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**DEVELOPMENT OF METHODOLOGY FOR THE COMPILATION OF CONSUMER  
PRICE INDEX IN NIGERIA<sup>1</sup>**

Submitted by National Bureau of Statistics of Nigeria

The meeting is organised jointly with the International Labour Office (ILO)

**Abstract**

This paper considers the development of methodology for computation of consumer price index (CPI) in Nigeria from the early stages to the current period. It focuses on how the country had attempted to solve the special problems over the period.

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<sup>1</sup> This paper has been prepared by Ms. Ogugua Nwaboku, National Bureau of Statistics of Nigeria, at the invitation of the Secretariat.

## **I. INTRODUCTION**

1. The Consumer Price Index measures changes in the average level of retail prices paid by consumers, through time. Consequently, it is of great interest to government, labour unions, business organization, research institutions and the general public. In Nigeria, the CPI is mainly used by Government as an important fiscal tool for the yearly budget. Some institutions such as the National Accounting Standard Board of Nigeria use it as a deflator. The Labour Unions, other agencies and individuals settling disputes on contracts or agreements over periods utilize the CPI as a reference. In view of the foregoing, various aspects of the methodology had been examined and re-examined from time to time. The help of consultants outside the country and known institutions such as the Bureau of Labour Statistics (BLS) had been sought in the past.

### Scope and Coverage

2. The index relates to all households living in the urban and rural areas in Nigeria except those in institutional homes. It is compiled monthly from prices data observed in 90 urban towns and 333 Rural enumeration areas (EA's). The CPI in form of Statistical News is released about one month after the month of the prices survey.

## **II. HISTORY**

3. Initial computation of the CPI in Nigeria was based on a few urban towns with different base periods. They include Lagos, the ten Federal capital (1953) and the other regional capitals. Ibadan (1953), Kaduna (1957) and Enugu (1957). However, there was the desire for a national index.

4. Thus the Federal Office Of Statistics (now the National Bureau Of Statistics) conducted a National Consumer Expenditure Survey in 1974/75 to provide weights for the computation of a National Composite Consumer Price Index. The urban sector was grouped into six income categories in each town namely:

- (a) Lower income wage earners;
- (b) Lower income self Employed;
- (c) Middle income wage earners;
- (d) Middle income self employed;
- (e) Upper income wage earners;
- (f) Upper income self employed.

5. The group indices were combined across the country with weights proportional to population. The rural indices were computed in zones and similarly aggregated across the country.

6. The index was revised in 1985. By that time, the impact of the decline of oil prices in the international market had become apparent on the households in Nigeria. The basis for grouping the urban households required a review backed up by an appropriate study. Furthermore, the

expenditure values from 1985/86 survey employed for the item weights review was available at state level sector by sector.

7. Another revision was undertaken making use of the 1996/97 National Consumer Expenditure survey data. The weights were updated to May 2003 which is the reference base of the current CPI.

### **III. 1996/97 NATIONAL CONSUMER SURVEY**

8. Nigeria has 36 administrative regions called states. The other administrative area is the Federal Capital Territory (FCT). In each state, 120 Enumeration Areas EA's were covered for a period of twelve calendar months. And 5 EA's were randomly allocated to each month of the year. Altogether a total of 3,033 urban and 11,348 Rural households were studied. Institutional households were excluded. Expenditures such as donation to churches and contributions to local thrift societies were not included. The payment approach was adopted.

#### Classification

9. Classification of individual consumption by purpose (COICOP) was adopted for the current CPI, the two -digit level is given below:

- (a) Food and non Alcoholic Beverages;
- (b) Alcoholic Beverages, Tobacco & Kola;
- (c) Clothing and footwear;
- (d) Housing, Water, electricity, gas and other fuel;
- (e) Furnishings, household equipment HH Maintenance;
- (f) Health;
- (g) Transport;
- (h) Communication;
- (i) Recreation & culture;
- (j) Education;
- (k) Restaurants & Hotels;
- (l) Miscellaneous goods and services

Apart from the above major group indices, there are 85 subgroup indices in the new CPI construction.

