THE REVISED CONSUMER PRICE INDEX IN ZAMBIA

Submitted by the Central Statistical office of Zambia

Abstract

This paper discusses the Revised Consumer Price Index (CPI) in Zambia, based on revised weights, new methodology and software for data processing. The paper also highlights the differences between the old and revised Consumer Price Index (CPI).

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I.   Introduction

1.   The Consumer Price Index (CPI) measures changes in the average level of retail prices of goods and services purchased by typical households for the purpose of consumption. The CPI is a key macro-economic indicator. Consequently, it is of great interest to government, labour unions, business organisations, research Institutions and the general public. In Zambia, the CPI is mainly used by the central bank and the government as an important fiscal and monetary tool.

2.   The Central Statistical office recently launched the revised Consumer Price Index, based on a new methodology and software for data processing. In the process of revising the Consumer Price Index, technical assistance was sought from both the International Labour Organisation (ILO) and International Monetary Fund (IMF).

Scope and Coverage

3.   The revised CPI covers non-institutionalised private households residing in both rural and urban areas of Zambia. All the 10 provinces and 56 districts are covered. Prices of 438 goods and services are collected from a sample of retail and service outlets.

II.   Background

4.   The first series of the Consumer Price Index in Zambia was for urban households with an index reference period of 1962. The index was compiled and published according to the High Income Wage Earners and Low Income Wage Earners.

5.   In 1997/1975 a full scale household budget survey was conducted and provided the basis for revising the weights for the Consumer Price Index. The survey covered rural as well as urban areas. However, the weights were computed from the expenditure profiles of urban households only. Price collection was restricted to urban areas along the line of rail and hence the CPI reflected changes in urban retail prices only.

6.   By the early 1990's the Government recognised the need to have a national index that was representative of the whole country and that would reflect current spending patterns of the population. In view of this, a provision was made to carry out a comprehensive house hold budget survey in 1993/1994.

7.   The 1993/1994 Household Budget Survey covered the whole country on a sample basis. A sample of 1800 households was selected. The overriding objective of the survey was to produce the weights for the new CPI and after consultation with users, it was agreed that three retail price indices were required, these would be for:

(a) Urban upper-income households (top 20% by income);
(b) Urban lower –income households (lower 80% by income): and
(c) Rural households

8.   With this requirement it was appropriate to stratify the country in to two strata. The first, comprising the 10 major towns was designated 'Metropolitan. The second comprising the small towns and the rural was called 'Non-Metropolitan". The major towns included Livingstone, Lusaka urban, Kabwe urban and all Copperbelt towns. The Metropolitan stratum was further stratified into urban upper-income households and urban lower-income households. This means that the major towns comprised the indices for Metropolitan high income and Metropolitan low income groups, while the small towns and rural areas formed the Non- Metropolitan group.

9.   Up to 1991, the selection of outlets to provide price quotations for the consumer price index was restricted to urban areas along the line of rail. In 1991, the selection was broadened to include outlets from districts in every province of Zambia. The range of outlets was also broadened to include open markets.

10.   Another comprehensive Household Budget Survey (HBS) was conducted in 2002/2003 and this provided the basis for revising the weights for the current Consumer Price Index (CPI). The weights were price-updated to 2009, the index reference period.

III.   2002/2003 Household Budget Survey

11.   The survey covered 520 Standard Enumeration Areas (SEA's) or approximately 10,000 non-institutionalised private households residing in both rural and urban areas of all the 10 provinces in Zambia. The survey was carried out for a period of 12 months using a rolling sample. The 360 days in a year were divided into 10 cycles of 36 days each and 52 SEA's, which is one-tenth of the 520 SEA's, were covered every cycle countrywide.

Classification

12. The revised Consumer Price index has adopted the Classification of Individual Consumption by Purpose (COICOP).

Weights

13. The weights for the revised Consumer Price index were derived from the 2002/2003 Household Budget Survey, and price-updated to 2009, the index reference period. The weights are based on household final monetary consumption expenditure. With the weighting system developed for Zambia, both horizontal and vertical aggregation is possible, e.g., the National all-items CPI resulting from the aggregation of the regional all-items CPIs is equal to the all-items CPI obtained from aggregating the national price relatives for individual products. Division weights by province are shown below:

