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Documents

The Consumer Price Index of Mozambique
A Short Term Mission
13-31 March 2000

Contents

1. Introduction - summary

Our third visit to Instituto Nacional de Estatistica (INE), within the framework of the Twinning Project, took part in the period 13 March - 31 March 2000. The terms of reference were:

- how to introduce seasonal adjustments
- how to handle the problem of non-response
- developing a new publication
- how to treat problem of products sold in non-constant quantities (montinhas)
- how to treat products which continuously change (new design etc.)
- methodology for updating the sample of establishments in Maputo City

Our main focus has been:

- Principle and methods used in re-sampling
- Principles and methods used in the price collecting phase
- Guidelines for a revised publication

This mission has been concentrated entirely on the Maputo-index. However, the problems faced in Maputo are probably similar to problems faced in Beira and Nampula as well.

The sample of outlets and items of Maputo seems to balance the shopping habits of the reference population regarding the different types of outlets, and the consumption pattern seems to be fairly stable. However, the basket of items consists of too many items with a very low weight. For the accuracy of the overall index, it is more important to get good data for a group with large weight than one with a small weight. As a general rule, if price movements of all representative items in a group are very similar, it is adequate to collect prices for only a few items. In contrast, prices are needed for many representative items to get reliable overall estimate for the group if the price movements of the items in the group are very different. We recommend reducing the basket by dropping items that are of small importance in the consumer purchases and redistribute the weight within the 4-digit group. INE should also consider reducing the number of outlets selling quite homogenous products, and increase the number of price observations of products that do not have a common trend (heterogeneous).

INE should develop annual (recommended) routines for updating the sample, as well as a procedure for immediately replacement when a specific product is permanently out of stock or an outlet is closing down. This involves introducing of non-comparable substitutes and price adjustment due to quality or quantity difference. Since a major revision of the representative items will not be conducted until the performing of a new household budget survey, the specifications of the items should be revised regularly in order to take into account the current changes in the product availability. Introducing substitutes into the index and thus take into account the appearance of new models, varieties and outlets, is a way of letting the consumer price index reflect the dynamic aspects of a continuously changing marked. By introducing a chained index, minor adjustment in the basket of representative items can be done without waiting for a new household budget survey.

Our impression is that the data collection phase has improved since our last mission. Still, there seems to be some lack of procedures for finding a replacement when a product is temporary or permanent missing and how to handle non-comparable substitutes.

Before revising the existing publications consultation with representatives of major internal and external users is recommended and request should be taken into account. In order to ensure public confidence in the index, a short description of the methodology and data sources should be published as well as the latest figures.

Chapter 2 discusses some basic issues when sampling within regions, outlets and items, while chapter 3 discusses guidelines for price collectors when dealing with different situations in the field work. Chapter 4 gives a brief presentation of some guidelines to consider when develop a revised publication. Chapter 5 gives a summary of the issues to focus in short and medium run.

2. Sampling

This chapter gives a brief presentation of some basic issues of importance when sampling the outlets, items and products in the consumer price index of Mozambique (IPC). The main purpose of this chapter is to point out some basic ways of thinking to improve the sample of IPC. The chapter discus activities that should take place periodically (annual) like re-sampling of outlets and the basket of commodities.

2.1 Basic issues

Given the weight of the an elementary aggregate, type of expenditure, region, outlet type and the selection of sample zones within each region, the next step is to select the precise products to be collected. This involves specification of the representative items, selection of specific outlets and selections of representative products within each selected outlet. These activities involve both the central unit and the price collectors.

The household budget survey (IAF)[1] provides some basic types of commodities and services - weight items - which is the basis for the basket of representative items. Based on the specification of the representative items, the price collector has to find unique representative products within each particular outlet.

This can be exemplified as:

Weight item:	Shirt
Representative item:	Shirt, cotton or composite, short sleeves
Representative product:	Shirt, 85 % cotton and 15 % polyester, short sleeves, good finish, brand: NIKE

When discussing the sample of items, outlets and products there are some basic concepts that have to be defined;

- Re-sampling:
  The range of products and outlets covered by the index is usually revised when an index is re-weighted due to a new IAF. However, between re-weightings the range of products may be revised at regular (annual) intervals taking account of the importance of new products entering the market. Revising the sample of representative items and products within an elementary aggregate between re-weightings will be referred to as re-sampling. Re-sampling involves revising the range of products and outlets, as well as the amending of specifications of the representative items when needed. Re-sampling of the basket can also take place within a 4-digit group, that means exclude or include items and redistributed the weights. The revised index must be chained to the old one.