#### Formula

10. The standard Laspeyres index number formula like earlier CPI series was adopted in the computation of the index number. By this method the average price of a commodity in the current month was compared with that of the commodity in base period; the resulting price relative was multiplied by a weight which was proportional to the average expenditure on the commodity in the base period. The price index is obtained by dividing the sum of the weighted relatives by the sum of the weights. The mathematical representation of the formula is given by:

$$I = \frac{\sum P_n q_o}{\sum P_o q_o}$$

where  $P_n$ ,  $P_o$  are prices at period  $n$  and  $o$  respectively, and  $q_o$  is the quantity at time  $o$  the base period. The quantity  $q$  is difficult to obtain in practice but the value of the expenditure on a commodity  $p_o q_o$  is relatively easier to obtain. Thus the above formula is expressed as:

$$I = \sum \left( \frac{P_o q_o}{\sum P_o q_o} \right) \frac{P_n}{P_o} = \sum W_o r_n$$

where  $r_n = \frac{P_n}{P_o}$  is the price relative for time  $n$   $W_o = \frac{P_o q_o}{\sum P_o q_o}$  are expenditure weights.

#### Aggregation of Indices Across the Country

11. In order to reflect the differences between levels of living in the urban and rural areas in the CPI series, aggregation weights based on total consumption was adopted.

12. The survey data for derivation of item weights were provided at state level by sector. Summing up such grossed up consumption expenditure on a commodity group in a sector of the country gave the total consumption expenditure for the commodity group in the sector of the country. States shares by sector and by commodity group were derived and employed for aggregating the indices in a state and across the country.

13. Altogether, there are 36 urban area indices and 36 rural area indices under the new CPI construction. The Federal Capital Territory (FCT) also has indices for urban and rural areas. Apart from the all item and the twelve 2-digit level COICOP indices, there are 85 sub indices.

#### Linking Current And Past Index Number Series

14. The old index (Sept 85 = 100) for the month of May 2003 is given by:

$$I_{85, May 03} = \sum W_{85} \frac{P_{May2003}}{P_{Sep85}}$$

15. The new index with 1996/97 weight adjusted to May 2003 and for any month  $t$  with a price reference base of May 2003 is given by:

$$I_{May 03, t} = \sum \left[ W_{96} \frac{P_{May 03}}{P_{96}} \right] \frac{P_t}{P_{May 03}}$$

16. The old index linked to the new index for common index components is given by:

$$I_{85,t} = I_{85,May03} \times I_{May03,t}$$

#### IV. PRICE COLLECTION

17. The Field Services Management Division of National Bureau of Statistics carries out prices survey like other NBS surveys. The division operates in each state and co-ordinates all field operations in the 36 states and the Federal Capital Territory (FCT). Price collectors or enumerators are permanent staff of NBS and live in the selected price collection centres. Occasionally, officers are sent from the headquarters to conduct spot checks or parallel price collection. This exercise is not to the prior knowledge of the enumerator and it is designed to improve the quality of price collection and identify erring price enumerators. The scrutiny staff at NBS office in the state capital verify the prices before the data are forwarded to Lagos.

##### Urban Centres

18. A locality is designated as urban if it had an estimated population of not less than 20,000 persons. The selection of price collection towns was done state by state. In each state, the state capital was chosen with certainty and at most two other centres were selected from the remaining other towns. In determining the towns other than the state capital, the following factors were considered:

- (a) Geographical spread;
- (b) Size of the town (where clusters existed).

19. On the whole, 90 urban towns were selected. In each of them, open markets were chosen. The number of open markets ranged from 2 to 6 in each selected urban town. Some urban centres have few open markets while others like Lagos, Ibadan, Enugu and Kaduna have many. The markets within the towns were selected so that the large, medium and small ones had chances of representation. For the supermarkets and other outlets, a listing was carried out. The compiled frame was stratified using employment size. Selection was subsequently made; however if a chosen respondent did not co-operate, a substitute was made.

