

## SOUTH AFRICA'S CONSUMER PRICE INDEX FOR FOOD (CPIF): A COMPARATIVE HISTORICAL VIEW

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### Abstract

*The consumer price index was first used in 1707. In 1925 it became institutionalised when the Second International Conference of Labour Statisticians, convened by the ILO, promulgated the first international standards of measurement. These original standards have been revised three times and are currently under review. Statistics South Africa (StatsSA) compiles and disseminates different CPI aggregates, including the Consumer Price Index; the Core Index; CPIX; and the Food Price Index or CPIF. StatsSA has gone to considerable trouble in complying with international best practice in the calculation of the CPI. Nevertheless, three problems still remain, namely that StatsSA works with an unsatisfactory definition of rural areas, that no provision is planned for sales through informal sector outlets, and that no provision is made for food consumed away from home.*

### 1. INTRODUCTION

Towards the end of 2001 the farm gate prices of basic agricultural commodities in South Africa started to increase rapidly, to be followed shortly afterwards by an escalation in the food price component of the consumer price index (CPIF), and an acceleration in the general consumer price index (CPI) which lasted until the beginning of 2003, largely because of the increase in the price of food. Given high unemployment and poverty in South Africa, any increases in food prices should be cause for concern. As a result, the Treasury commissioned an investigation into the causes of food price inflation (Vink & Kirsten, 2002). In that investigation, it was shown that the trigger for the increase in food prices was the sharp depreciation of the Rand towards the end of 2001. This rapid devaluation of the currency over a short period combined with other factors (historically high world prices, a regional shortage of basic staple foods during that time; the climate of uncertainty created by the

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circumstances surrounding the land reform programme and the elections in Zimbabwe; and a lack of competition in the supply chain beyond the farm gate, especially at the retail level) to cause an acceleration in the CPIF.

Subsequent investigations have focused on establishing the mechanisms of food price formation (e.g. the presence or absence of price manipulation), on testing the relationship between the exchange rate and the CPI, and on the monitoring of food prices. However, there has not been sufficient focus on the actual measurement of the CPI in historical as well as comparative context, i.e. on its usefulness as a policy tool in South Africa.

To this end, the purpose of this article is to explain how the CPI and its various component indices are calculated, and to compare these with international best practice as a basis of recommending changes to the way in which the index is measured and used in South Africa. Thus, a short history of the CPI is provided in the next section, followed by an explanation of the types of CPI aggregates compiled in South Africa, and then by a review of three evaluations of South Africa's CPIF. South Africa's method of calculating the CPIF is compared to methods in other countries for which data are available in the penultimate section, and the article ends with conclusions regarding possible improvements to the way in which CPIF is measured.

## 2. THE HISTORICAL CONTEXT<sup>2</sup>

The CPI measures how the average price level of a representative basket of consumer goods and services purchased by households has changed between two periods. The CPI was first used in 1707 when William Fleetwood compiled a simple index to estimate the average change in the prices paid by Oxford University students over the previous two and half centuries. In 1823, Joseph Lowe published a study on agriculture, trade and finance in which he developed the concept of a price index as the change in the monetary value of a selected set, or basket, of goods and services, an approach that is still widely used today. He also noted the various uses for a price index, such as the index linking wages and rents to price increases, and the calculation of real interest rates. In this regard, Lowe can be considered 'the father of the consumer price index'.

Later in the 19<sup>th</sup> century further important contributions were made, including those of Laspeyres (1871) and Paasche (1874) whose names are associated with particular types of price indices. The Laspeyres index measures the change in

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<sup>2</sup> This brief history is based on ILO (International Labour Organisation), 2002.

the value of the basket of goods and services actually purchased in the earlier of the two periods. In effect, it uses the expenditure of the earlier of the two periods compared to weight the price changes, while the Paasche index uses the shares of expenditure in the later period as weights. As a result, the Laspeyres index tends to overstate price increases because it does not take into account a household's willingness and ability to reduce its consumption of items whose prices are rising rapidly, while growth in a Paasche index tends to understate price increases as current spending patterns reflect in part household consumption of more of some items simply because their prices are rising more slowly (Steindel, 1997:2).

In 1925 the CPI became institutionalised when the Second International Conference of Labour Statisticians convened by the International Labour Organisation (ILO) promulgated the first international standards of measurement. The original international standards have been revised three times, namely in 1947, 1962 and 1987, each revision being approved by the International Conference of Labour Statisticians. The present Manual contains the draft resolution for the fourth revision of these international standards that was submitted to the XVII<sup>th</sup> International Conference of Labour Statisticians in 2003. The manual is available on the website of the ILO at <http://www.ilo.org>.