- Replacement:
  From time to time an outlet stop selling a specific product or an outlet closes down. This is regarded as a permanently missing price observation, and the price collector must select a replacement (substitute), e.g. a new product and if a shop closes down a new outlet.

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[1] The result of the IAF was properly covered in the previous report.

- Elementary aggregate:
  The most detail level in the IPC consists of an item-area stratum where the item is one of the 208 representative items from the Maputo-basket, e.g. Toothpaste-Maputo. This is referred to as an <u>elementary aggregate</u> and covers all prices collected for one item in one region (stratum). Specific varieties (products) of toothpaste are sampled within each elementary aggregate, e.g. Colgate, Aquafresh, etc. Because prices of some items are obtained from different types of outlets, an elementary aggregate covers more than one outlet type, e.g. the prices of toothpaste are obtained both in retail shops and in the markets. Elementary aggregates are often referred to as micro level, and price indices of an elementary aggregate are referred as micro level price indices.

- Static and dynamic features
  The concept of a consumer price index requires a measurement of the cost of purchasing a fixed constant-quality basket of commodities and services. The <u>static features</u> consist in those varieties and models that will exist from period to period. In reality products frequently disappear from the market, products are replaced with new versions and new products emerge. All this will have an impact on the consumer habits and should be taken into account when making a consumer price index. The <u>dynamic features</u> are represented through the practice of re-sampling and replacement procedures involving the chose of new products. How to take into account the dynamic features, will be further discussed below.

Sampling procedures involves;

- selection of regions
- selections of sampling zones within each region
- selections of the outlets
- selections of items
- selections of different products within each outlet

Each dimension will be discussed further below.

2.2 Regional dimension

According to the demographics of Mozambique the prices are obtained in three different urban areas (regions); Maputo in the south, Beira in the middle and Nampula in the north. No price collection is done in rural areas[2]. An all item index and sub-indices are computed for each region. The three all-item indices are weighted together to a <u>National Urban Consumer Price Index</u> by using household expenditure on consumption as weights. At present the most relevant source for household expenditure is the 1996 IAF. Two sets of weights can be deduced from this IAF:

- expenditure shares of all urban households within each of the 3 region (total 23 towns)
- expenditure shares based only on households in each of the 3 cities where the price collection is taking place.

Whether to use expenditure shares of only the 3 cities or expenditure shares based on all urban households within the given regions, depends on the correlation of price movements within the regions. If the price movements in different places are highly correlated, will it be possible to estimate a national urban index without a wide geographic spread of price collecting. Based on this assumption, using total expenditure shares of all urban households within a region gives a better estimate of the index for the specific region, even if price collecting is only taking place in one specific city. For the time being, without having knowledge if the price movements tend to be parallel or not, we recommend to use expenditure shares based on the 3 cities only when constructing the national urban

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[2] Whether the scope of the IPC should be expanded to cover the whole population of Mozambique (include population outside urban areas) depends on the availability of recourses and whether price movements tends to be similar to those in urban areas. Another argument for still excluding the rural areas could be that one has reason to believe that most people make their money-purchase in the urban area, regardless of their place of living.

index. To make a proper <u>national index</u> we recommend expanding the price collecting by including more provinces.

Alternative sources of weights
The total population of inhabitants of Mozambique may be a reasonable source for estimating the total consumption, but not for total expenditure[3]. The reason is that the consumption of the rural population for a large part consists of own produced non-marketed products. It is also important to remember that the use of population figures makes the implicit assumption that expenditures per household are the same in all regions. Taking into account the higher levels of expenditure of urban household will raise the weights compared to population data alone. Hence population data as the only source should not be used as weights.

