of each month on a schedule, which is drawn up in the relative regional

statistical office and is confirmed by its director. Prices are collected by qualified specialists, employed in the regional statistical offices. Prices are recorded in special notebooks or by electronic devices.

5. Calculation of Consumer Price Index

Calculation of the CPI is based on the following information:

- Base prices – annual average prices in the previous year for every item in the consumer basket;
- Base weights – calculated from the monetary expenditures of households in the previous year.

Base prices and base weights are updated every year.

There are four stages in the calculation procedure:

A. Calculation of imputed prices

The indices for all elementary aggregates are compiled and where necessary missing prices are imputed using the change in a matched sample of average prices. Where a matched sample is not available, prices are imputed with the help of an upper-level group index.

The index $I_{t/t-1}$, with which the imputation is done, compiles as:

$$I_{t/t-1} = \sqrt[m]{\prod_{i=1}^{m} \frac{P_t^i}{P_{t-1}^i}}, \qquad i \in S_{t-1} \cap S_t$$

where:

P_t^i denotes available prices in period t;

P_{t-1}^i - available (real and imputed) prices in period $t-1$;

S_t - set of available prices in period t;

S_{t-1} - set of available prices in period $t-1$;

m - number of prices, which belong to sub-set $S_{t-1} \cap S_t$.

B. Calculation of the aggregate CPI

The average national price for every good or service in the consumer basket is compiled as the geometric mean of all prices (real and imputed):

$$P_t = \sqrt[n]{\prod_{i=1}^{n} P_t^i},$$

where:

P_t denotes national price for the current month;

P_t^i - price of i-th item;

n - number of recorded and imputed prices.

C. Calculation of base indices for the current month t

The base index for elementary aggregate (5th level) is calculated as the ratio of geometric mean prices, that are part of a given aggregate:

$$I_{t/b} = \sqrt[n]{\prod \frac{P_t^i}{P_b^i}}, \qquad i \in S_t$$

where:

S_t denotes the set of all prices (real and imputed) in period t;

P_t^i - i-th current price for an elementary aggregate;

P_b^i - i-th base price for an elementary aggregate;

n - number of prices in an elementary aggregate.

Base indices for the groups of 4th, 3rd, 2nd and 1st level are compiled as Laspeyres-type indices:

$$I_{t/b(m)} = \frac{\sum_{i=1}^{n} I_{t/b(m+1)} \cdot W_{(m+1)}^i}{\sum_{i=1}^{n} W_{(m+1)}^i},$$

where:

m is the hierarchical level (m=4 for group of goods, m=3 - class, m=2 - group, m=1 - division and m=0 - overall CPI);

n - number of groups from (m+1)-th hierarchical level, going into the group from m-th hierarchical level;

$W_{(m+1)}^i$ - base weights.

D. Chain indices

Chain indices during one year for all levels are compiled as the ratio of the base indices for the current month and the relative base indices for the previous month.

$$I_{t/t-1(m)} = \frac{I_{t/b(m)}}{I_{t-1/b(m)}}$$

The consumer price index is a chained Laspeyres-type index. The chain index for January of the current year taking December of the previous year as 100 (refers to the general index and particularly to any hierarchical level) compiles as:

$$I_{Dec2023}^{Jan2024} = \frac{I_{2023}^{Jan2024}}{I_{2023}^{Dec2023}}$$

where:

$I_{2023}^{Jan2024}$ - is the base index for January 2024 with 2023 as price and weight reference;

$I_{2023}^{Dec2023}$ - amending base index, defining the change of prices in December 2023 taking the annual average prices in 2023 as 100, weighted with the monetary expenditures in 2023.

6. Treatment of the quality changes of the observed products

When the CPI is calculated, it is important to be priced the products with unchangeable quality, because the change in prices should reflect only 'pure' price changes not changes due to change in the quality of the observed products.

The most influential methods with dealing with quality change of products are:

•	Annual overlap. For many of the products new samples are drawn each year during the annual revision of consumer basket. December is used as linking month and then the dual price collection is done – the prices are collected both for the old and for the new sample. Quality differences between these two samples are then eliminated by overlap method called 'annual overlap'.

• Direct comparison. Price collectors are instructed to measure the price for the same variety throughout the year and if the variety disappears permanently from the market, they should choose another one with the most similar quality. In these cases, direct comparison method is applied, because of the minor difference in quality between the old and the new variety.

• Implicit quality adjustment methods. In some particular cases, the second approach is not applicable, due to the fact that quality difference between old and new product is 'significant', and implicit quality adjustment methods are applied: (a) overlap is used when the prices of both products are available in the same time period; (b) bridged overlap is used when they are not available; and (c) option cost.

Quality adjustment procedures are done centrally by the staff in central office. At regional level, price collectors do not make any quality adjustments; they are only instructed to report to central office for the all cases of considerable quality changes of the replacement products.

7. Publicity and transparency

7.1. Announcement of results

The CPI data is published together with CPI data to a strict, pre-announced timetable – in general 14 and 16 calendar days after the month in a question.

The CPI data which is released each month covers the monthly indices and rates of change, annual indices, annual average indices and indices for the current month compared to December of the previous year.

The press release includes also data for price changes of the basic consumer groups: foods, non-foods, services and catering.

7.2. Publications

• 'Statistical Yearbook of the Republic of Bulgaria', Chapter 'Prices';

• 'Statistical Reference Book', Chapter 'Prices' - annual publication of NSI;

• 'Bulgaria' - annual brochure of NSI;

• 'Key Indicators for Bulgaria';

• 'Consumer Price Index and Inflation - Answers to the Most Frequently Asked Questions' - brochure.

7.3. Electronic access

The NSI has a WEB-page in the Internet. The address is: http://www.nsi.bg. Basic data for consumer price indices, the entire methodology of CPI compilation as well as the consumer basket can be found there.