### 3. CALCULATION OF THE CPI

The first step in calculating the CPI is to determine what goods and services should be included in the index basket, and what relative weights to attach to the prices of these goods and services. This is conventionally done with the help of a Household Budget Survey/Household Expenditure Survey. A point-of-purchase or retail survey is also used to determine where the goods and services are acquired from, to determine where the prices should be collected (StatsSA, 2002a). The next step is to classify these goods and services in order to group them into sensible categories. Products are grouped because they have a common end-use or because they are substitutes.

The weights attached to the prices of the lowest level of goods and services, the elementary aggregate, are conventionally assigned as an arithmetic mean (average), although geometric means have been used. In the USA, for example<sup>3</sup>, significant changes were made in 1998 to eliminate a bias associated with the introduction of new items into the index; better capture price changes associated with the introduction of new prescription drugs; better reflect

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<sup>3</sup> Bureau of Labour Statistics, 1998.

patterns of treatment received by hospital patients; and, importantly, better capture the actual (quality-adjusted) prices of personal computer equipment by means of a geometric mean estimator.

In contrast to the fixed quantity weights of the current CPI formula, the geometric mean estimator employs a set of fixed expenditure proportions as weights for average prices of items within a CPI basic index. Fixing relative expenditure proportions rather than relative quantities implies that consumers can alter the quantities of goods and services that they buy, albeit within the narrow range of a CPI category, when the relative prices of those goods and services change. The basket with the weights is constructed periodically; in most cases depending on the frequency of the surveys on which the weights are based. Prices are usually collected more regularly (mostly monthly, but there are some that are collected weekly, quarterly, biannually or even annually). These prices are calculated into an index with the help of a formula, the most commonly used being the Laspeyres formula or a variant thereof.

The use of constant weights, as is the case with the Laspeyres formula, has merit on the following grounds (Von der Lippe, 2002:7):

- A mean using constant weights represents a pure change of price. The Laspeyres principle is thus more in line with a 'pure' price comparison, whereas Paasche indices are superior as regards the representativity criterion;
- Constant percentage weights permit operation with the same constant basket for all successive years in which the same base period is maintained. The Laspeyres formula is thus less demanding from the point of view of data-collection, unlike the Paasche formula, which requires an update of the structure of weights in every period; and
- The Laspeyres approach infers rising prices directly from the rising costs of a fixed budget, while the Paasche approach is more indirect: prices move by the amount with which actual costs diverge from those costs that were to be paid if prices remained constant.

The CPI has various uses apart from being the best-known indicator of inflation. It also serves as a barometer of economic performance, is a key indicator in evaluating monetary and fiscal policy, and is used to index wages and social security payments (ILO Manual, Chapter 2).

#### 4. TYPES OF CPI AGGREGATES COMPILED IN SOUTH AFRICA<sup>4</sup>

Statistics South Africa (StatsSA) currently compiles and disseminates a number of different CPI aggregates, each serving a number of different analytical purposes. These include:

- **The Consumer Price Index (CPI).** This index is used to calculate the official or headline rate of inflation, and consists of price increases for all goods and services in the main metropolitan areas of the country;
- **The Core CPI.** Certain items are excluded from the CPI basket on the basis that their prices are highly volatile, subject to temporary influences, or affected by government policies. These exclusions include fresh and frozen meat and fish, fresh and frozen vegetables, fresh fruit and nuts, interest rates on mortgage bonds and overdrafts/personal loans, and changes in VAT and assessment rates. This index is used to calculate 'core inflation' and is a reflection of the underlying inflationary pressures in the economy;
- **CPIX.** This is the CPI excluding interest rates on mortgage bonds, and it is a measure designed to assist with inflation targeting. Inflation targeting is a monetary regime whereby the central bank uses various monetary policy instruments to achieve a certain rate of inflation. Interest rates on mortgage bonds are excluded from the index, as they are inherently problematic for effective inflation targeting. While the index should go down when monetary policy is tightened, the housing component goes up because it embodies the rise in mortgage interest rates (Huh, 1997); and
- **The Food Price Index, or CPIF.** Only the food items appearing in the CPI basket are included. The index is regarded as useful to assess the impact of price increases especially on the lower expenditure groups in the population, as food is the single biggest item in the total basket for the CPI. While CPIF is not a sufficient measure of the impact of policy on poverty, it remains an important indicator. For example, the CPI in the year to June 2002 rose by between 11 and 14% for households earning below R2,030 a month, compared to 8% for the very high-income group, and 9% for the overall CPI in metropolitan and other urban areas (Watkinson & Makgetla, 2002:1).

The more recent trends in these measures since February 2001 are shown in Table 1 in order to illustrate the differences in the composition of these

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<sup>4</sup> This information was taken from the StatsSA website, <http://www.statssa.gov.za> (2002b).

indices. It is evident that CPIF increased faster than the other indexes in this period, indicating that food price increases contributed materially to the higher overall rate of increases in prices in the country.