##### Rural Centres

20. In the Rural sector of a state, 12 fixed enumeration areas (EA's) were chosen. The selection ensured adequate geographic coverage of the state. On the whole, 333 enumeration areas were selected. Most purchases are made in the open markets; consequently, the open market in the selected enumeration area became the pricing outlet. Where there is no market, the nearest one to the E.A became the pricing outlet.

Frequencies

21. The frequency of price collection is determined by the degree of fluctuations in the prices of the items. This frequency varies from once a week for certain foodstuffs to once a month for an item with fairly stable prices such as services.

22. Table 1 below shows the RP forms, the commodity group names and their frequencies.

Table 1. Major Commodity group and their frequencies

RP	Major Commodity Groups	NEW
RP1	Major Food items (market Enquiry)	Once/weekly
RP2	Major Food items (Physical Purchase)	Fortnightly
RP3	Processed Foods	Once/wk state capitals Once/monthly for other centres
RP4	Drinks & Tobacco	Once/wk for state capitals Once/monthly for other centres
RP5	Clothing & Footwear	Fortnightly
RP6	Accommodation Fuel & Energy	Monthly
RP7	Furniture, Furnishing & Other HH Goods	Monthly
RP8	Medical and Health Services	Monthly
RP9	Transport & Communication	Monthly
RP10	Recreation, Entertainment & Education	Monthly
RP11	Miscellaneous Goods & Services	Monthly
RP12	Building Materials	Monthly

## V. PROBLEMS

23. One of the problems in the construction of CPI in Nigeria is the appropriate weight to employ to combine the urban and rural indices. It has been indicated above that aggregation weights based on total consumption is currently used. Some of the other problems are considered below.

### Temporary Missing Products

24. When a product is temporary unavailable, the current price is estimated by utilizing the price change of other varieties of the item having prices in both current and previous periods to update the price of the missing variety.

### Permanently Missing Product

25. When there is an indication that a product will become permanently unavailable, a close substitute is priced at the same period as the disappearing product. The substitute is introduced into the CPI by estimating a base period price for the substitute. The assumption is that the old and the substitute varieties of the item had experienced the same price change between the base and current periods.

### Seasonal Items

26. There are two seasons in Nigeria, the wet and dry seasons. The wet season lasts from April to October while the dry season lasts from November through March. When a product disappears due to seasonal unavailability, the price is estimated as indicated above for temporary missing products. However, the last price is held constant if a similar variety does not exist.

### Owner Occupier Dwelling

27. Rents are imputed for owner occupier dwelling during the National Consumer survey. Rent of similar dwelling and in the same locality are employed for the imputation.

### Consumption From Own Production

28. Values are imputed for consumption of households from own production and employed for the weighting of the CPI. This is of some significance in the rural areas.

### Local Measures

29. Local measures in form of bowls, cups etc are used in open markets to sell cereals, dried seeds, flours etc. The measures differ from one locality to the other. For the units to be used for CPI compilation, they are standardized by purchasing the products and weighing them with scales. This procedure is repeated every quarter.

### Local Foodstuff

30. Local foodstuffs like meat, fish, seafoods, tubers, fruits and vegetables are sold in open markets in units that cannot easily be standardized. Owing to some traditional beliefs, retailers do not allow the weighing of their products in the open markets if purchases are not being made. In fact this group of items pose the greatest problem in the course of price collection. Various approaches had been adopted in the past to collect the prices. One of them was the selection of housewives who make regular purchases from the open markets as respondents. The enumerators visit their houses to weigh and record the prices of items purchased by them in the

open markets. They make use of price forms called RP 2 form. The office also made some purchases to complement the data from the housewives survey. They are later resold wherever possible at prices less than the original ones. Attempt is currently being made to persuade the retailers to permit the price collectors to weigh their products without purchasing them. The problem does not exist in some supermarkets where the weights are displayed. However most consumers make their purchases in the open markets.