Table 1: Division level weights by Province

Division	Central	Copper belt	Eastern	Luapula	Lusaka	Northern	North western	Southern	Western	Total
1. Food and non-alcoholic beverages	71.44	116.63	48.47	32.69	122.33	38.04	20.51	57.25	27.49	534.85
2.Alcoholic beverages & tobacco	1.65	2.80	1.74	0.73	3.22	1.26	0.41	2.70	0.69	15.21
3. Clothing and footwear	7.27	17.84	8.39	3.78	18.24	7.18	3.43	10.39	4.27	80.78
4.Housing, water, electricity, gas and other fuels	4.27	28.50	5.17	5.36	51.15	5.17	1.77	10.61	2.12	114.11
5. Furniture, household equipment and maintenance	8.00	15.16	11.05	3.32	23.23	5.74	2.31	9.90	3.65	82.36
6.Health	0.89	1.92	0.93	0.17	2.00	0.63	0.20	1.08	0.34	8.15
7. Transport	5.75	12.15	4.65	0.90	25.51	1.47	1.16	5.80	0.70	58.08
8. Communication	0.38	3.59	0.16	0.06	7.70	0.12	0.04	0.84	0.04	12.94
9.Recreation and Culture	0.76	3.02	1.00	0.59	5.45	0.70	0.30	1.55	0.47	13.84
10.Education	1.71	8.87	0.92	0.60	10.27	1.20	0.49	2.16	0.40	26.62
11.Restaurant and hotesl	0.14	0.75	0.40	0.53	0.79	0.09	0.07	0.40	0.19	3.37
12. Miscellaneous goods and services	4.94	8.46	6.10	1.86	13.99	4.10	1.65	6.52	2.07	49.69
Total	107.19	219.68	88.98	50.60	283.89	65.72	32.33	109.19	42.42	1000.00

Key features of the revised CPI:

14. Summarised features are as follow:

(a) A revised basket of goods and services comprising 438 products.
(b) Classification of Individual Consumption by Purpose (COICOP)
(c) New expenditure weights from the 2002/2003 Living Conditions Monitoring Survey (LCMS)
(d) A new index reference period 2009=100

(e) Use of Geometric Mean in calculating elementary level indices

(f) Compilation of provincial Indices

(g) Expanded scope (number of districts and outlets)

(h) New computer system for data entry and data processing

15.   The differences between the Old and the Revised CPI are summarized below:

Table 2 - Comparison of the Old and revised Consumer Price Index

Item/ Area	Old CPI	Revised CPI
Basket of products	357	438
Classification system	8 Divisions	12 Divisions (COICOP)
Expenditure weights	Derived from 1993/1994 Household Budget Survey (HBS)	Derived from 2002/2003 LCMS III HBS type
Compiled according to:	Metropolitan Low Income Group, Metropolitan High Income Group, and Non-Metropolitan Group.	Provincial CPIs
Index reference period (Base Period)	1994	2009
Methodology for calculating elementary aggregates	Arithmetic mean of price relatives(AR)-Carli index	The ratio of geometric mean of prices (GM)- Jevons index
Methodology for calculating upper-level aggregates	Laspeyres type formula (direct method)	Laspeyres type formula (chained index)
Price quotations per month	15,000	30,000
Districts	45	All districts in Zambia
Outlets	2115	3,000
Software for Data Entry, Processing and Reporting	Dbase IV, DOS based	Microsoft Access, with Visual Basic for Applications (Windows based)

Features of the New CPI Software

16.   The New CPI System has been developed in Access with the following features: -

(a)Uses Windows platform

(b)Propagates centrally collected prices to provincial outlets

(c)Validation is immediate, which allows immediate correction

(d)Editing/ reviewing of quotations is flexible – permitting filtering of records of interest such as the threshold (upper and lower limits) values of price change rates

(e)Prints Questionnaires from the application

(f)System works in a Client-Server environment, supporting a minimum of

15 users concurrently

(g)System is secure (implements log-on and roles)

IV. Formula

<u>Calculation of the elementary aggregate price indices</u>

17.   The ratio of geometric mean of prices formula is used in constructing elementary aggregate indices. The formula has many desirable mathematical properties and produces unbiased results. The formula is expressed algebraically as follows:

$$I_J^{0:t} = \prod_{i=1}^{n} \left(\frac{p_i^t}{p_i^0} \right)^{1/n}$$

where

p_i^t is the price of product i in month t.

$p_{i,j}^0$ is the reference period price of product i in month 0.

<u>Calculation of upper-level indices</u>

18.   Laspeyres type arithmetic mean formula for higher level aggregation is used, in a chained form. The national index is calculated in two steps.

   (a) Class/Group/Division/All items indices at province level are calculated as weighted averages of the indices for elementary aggregates according to the following formula:

$$I_{t/0} = \sum_{i=1}^{n} w_{0,i} * \left(\frac{p_{t,i}}{p_{0,i}} \right)$$

where

$I_{t/0}$ is an index for all products showing the average change between period 0 and t.

$p_{t,i}$ is the price of product i in a month t.

$p_{0,i}$ is the base period price of product *i* in a month *0*.

$w_{0,i}$ is the provincial weight of product *i*

  (b) These provincial indices (at the Class/Group/Division/All items level) are then further combined to estimated indices at the national level. The national indices are calculated as a weighted averages of provincial indices by using regional weights. The formula is as follows:

$$I_{t/0}^{N} = \frac{\sum_{P=1}^{9} g_0^P * I_{t/0}^{,P}}{\sum_{P=1}^{9} g_0^P}$$

$I_{t/0}^{P}$ is a provincial index for class/group/division/all items showing the average change between period *0* and *t*.

g_0^P is the regional weight .