2.3 Sampling of outlets

2.3.1 Outlets in the IPC
The sample in the IPC consists of markets, different retail shops, drugstores and some service establishments. For practical reasons the small mobile shops (ambulantes) are left out of the sampling population. Much effort has been done to include new types of retail shops to reflect the shopping habits of the consumers and the balance between different types of outlets in the IPC sample seems to reflect where the consumers are doing their purchases. In general, all major types of outlets where the reference population do their shopping should be included in the sampling population. This includes supermarkets like Shopright as well as so called luxuries shops and informal markets. The reason for excluding Shopright in the first place seemed to be based on the thought of Shopright as a luxury shop and thereby more expensive. However, nowadays a great part of the reference population in Maputo seems to be doing their purchase in Shopright.

INE should consider to cut down the number of small outlets that provides relatively homogenous grocery like canned foodstuff, washing-powder, tooth paste, etc. The price difference between different outlets offering these commodities seems to be relatively small and their price movement seems to be correlated.

For the time being only official markets are included in the sampling population of outlets in Maputo. According to the central unit, there exist a great deal of informal markets where the price levels is somehow lower compared with the official markets. Without knowing if the price movement in the two markets are parallel and if a large part of the population of consumers are doing their purchase in these markets, we recommend to obtain prices in both types of markets. More effort should be put in to analyse whether the price movements in different types of markets are correlated or not.

Transactions between households (second-hand purchase) are not relevant when measuring price changes. However, if the household spend more on second-hand purchase than they receive for second-hand sales, that means the country (the household sector) is net importer of second-hand goods e.g. clothes, the purchases of second-hand goods should be included in IPC. However, it might be difficult to obtain the prices according to the IPC principles. If there is a large transaction of used car from the business sector, net purchase of second-hand cars by household should also be included. The appropriate weight for second-hand cars will be the value of the net purchase.

2.3.2 Re-sampling of outlets
For the time being, the main part of the outlet sample is established by purposive (judgmental) sampling. This is a non-random method where personal knowledge is used to select the outlets assumed to be in some sense representative of household shopping patterns. The result of the IAF indicate the <u>type of outlets</u> for each recorded expenditure, but not the name and location of each particular outlet. Such information will be found in an updated business register or based upon special surveys within selected zones, e.g. a survey of outlets or a household sample survey.

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[3] Household expenditures differ from household consumption, as consumption of non-marketed goods e.g. own produced goods, is not included.

The outlet sample of Maputo seems to reflect the shopping habits of the reference population when it comes to different types of outlets. For the time being INE should seek to maintain the established sample by regularly replacing outlets that are closing down (unless a reduction of specific outlet types is accepted, e.g. outlets selling quite homogenous goods). The replaced outlet should be of the same type and located in the same zone as the old outlet. In the future, we do recommend to introduce sampling of outlets based on either random or probability sampling.

In lack of an up-to date business register, one way of sampling outlets is to do a two-step sampling procedure; dividing Maputo into geographical areas (zones) followed by a point of purchase survey within each zone. A point of purchase survey is a household sample survey of the reference population in towns and villages selected for price collecting. If conducting a point of purchase is not possible, INE could select the sample of outlets by a list of outlets provided by the price collectors visiting relevant zones and noting details of all retail outlets within the zone. Each zone can be defined as a cluster of postcards or by residents of household. All the outlets within a zone need to be enumerated to produce a sampling frame. For each commodity group the required number of outlets are drawn from the sampling frame by simple random sampling, or if details of size (turnover, amount of sale) is available, probability proportional to size.

Point of purchase survey
A point of purchase survey (POPS) is based upon a sample of household residents within each zone and provide current data on retail outlets from which urban households are making their purchase of defined groups of goods and services. The purpose is to make a sampling frame of outlets for most of the goods and services to be priced in the IPC. Commodities and services should be grouped into consumption groups in the IPC-classification (4-digit level). Outlets should be selected for each group of items and each outlet in the frame has a probability of selection proportional to the amount of expenditures reported for each group. To determine the sample of household to be interviewed in the survey and increase the chance of clustering the outlets, the household clusters (zones) should be formed around central business districts, shopping centres and market places[4].

Problems with POPS:

- costly because it requires a specific household survey in each selected zone (even if it is possible to integrate the survey with the IAF)
- the survey is more complex than the IAF since it obtains the name and the address of different retail establishments where household makes their purchases for each group of items
- POPS yields data on purchase by the households of a zone and not within the zone. Shopping done during visit to other places may be important so that price collecting will have to extend to outlets outside the zone. Price collecting outside the zone can be avoided only if price movements in all of the outlets of a given type outside the zone move in the same way as those within the zone.
- Annual re-sampling of outlets requires a new POPS every year (at least for a small number of zones).