**Table 1: Trends in the different CPI indexes measured in South Africa, 2001-2002**

Main Indices	Indices (2000 = 100)			Percentage change between February 2001 and February 2002
	February 2001	January 2002	February 2002	
CPI (Metropolitan areas)	104.1	109.0	110.4	+6.3
Core Index	104.4	110.7	111.4	+7.5
CPIX	104.1	111.2	111.9	+6.7
CPIF	102.4	113.9	114.8	+12.1
CPI excluding food price index	104.1	107.7	110.2	+4.8

Source: StatsSA, 2002a

The extent of expenditure on goods and services purchased is derived from a five-yearly Income and Expenditure of Households Survey. The results of this survey are also used to determine the relative importance (weights) of each item in the 'basket' of goods and services. The survey is conducted every five years among a sample of 30,000 households. The sample is apportioned on a *pro rata* basis among households in the urban and the non-urban areas, and includes people living in all types and sizes of dwellings. In South Africa, expenditure group categories are used instead of income group categories to group products and services. This is done in accordance with international guidelines set by the International Labour Office. The boundaries of the expenditure group categories are set as the quintiles of the total number of households in South Africa, i.e. of the lowest 20% of the population, the next lowest 20%, etc.

The sampling for the Survey on Retail Prices is conducted in three phases. First, a sample of goods and services, based on the information collected through the Survey of Income and Expenditure of Households, is designed and selected. Second, a geographical sample for price collection is designed and selected. Currently 13 major metropolitan areas, covering all nine provinces, are included in the geographical sample for price collection. The 'other urban areas' are covered by nine provincial samples of four to five urban areas each, depending on the population size of the area. Thirdly, a retail trade and service outlet sampling frame is constructed, based on available data sources, mainly the business register of StatsSA, telephone directories and lists obtained from the head offices of chain stores. Specific retail trade and service outlets are selected randomly within each area. The sample of outlets is revised every five years when the weights are revised.

On this basis an average of 110,000 price quotations are collected each month from about 2,200 outlets by means of 6,700 questionnaires. The indices are based on retail trade and service prices. Price information refers to the first seven days of the relevant month, while the prices of all items include VAT where relevant. Price indices are calculated using a geometric mean, while group price indices are calculated by weighting product indices with the relevant product weight, according to each weighting structure, using the Laspeyres formula.

Three problems, in addition to the drawbacks of the Laspeyres method, can immediately be identified with respect to the measurement of the CPIF. First, the definition of urban and non-urban areas is problematic, as it rests on the administrative distinction between formally proclaimed towns (urban) and other areas (non-urban) regardless of the actual circumstances prevailing. The result is that no accurate 'rural' food basket is calculated for South Africa. Second, the price survey is confined largely to the formal sector and ignores the substantial sales of food products through informal outlets in urban areas (e.g. through spaza shops and hawkers) and formal and informal sales in rural areas. According to Haglund (2000), the reason for excluding the rural areas is mainly cost related. However, as the majority of poor people in South Africa live in these areas, it is not possible to readily trace the impact on rural poverty of policies that affect food prices. Third, no account is taken of the consumption of food away from home, whether in restaurants or on the pavement.

## **5. EVALUATIONS OF SOUTH AFRICA'S CPIF**

### **5.1 The Board on Tariffs and Trade report of 1992**

The terms of reference of the Board on Tariffs and Trade report on the functioning of the price mechanism in the food chain in South Africa (BTT, 1992) included an investigation into the CPIF from 1980 to 1991. The report found that CPIF rose by 397%, at an average annual rate of 15,7%, over this period, compared to 352% or an average annual rate of 14,7% for the all-items index. At that time cost-push factors such as salary and wage increases were found to bear the most responsibility for food inflation.

Simultaneously, certain retail chains in South Africa cast doubt on the published statistics, indicating that their own studies showed a substantially lower figure for food price inflation. However, the BTT report recognised that the fact that wholesale and retail food prices had risen could in part be attributed to improvements in the quality of much of the produce offered, to changes in the way that food is presented to the customer, and to changes in consumer tastes. Given the choice between lower prices, improved quality

and greater convenience, some customers show by their own actions that lower prices are not always their first preference and seldom their only criterion when purchasing food. Conversely, poor people are probably generally more likely to be interested in the lowest possible price.