$I_{t/0}^{N}$ is a National index for class/group/division/all items showing the average change between period *0* and *t*.

V.   PRICE COLLECTION

Data Collection Instrument

19.   Prices are collected from outlets using the Consumer Price Index Questionnaire. It has information about the responding outlet, the response month, and details of products quoted – that is product code, product description, and price.

Data collection time-table

20.   The price collection period is from 1st to 10th of every month.   The CPI statistical bulletin is released the last Thursday of the reference month.

<u>Frequency of price collection</u>

21.	Prices of all the goods and services used to compile the CPI are collected once per month.

<u>Central or Head Office Price Collection</u>

22.	Centrally collected prices include the following :-
  (a) Charges of public utilities or services provided by deregulated (or regulated) bodies or Government (such as electricity tariffs, bus and train fares, postal services, telephone services etc.)
  (b) Taxes and license fees paid to Government (for example, television license and vehicle license)

<u>Local Price Collection</u>

23.	For many items, prices are collected locally by data collectors based in all the 9 provinces by visiting retail outlets and recording current prices for the sample of goods and services.

<u>House Rent Survey</u>

24.	A sample of housing units are surveyed every month to collect house rental data. A sample of 100 housing units are covered from each province except for Lusaka and the Copperbelt with samples of 300 housing units each. The housing units have been stratified into Low cost, Medium cost and High cost.

## VI.	Problems

<u>CPI basket/weights revision</u>

25.	One of the problem encountered in compiling the CPI is the outdated weights and basket of goods and services. The 2003 ILO resolution on Consumer Price Indices states that weights should be revised at least once every 5 years. The revision of weight and basket depend on how often the Household Budget Survey is undertaken. The previous HBS's were conducted during the period: 1974/1975, 1993/1994, 2002/2003

<u>Price up-dating of weights</u>

26.   The current CPI expenditure weights were derived from the 2002/2003 HBS, and having chosen 2009 as the price reference period, the weights were price up-dated to 2009. Price up-dating was applied at the product level, where each expenditure weight was multiplied by its corresponding product index. However, since in the old basket had 357 products compared to 438 in the new basket, product indices for 81 products had to be estimated.

<u>Outlet selection</u>

27.   Non-random (purposive approach) is employed in selecting outlets. For example, outlets that are selected are those most frequented by the households. Generally, available information and application of best judgement was used to ensure that representative samples are selected. When an outlet has closed permanently, it is usually replaced with a similar outlet not too far from the one which closed down.

<u>Prices for non-standardised quantities</u>

28.   Food items that are sold in non-standard quantities are usually found in markets and these include fresh food (vegetables etc.), dried vegetables, cereals etc., The collector takes a weighing scale to the market for purposes of weighing 'bundle' or 'heap' or contents of a plate or cup – which is then converted to a price per Kg. The collectors record the price of the reported quantity, and the conversion is done in the office by compilers.

<u>Prices for clothing , furniture and electrical appliances</u>

29.   Many problems are encountered in the collection of prices for products such as furniture, clothing and household appliances. This is due to frequent changes in product specifications.

<u>Temporary missing products</u>

30.   When a product is temporary unavailable, the current price is estimated using the monthly price change in prices of the set of products in the same COICOP class (short-run geometric mean imputation).

<u>Permanently missing product</u>

31.   When a product becomes permanently unavailable, a close substitute is selected. The use of a chained index makes the estimation of missing prices and

introduction of replacements easier: a replacement is included in the index as soon as prices for two successive months are available.

Seasonal products

32.   The missing prices for the 'strongly' seasonal products are estimated as in the case of temporary missing products.

Data validation

33.   he manual editing is done both in the field and in the office before data entry. Computer editing is done as follows:

   (a) At Head quarters, prices from Consumer Price Questionnaires are entered on to the system on client PCs.
   (b) During data entry the system compares the quoted price against the previous month's price to ensure that the new price is within the acceptable range.
   (c) Editing of prices – the system computes variance attributes based on product's previous month's price, and the month's quoted price. In editing, variances provide the means of identifying potential problem entries, such as where a quotation might be way out of the expected price
   (d) Correction of quotations – where problems are identified, a reference may be made to the physical price quotation (questionnaire), or where the officer performing the editing may use empirical knowledge of the product. In all cases the price can be amended to reflect the value deemed to be correct

VII . **Future Revisions**

34.   The next revision of the Consumer Price Index depends on the conduct of the HBS. The last HBS was carried out in 2002/2003, and with a time lag of this implies that the current weights may not adequately reflect the spending patterns of the population. Consequently, there is need to revise the CPI at least every 5 years.

VIII.   **Conclusion**

35.   The discussion in this paper attempts to present the various features of the revised consumer price index(CPI). Most significant are changes in the method used in calculating elementary aggregate indices and the software for processing the CPI.