When the next IAF is conducted, INE should consider extending the survey by including a POPS since the reference population of the POPS and the IAF is the same and it could be modelled after the sample design of the IAF[5].

2.4 Sampling of items

2.4.1 The basket of representative items
The basket of representative items in the Maputo-index consists of 208 items. However, a great deal of the items seems to be not significant. As discussed in our previous report based on a rather thorough examination of the draft solution for the new weights and the weight basket specified, we concluded that the number of items on the list were too many. The basic principle used when selecting the weight basket - all items having a weight of 0,01 or more should be included - seemed all too ambitious and

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[4] This is based on the assumption that the households tend to buy in the areas they live.
[5] The use of a POPS to draw the sample of outlets has been recommended at the latest SADC-meeting.

even superfluous. For the accuracy of the overall index, it is more important to get good data for a group with large weight than one with a small weight. If the price movements of all the possible items in a group are very similar, it is adequate to collect prices for only a few. In contrast, if the price movements of different items are very different, prices are needed for many representative items to get a reliable overall estimate for the 4- digit group. We will like to stress out the principle of redistributing the weights laid down in the previous report. Redistributing the weight within the 4-digit group and thereby dropping items that have a low weight will concentrate recourses on the items having a large importance in the consumer's purchase. By taking out non-important items and redistribute the weights, the basket in a better way will reflect the consumption pattern of the reference population.

On way of making the basket more representative could be to look for existing goods in the basket which can represent the price trends of other items and thereby take out items that has a relatively low weight. Obtaining prices of e.g. oranges, lemon and grapefruit should not be necessary if the price movements of these items are parallel. The price change of e.g. oranges will may be representative for all 3 items.

Maputo Central should also obtain prices of all the items in the basket that are to be found in a particular outlet, except for standard products where a few major brands are available nearly anywhere and where prises are relatively stable. E.g. painting is to be found in an outlet where the price of a square meter windowpane is collected. If this painting is representative for the item "painting" in the basket of commodities, the price collectors should also obtain the price of painting in this particular shop. In this way INE could easily increase the number of price observation and thus make the IPC less vulnerable of missing price observation for a particular item. As a general rule INE should seek to increase the number of price observation for commodities with high variability of price changes like fresh fruit and vegetables, clothing and technical equipment. The number of price observations for commodities with low variability like canned food, diary produce, washing powder etc. should be decreased.

2.4.2 Re-sampling of the basket

New goods that become a significant part of the household's expenditure should be reflected in the basket by including new representative items and excluding outranged ones. To reflect the changes in the consumption patterns (composition of expenditure) on the aggregate level requires a re-weighting. This will normally take place through a revised IAF[6]. Even if updating is closely related to establishing a new weighting structure, there is still some re-sampling that can be done without having updated weight information. Such re-sampling of the basket involves revising the products within an elementary aggregate as well as changing (updating) the specifications of the representative item and introduce new representative items that fits within a 4-digit group. Example of the latter is the introduction of a compact disk player that becomes more important than a tape player. In the beginning one should follow both representative items, but when compact disk players totally dominate the market the tape player should be left out of the basket. Both introduction of a compact disc player and the exclusion of the tape player from the basket require a redistributing of the weights within the specific 4-digit-group.

Specifications of the representative items should be regularly annual reviewed in order to see whether they need to be revised. A need for revision may be indicated by a large number of missing price observations or a large number of substitutions. New specifications may be needed if the sale of an originally unimportant product have grown large while the sale of other products has dropped.

Examples of revising of specifications;

- the item to be priced for soft drinks is changed from a can to a plastic bottle
- the item to be priced for baking powder is changed from box of 100 gram to a box of 200 gram.
- the item to be priced for a stereo is changed from one model to another model due to the fact that the old model is obsolete

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[6] Use of estimate of private final consumption from the National Accounts estimates may be used as an adjustment (partial re-weighting) of the weights if they are detailed.