## 5.2 External evaluations of the CPI

The base method used to calculate the CPI in South Africa has remained the same in recent years. StatsSA recently requested Statistics Sweden to evaluate the present CPI (Haglund, 2000). The report mentions areas where the methodology for computing the South African CPI could be improved, but there was no mention of any improvements specifically directed to the CPIF. This report concluded, *inter alia*, that:

- The sample of outlets and that of indicator products are the results of well thought out sampling procedures;
- The index is compiled by means of internationally recommended index formulas and methods for dealing substitutions and quality change are expected to be appropriate for most of the different product areas covered;
- In general the index, as well as the derived indexes that are presently published are likely to result in suitably reliable results regarding the rate of change of South African consumer prices;
- The standard procedure used for dealing with substitution and quality changes should be reconsidered only for at least part of the clothing component index; and
- The coverage of the index should be extended to all South African households - even if this must be done by imputing the metropolitan and other urban area indicator product indices for the rural areas.

The **International Monetary Fund (IMF)** has also evaluated the methodology for measuring the CPI in South Africa (IMF, 2001). They found that the method conforms to international best practice, and is consistent with the ILO guidelines. However, they also highlighted, among others, a concern that rural households and rural outlets were excluded from the survey. StatsSA responded by pointing out that in the October Household Survey of 2000 they had included a question on the place of purchase of goods and services. They had planned to decide whether the prices of items sold in rural areas will be collected on a regular basis, based on whether people in rural areas purchase their goods and services mainly in local rural shops. If this were the case, they would also include a weighting reflecting the purchasing patterns of rural people. According to StatsSA no final decision on this issue has been made.



## 6. SOUTH AFRICA'S METHOD OF CALCULATING THE CPI IN COMPARATIVE CONTEXT

Table 2 shows the share of food in the CPI in 13 selected countries that were chosen to represent a spread of developed, developing, and middle-income food exporting countries, and on the basis of data availability.

**Table 2: The share of food in the CPI for selected countries**

Country	Base year	Per capita income (US\$) <sup>2</sup>	Share of food in CPI (%)	Share of food away from home (%)	Basis of inclusion
Australia	1998/1999	20,240	17.72	4.93% of the food sub-group	Includes an item 'Meals out and take away foods' in the food sub-group.
Chile <sup>1</sup>	1997	4,590	27	na	-
Hong Kong	1999/2000	25,780	26.67	16.67	Included, i.e. food at home makes up only 10.28% of the total for food.
Ireland	2001	22,660	12.75	17.76	Includes a separate item 'Restaurants and Hotels' (which includes take-away) in the CPI.
Japan	2000	35,620	28.5	na	The cost of a bowl of rice topped with seasoned beef is included in the food category of the CPI.
Malaysia	2000	3,380	33.8	na	-
New Zealand	1999	12,990	18.5	19.71% of the food sub-group	Includes an item 'restaurant meals and ready-to-eat' in the food sub-group.
Philippines	1994	1,040	51	na	-
South Africa	2000	3,020	25.44	Not included	-
South Korea	2000	8,910	27.12	na	-
Swaziland	1985	1,390	30.7	Not included	-
Uganda	1997/1998	300	45.2	Not included	-

Note: <sup>1</sup>Includes beverages

Source: <sup>2</sup>World Development Indicators database (World Bank, April 2002)

Food consumed away from home already represents more than 50% of food consumption in many developed countries. The example of Hong Kong is instructive in this regard, as food consumed at home represents only some 10 percentage points of the total contribution of food (about 27 percentage points)

to the CPI. Food eaten away from home is less than half of all food consumption in New Zealand (less than 20% of the food sub-group) and Australia (a third or 4.93% of 17.72%), while in Ireland it is allocated to an entirely different sub-group.

The weight of food in the CPI in South Africa is higher than that of developed economies such as Ireland, Australia and New Zealand, as would be expected. However, the share is lower than countries such as Japan, Hong Kong and Chile, where per capita income is higher than in South Africa (World Bank, 2002). A part of the reason why the share of food in the CPI for South Africa is lower than expected relative to these three countries can be found in the last two columns of the Table, which show that the South African CPIF excludes meals eaten away from the home.

## 7. CONCLUSION

Although the calculation of the South African CPI (and hence CPIF) complies with international best practice and is comparable with the methodology used by most other countries, it is essential to interpret the CPI figures with the knowledge that the Laspeyres formula used tends to overstate price increases. Rural areas are also excluded from the construction of the CPI. This exclusion causes concern, as it does not reflect the possible impact of rising food prices in these areas. Another methodological concern that could impact on the real level of food price inflation is the lack of provision for sales through informal sector outlets. While the inclusion of informal sector sales is not common in other countries, the distribution of poverty in South Africa is such that their inclusion would result in a more accurate reflection of South African food price inflation. However, recent efforts in this regard by StatsSA have produced inconclusive results, and have proven to be costly.

A final critique on the calculation of the South African CPIF is the lack of provision made for food consumed away from home, whether in restaurants, as take-aways or in the informal sector. Although data on this phenomenon are not readily available, StatsSA should consider this issue.

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