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SOME THOUGHTS ON CONSUMER PRICE INDICES

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Some thoughts on consumer price indices

1. As indicated in the document entitled Consumer Price Indices in Africa (E/CN.14/CAS.5/LS.16), most African countries construct indices of consumer prices, and most of these relate to limited groups of households in urban areas. They usually have specific purposes, such as providing guidance for wage adjustments, and, so far, few attempts have been made to develop index systems which can be aggregated over wider groups of population or at national level.
2. Consumer price changes are, of course, dependent on many different factors, including level of economic activity, availability of raw materials, marketing arrangements, consumers preferences, etc. An index of such changes simply provides an indicator of their general effect on the cost of living without being concerned with the basic causes of change. However, the relationship between price and income changes is a factor which needs to be kept under review, because of its importance in assessing changes in material welfare.
3. Monetary incomes generally tend to follow price increases, but not decreases, and themselves have a significant effect on price levels. Thus, apart from short term fluctuations and seasonal changes, the normal tendency is for prices and incomes to show a continuing upwards trend. Under these circumstances, series need to be compiled at frequent intervals if an adequate account of the changing situation is to be achieved.
4. The purpose of this note is to consider whether current price and income statistics in Africa are organised in a way which enables maximum use to be made of the information collected.

Validity of an index with respect to expenditure pattern

5. As most consumer price indices have to cover a reasonably wide range of household incomes and consequently some variation in expenditure patterns, it is first necessary to form an idea of the extent to which an index is a valid indicator of price changes with respect to individual households in the group covered.

6. Table 1 shows the movement of a base-weighted index for an African urban area during the period 1954-61. The index relates to lower income households comprising a little over 40% of those dependant mainly on wages, and weights were obtained from a survey carried out in 1953.

Consumer price index for lower income
urban households

	Index 1954=100			1953 Expenditure pattern					
	1954	1955	1961	All income classes		Lower incomes		Higher incomes	
				1954	1955	1954	1955	1954	1955
Local food	441	1.22	538.02	492	600.24	545	664.90	458	558.76
Imported food	97	1.10	106.70	88	96.80	88	96.80	79	86.90
Clothing	133	1.18	156.94	121	142.78	103	121.54	101	119.18
Drink & tobacco	67	1.36	91.12	61	82.96	69	93.84	121	164.56
Services	57	1.18	67.26	58	68.44	23	27.14	81	95.58
Rent.	59	1.33	78.47	54	71.82	70	93.10	46	61.18
Fuel & light	55	1.03	56.65	47	48.41	51	52.53	42	43.26
Household goods	40	1.05	42.00	36	37.80	21	22.05	36	37.80
Miscellaneous	51	1.13	57.63	43	48.59	30	33.90	36	40.68
All items	1,000	-	1,194.79	1,000	1,197.84	1,000	1,205.80	1,000	1,207.90
Index 1961 1/	119.5			119.8		120.6		120.8	

1/ 1 = 100
119.5

7. The first part of the table shows the index calculated according to the weights actually used. For practical reasons, these are not exactly the same as the expenditure pattern of the 1953 survey. In the second part of the table, the same price changes are applied to the expenditure pattern for all income classes together and for groups of households at the lower and upper ends of the income range covered by the survey.

8. It will be noted that the modifications made to the 1953 expenditure distribution in obtaining the weighting system for the index make very little difference to the calculation. Also, the indices for the extremes of the income range are almost the same, in spite of differences between the expenditure patterns.

9. This comparison is perhaps not very satisfactory because it is based only on published data and cannot take account of variations in expenditure patterns within the principal groups of items at the different income levels. In this connection, the local food group is the principal source of doubt, since it accounts for nearly half of total expenditure. It would be much better if it were broken down into several sub-groups for publication purposes.

10. Nevertheless, the figures in Table 1 suggest that a consumer price index is not very sensitive with respect to differing expenditure patterns, and that a single index can give a satisfactory indication of changes in the cost of living over a fairly wide range of living standards. The extent to which this is true is, of course, dependent on the relative changes in prices of items and groups of items, but it will be noted that, in Table 1, price increases vary between 3% and 36%.

Relationship between price and income change:

11. Reference has already been made to the need for considering price changes in relation to those in incomes, in order to determine whether material welfare is improving or declining. The comparison is not quite straightforward and is discussed below.

12. Income relevant to the comparison is that part of total income which is spent on consumer goods and services, i.e. it is net income after deducting operating costs of household enterprises, net remittances and savings, etc. Under these circumstances, the change in consumer income/ expenditure between the base and current periods is given by
$$E = \frac{\sum P_t Q_t}{\sum P_0 Q_0}$$

the
However, measure seems somewhat unsatisfactory, as it does not take account of changes in the proportion of income allocated to consumption expenditure, and therefore does not have a constant relationship with total income.

13. In the case of consumer prices, there are two normal methods of aggregating changes. As already noted, most African countries use the base-weighted Laspeyres type of index, where $L = \frac{\sum P_1 Q_0}{\sum P_0 Q_0}$. The problem with this index is that it does not necessarily give a measure of actual cost of living changes, since it ignores substitution effects arising from alterations in the price situation.