Redistributing the weights while introducing new representative items or dropping items obsolete and revising the specifications, requires that the revised index must be chained to the old index and thus form a continues series. To do this one has to choose an appropriate chaining period. The new index could be started in every December (price reference month), using the weights related to the 1996 IAF. The published index for January 2001 will then be the new index for January with December 2000 as price reference period, multiplied with the published index (long term index) for December 2000.

The annual activity of re-sampling is a supplement to the replacement procedures taking place whenever a specific product in a given outlet is temporary or permanently missing or an outlet has closed down. This will be further discussed in chapter 3.

3. Price collection (field work)

The main purpose of this chapter is to lay down guidelines of how to handle different situation when doing the fieldwork. The chapter discusses activities that take place between the re-sampling periods.

3.1 Representative products

One role of the central unit is to specify the representative items for each 4-digit group and select the outlets where the prices of the representative items will be obtained. The price collectors have to select one or more specific varieties of representative items (products) within each selected outlet. The products must be described in more detail than the representative items. The information should cover brand, style, material, etc. The detailed descriptions of the representative products serve two purposes;

- helps to identify the unique product to be priced every month
- in case of a missing items it provides an opportunity to find a substitute and make a judgement whether the quality of the substitute is equivalent to the old product

Product availability among outlets could differ considerably, especially for heterogeneous products like clothing and technical equipment. The price collectors should not seek to find exactly the same product (brand) in every outlets, but try to find products that are representative for the representative items. This will increase the number of price observation within the elementary aggregates. When a whole range of quality is available, a product of the middle-range quality should generally be chosen. However, when several products that are assumed to be representative for the representative items are available within an outlet, the price collectors should seek to find products that are selling well within a selected outlet. Specials and sales prices should be accepted when there is a genuine reduction in prices for products, which is not due to inferior quality.

The price collectors should note if there are any special features in the prices recorded. Examples of codes are given in table 1.

Table 1. Codes to be used in price collecting

S	Sale or special offer (explains a reduction in price)
R	Recovery from S (explains a price jump), the price is not necessarily the same as before the sales
N	New product (variety) to represent an item (the original products base price is not suitable for comparison)
C	New product (variety), but not significantly different from the old (C = comparable, implying that the original base price is suitable for comparison)
T	Temporary out of stock
M	Item missing from outlet and not likely to be back in stock in the near future
Q	A special note has been made (Q = query) by the collector, and requires a respond from the central stab
W	Weight/Size change

The price collecting zones are grouped in 7 circuits where each circuit is visited approximately at the same time (same week) every month. Markets are still visited every week. The outlets in some of the circuits are widely spread and can only be reached by car. According to Maputo Central, some types of non-food outlets are almost absent within a circuit and replacement will be hard to find if a particular outlet is permanently closing down. Maputo Central should reconsider the circuits and if lack of recourses should be taken into account, try to concentrate the outlets within a specific circuit.

3.2 Non-response (missing price observation)

According to the Maputo-staff there seems to be some problems of obtaining prices for some representative items. A relatively large number of price imputations occur every month. Instead of just continue to carry forward last month price of a missing product, the price collectors ought to find a replacement (substitute).

Missing price observations are caused by several sources;

- specifications of the representative items
- seasonal products
- product temporary sold out (beside seasonal reason)
- product permanent sold out
- given outlet is closed

3.2.1 Specification of the representative items

In most cases the specification of a representative item will cover a number of varieties (products), and thereby leaving the price collectors to select a unique product within each outlet. However if the specifications are too tight there is a risk that an outlet does not sell the item exactly as specified. The solution is to loosening the specification an allowing the price collectors to chose among a wider range of products. Examples of loose versus tight specification of representative items are given in table 2. For some items like refrigerator, stove, stereo and other kinds of technical equipment specifications ought to include alternative models and brand within the same price level class. As described in chapter 2.4.2, the specifications has to be changed periodically as new varieties, models, quantum etc. enters the market.