### Data quality Control

31. In CPI computation the errors are grouped into sampling errors and procedural errors. The sampling errors are no mistakes but are due to the fact that a sample rather than the whole population was covered. It is measurable. The procedural errors are considered quite significant. Consequently great care and caution is required for its minimization. In the field the enumerators are trained and retrained so as to know how to read the scales and adhere to established procedures. The scrutiny staff are also trained to recognize recording errors.

32. N.B.S. has various levels of field checks and control. They include the zonal officers who coordinate field operations including spot checks and monitoring of the states within the zones. The state officers are responsible for all field work in their respective states. Finally, the price supervisors monitor the activities of the price enumerators under them. Also, occasionally, parallel price collections are carried out by officers sent from the headquarters. Erring price enumerators identified during such visits are subjected to disciplinary measures.

33. A number of measures had been established to also identify problems with the data during data processing and the steps are indicated below.

### Manual Editing

34. The manual editing is an important process to eliminate problems with the price data from the field. Each of the price forms especially RP1 and RP2 forms are well scrutinized by experienced staff.

### Computer Editing

(a) Valid Codes:

The item codes, centre codes and E.A's codes are important variables that must be checked to ensure data consistency. A combination of Dbase special editing facilities and programs was established to ensure that only valid codes are acceptable.

(b) Exclusion of Unrealistic Prices:

Despite efforts in ensuring accurate weighing of items particularly in RP2 form, a few item unit prices derived by dividing each item price by the corresponding quantity turn out to be unrealistic. Dynamic price ranges are specified for each

item and prices outside the range are excluded. The process is automated but the ranges had to be determined.

#### Measurement of CPI Inflation Rate

35. The measure of the rate of inflation using the CPI adopted by NBS is the percentage change of the price index. The CPI Statistical Newsreports three versions of percentage changes, namely:

- (a) Month to month percentage change;
- (b) Corresponding consecutive month percentage change (end point); and
- (c) 12-month average at corresponding consecutive month percentage change (12 month average at end point).

#### All Items Less Farm Produce and Energy

36. Farm produce products account for about 59% of the CPI basket by weight. These are seasonal items and the prices are rather volatile. Similarly, the prices of petroleum products are volatile. They often record substantial price increases in periods of supply shortages but revert to old prices as the supply improves. An All Items Less Farm Produce and Energy is computed to enable users understand the underlying price movements.

### **VI. STAFF TRAINING**

37. Staff training is accorded high priority. For instance, prior to the revision of the current CPI, the U.K. Department of International Development (DFID) brought in CPI experts from the Bureau of Labour Statistics, Washington DC to the country. For two weeks the experts conducted CPI training for selected participants. Another one week in-country training programme on Producer Price Index (PPI) methodology was conducted by BLS officials in Nigeria for CPI staff and was funded by DFID. Field training was later organized for price enumerators and their supervisors by trainers from the headquarters in Lagos.

### **VII. FUTURE REVISION**

38. The main disadvantage of the standard Laspeyres formula in CPI computation is the long period between the base period and the current period. It is argued that after a long period, the items undergo modifications and may therefore not be regarded as exactly the same as at the base period. To address this problem, the country uses any major national consumer survey conducted to revise the CPI.

39. The Nigerian Living Standard Survey was conducted in 2003/2004. The main objective was to provide data for analysis of poverty in Nigeria. National Consumer Survey was a module of the NLSS and efforts are being made to revise the CPI using the data from NLSS. It is hoped that such revision coupled with CPI maintenance techniques indicated above, the basket of goods and services compared from month to month would be the same.

## **VIII. CONCLUSION**

40. The discussion in this paper attempted to present the methodology of CPI computation in Nigeria from the early stages to the current period. Some methods of maintaining the CPI in between revisions were also considered.

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