14. On the other hand, the current-weighted Paasche index, where $P = \frac{\sum P_1 Q_1}{\sum P_0 Q_1}$ does take account of substitutions, although it makes comparisons with the cost of a pattern of purchases which did not exist in the base period.

15. The changes which contribute to the movements of the two indices and of total consumption expenditure are necessarily complex, but some general conclusions can be drawn.

16. If an individual household is better off in the current period, $\sum P_1 Q_1 > \sum P_0 Q_0$. Dividing by $\sum P_0 Q_0$, this gives $E > L$. In other words, the increase in consumption expenditure must be greater than the increase in the base-weighted index.

17. If a household is better off in the base period, $\sum P_0 Q_0 > \sum P_1 Q_1$. Dividing by $\sum P_1 Q_1$, this becomes $\frac{1}{E} > \frac{1}{L}$ or $E < L$. In this case, the increase in consumption expenditure between base and current periods must be less than the increase in the current-weighted index.

18. It is not so simple to reach any precise conclusions on the relative movements of the two indices. If the base-weighted index shows a greater movement than the current-weighted index, $L > P$ or $\frac{\sum P_1 Q_0}{\sum P_0 Q_0} > \frac{\sum P_1 Q_1}{\sum P_0 Q_1}$ which, when multiplied by $\frac{\sum P_0 Q_1}{\sum P_0 Q_0}$, becomes $\frac{\sum P_1 Q_0}{\sum P_0 Q_0} > \frac{\sum P_1 Q_1}{\sum P_0 Q_0}$. In other words, the cost change in buying current period instead of base period quantities is greater at base period than at current period prices. This is the most usual situation, since the pattern of purchases in the current period is adjusted within the limits of consumers' tastes to meet the new price situation in an optimal manner.

19. Conversely, if the change in the cost of buying current instead of base period quantities is greater at current prices, it would appear that a factor other than substitutions within a given pattern of preferences has been operative, and that there has possibly been a change in tastes.

20. The above argument suggests that, over a fairly short period when prices are rising and when changes in consumers' tastes would not be very great, the base-weighted price index would normally show greater movement than that with current weights. However, the difference is not likely to be large because, as shown earlier in this note, an index tends to be rather stable over a fairly wide range of variation in its weights.

21. Summarising the above remarks, it can be said that, if $E > L$ and P , the standard of living has risen, whereas, in the converse situation, it has fallen. If $L > E > P$, no precise conclusion can be drawn, but there has probably been very little change. When $P > E > L$, there has probably been a change in consumers' tastes.

22. It should be noted that, while a price index may be valid for quite a large group of households with different expenditure patterns, the same is not true for an index of income/expenditure. It is possible to say that, in a particular group, the standard of living has risen, but the group may include some households for whom the rise has been considerable and some whose standard has actually declined. It is therefore most important to have information on the distribution of income/expenditure.

Practical aspects of price and income comparisons

23. Returning to the previous example, it may be of interest to examine the possibility of making comparisons of the type discussed above.

24. It will be remembered that the base-weighted index started in 1954, stood at 119.5 in 1961. In 1961/62, a new survey was carried out in the same urban area, but coverage was different in that it related to all households instead of those in the lower range of incomes. The weights derived from this survey are shown in Table 2 below, together with a calculation of the current-weighted index for the period 1954-61, using the same price changes as before.

Current weighted consumer price index

Table 2

	P_{1953}	$P_{1961/62} / P_{1953}$	$P_{1961/62}$
Local food	459	0.8197	376.24
Imported food	39	0.9091	35.45
Clothing	120	0.8474	101.69
Drink & tobacco	50	0.7353	36.77
Services	93	0.8474	78.81
Rent	96	0.7519	72.18
Fuel & light	43	0.9709	41.75
Household goods	12	0.9524	11.43
Miscellaneous	88	0.8849	77.87
All items	-1,000	-	832.19
Index	$P = \frac{\sum p_1 q_1}{\sum p_0 q_1} = 120.2$		

25. The current-weighted index is close to the base-weighted one and the fact that it is a little higher is probably due simply to the different household coverage in the 1953 and 1961/62 surveys, rather than to any change in consumers' tastes.

26. While the two sets of weights are sufficiently consistent to enable a new index to be linked to the old, it seems fairly clear that the position would be more satisfactory if coverage were similar in both cases. It is appreciated that the index based on the 1953 inquiry was concerned with the cost of maintaining a basic standard of living, but this objective could have been realised equally well if a wider income coverage had been adopted, with separate indices for the higher and lower ranges.

27. Next, there is the question of changes in income/expenditure which need to be considered in relation to the price changes. For the country used in the illustration, indices of earnings and wage and salary payments were established in 1956. In 1961, the levels of these indices were 130 and 138 respectively, i.e. they were rising by approximately 6.0 and 7.6 points a year. This suggests that, if they had been started in 1954, their levels in 1961 might have been around 142 and 153. Assuming that the earnings figure is a satisfactory indication of income movements in the urban area under consideration it would appear that there was an over-all improvement in the standard of living of the order of 19% (given by $142/119.5$) during the seven year period.

28. However, it does not seem reasonable to accept such a conclusion in the absence of information on the relative coverage of the earnings and price indices, and on changes in incomes from sources other than employment. For the group of households covered by the survey in 1953, 29% of total income came from such sources. This may have remained static, or, at most, have followed the trend of employment earnings, in which case the improvement in living standards would lie between 13% and 19%, if the coverage problem is not taken into account. There is, of course, no information on the distribution of this improvement.

29. The household budget surveys themselves should give a more complete indication of changes in income from all sources, but, again there are problems. The average household income/expenditure in the 1953 inquiry was 314 shillings a month, but this relates to the year before the beginning of the price index and there is no means of up-dating the figure. In the 1961/62 survey, average household expenditure was 513 shillings a month, but is not comparable with the earlier result because of different coverage. The point of interest here is that it would be very different to isolate the group covered by the first survey in the results of the second. Criteria other than income levels would have to be used, since it is changes in income which are being measured.

30. To obtain an estimate of income changes from household surveys fairly widely spaced in time, it is necessary to ensure that coverage is comparable. This can be done by using very well-defined groups of households, but probably the best arrangement is to cover all households within a given area. Both the overall averages and the income distributions in **each** inquiry can then be examined. It is appreciated, however, that survey coverage is dependent on cost considerations.

Some conclusions

31. The foregoing exercise leads to some general suggestions concerning the organisation of urban area household budget surveys and consumer price indices. These do not necessarily apply to rural inquiries, where other factors have to be taken into account.

32. Firstly, it is desirable to arrange a long-term programme of urban surveys, so that new budget data can be collected at, say, five yearly intervals. In each urban area, it is preferable to cover all households, but, if any limitation is necessary, it should be made on the basis of well-defined groups of households which can be identified (as groups, not individuals) in subsequent inquiries. Income levels should not be used for the purpose of defining such groups, as income is one of the variables under investigation.

33. Separate indices can be calculated for various groups within the population covered, if their patterns of expenditure differ significantly, but, again, definitions involving income levels should be avoided.

34. The base period of a consumer price index should coincide with or be as close as possible to the period covered by the survey from which it originates. This ensures that the index movements can be properly related to changes in income and other characteristics covered by the survey. It should also be noted in this connection that, during budget surveys, it is possible to collect a large amount of data on quantities and values of purchases. There are advantages in using this directly for obtaining base-period prices as well as weights, instead of initiating the index with a separate price-collecting operation.

35. Accurate price records throughout the life of the index are more important than the weighting system. Some African countries are still using the method where price collectors purchase goods and take them back to the office for weighing. Apart from being expensive and providing only a limited number of records, the method involves dangers of bias, since the price collectors soon become known to the market traders.
36. An alternative arrangement is to approach housewives after they have made their purchases in the markets, and to weigh the various items and record values on the spot. This eliminates any deliberate bias which might be introduced by vendors, and enables a large enough number of measurements to be made to overcome variations arising from lack of standardised quantity units. Price collection from shops and stores is, of course, a separate consideration.
37. Published data on consumer price indices should give a reasonable breakdown according to type of expenditure, and broad groups such as "local food" which comprise a large proportion of total expenditure, should be avoided.
38. It would be very useful if earnings indices could be sub-divided, so as to be more comparable with the consumer price indices currently in use. However, it is appreciated that this might not be easy to achieve.
39. If the above considerations are borne in mind when organising urban surveys and price indices, the position achieved may be roughly as follows. Whenever an index has been running for five years, or perhaps a little longer, a new survey is conducted to provide new weights and base-period price data. These are used for calculating a current-weighted index over the past years, and for initiating a new base-weighted index for the future.
40. The result is a series of overlapping indices, each of which has the base-period at approximately its mid-point, and, for every base-weighted index, there is a current-weighted counterpart. The method of linking to provide a continuous index is not so important, and the interest lies in having successive sets of comparable data, which not only give a good indication of price movements, but also serve to indicate changes in

consumers' tastes, etc. The arrangement reduces the need to continue any base-weighted index beyond the point where a new one starts, since the relationships between old and new have already been examined.

41. In addition, there would be a series of comparable bench-mark statistics every few years, which would enable assessment of changes in the level of monetary incomes and their distribution, as well as the calculation of elasticities for estimating future changes in demand.

42. The production of such data calls for very little addition to existing efforts. The principal requirement is the organisation of work on a systematic basis, with particular attention to comparability of data from a number of sources.

43. As a parting thought, it should perhaps be emphasised that, even in urban areas, consumption expenditure in Africa is only a proportion of gross income. Households have many entrepreneurial activities which involve running costs, and these have demand functions in much the same way as domestic expenditure. Some knowledge of these transactions is therefore needed in achieving a satisfactory understanding of changes in consumption expenditure, and it is important that such items should be adequately covered in budget surveys.