Table 2. Specifications of representative items

Loose specification	Tight specification
Spaghetti, one package	Spaghetti, 500 gram, imported, brand Donna Maria
Men's shirt, cotton or polyester, good finish	Men's shirt, cotton, good finish, long sleeves, 100 % cotton, front pockets, brand St. John
Women's fashion shoes, 1 pair	Women's fashion shoes, 1 pair, leather, 35-70 mm heel, size 37-40, brand Balley
Child's T-shirt, cotton or polyester	Child's T-shirt, cotton, short sleeves, collar, 70 % cotton, 30 % polyester size 8 years
Batteries, 4 pack	Batteries, 4 pack, small, domestic, brand National

3.2.2 Seasonal availability

Seasonal items[7] are those commodities and services that are available only at certain times of the year, or are only available to a very limited extent when not in season, so that a meaningful price can not be observed. Seasonal items are to be found among fruit, vegetables, meat fish and some kinds of clothing. If an item is unavailable because it is out of season, no substitute should be selected. The price of the missing item has to be imputed. One recommendation of attribute a fictitious price for the seasonal item is to assume that if the items had remained available, the price would have moved in the same proportion as the price of the available items within the consumption group. This is equivalent to

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[7] The term seasonal items should not be mixed up with seasonally varying prices which occur for several commodities during the year even if they are available year around and a meaningful price is possible to obtain. Seasonally varying prices are caused by seasonal variation in supply and demand, regular seasonal sales, etc.

redistribute the weight to other items within the 4-digit consumption group. The method is described in table 3.

Table 3. Index 4-digit group 1107, Maputo. (December 1997=100).

Codes	Item	Weight	Jan. 98	Feb. 98	M-1	M
1107111	Laranja	0.160	100.35	100.44	16.0560	16.0704
1107121	Limao	0.110	100.12	100.11	11.0132	11.0121
1107131	Tangerina	0.020	100.24	100.29	2.0048	-
Sum of products					(29.074)	27.0825
Sum of products *					27.0692	
Index			100.255	100.304		

*Sum of products when only taking account to "Laranja" and "Limao"

By dividing the sum of products of February 1998 (M) with the sum of products of the items still available (M-1) gives and increase of 0,049. Based on this increase the index of the seasonal item "Tangerina" in February 1998 is 100.29. (The sum of products is computed by multiplying the item weight and the index of the item for each month).

Above we have discussed the treatment of seasonal items. This should not be mixed up with the term seasonal adjustment index. Introducing a method for seasonal adjustment of an index is a much more complex task and requires standard adjusted routines, plausible seasonal adjustment factors and regular examination of whether the adjustment method yields sensible results. Whether or not the index should be seasonal corrected depends on the user needs and the purpose of the index.

Temporary sold out

As a general principle, even if the product just is temporary out of stock, the price collector should find a similar substitute and obtain the price. If the product is likely to be back before next month collection or the outlet is temporary closed, the central unit can impute a price for the current month based on the observed price movements for the same products from other outlets in the same elementary aggregates. Copy last month price and thus assuming no price change, is only acceptable when there is hardly any inflation. Examples of substitute of similar quality and quantity are given in table 4.

Table 4. Examples of substitutes of similar quality

Old product		Substitute	
Descriptions	Quantity	Descriptions	Quantity
SURF washing-powder	150 gram	OMO washing-powder	150 gram
Colgate tooth-paste	50 ml.	Aquafresh tooth-paste	50 ml.

Another example of a substitute of similar quality is INDESIT refrigerator and GELTON refrigerator. Both have a price of 5.999.000 Mc. and have the same size and a small freezer. A colour TV by the brand SHINY DAY at the price of 990.000 Mc. is a comparable substitute to a HISENSE colour TV that cost 1.050.000 Mc. Both have the same size of the screen (measured in inches) and other similar characteristics. The prices of substitutes of similar quality may have a slightly different price then the missing product. As long as the size, models and other technical characteristics of different brands are of equivalent quality they can easily substitute each other. The price change should be computed based on the actual market price of the substitute and the base price of the missing products. In chapter 3.2.4 these kinds of substitutes will be referred to as direct comparable substitutes.

3.2.4 Permanently sold out

The price collectors will from time to time face different situations like:

- a product ceases to be sold (becomes outdated)
- an outlet closes down
- revision of the specifications requires a new product (e.g. a new model)

In all these situations the product should be treated as permanently out of stock and the price collector must find a substitute (unless a continuing reduction in the number of price observation is accepted). When an outlets closes down the price collector has to find a new outlet (replacement) and a substitute for the product, which was priced, has to be found in the new outlet. The replacement should be an outlet in the same area and offering the same range of items.

When the replacement product has been selected, a decision must be made as to whether the new and the old product are:

- direct comparable
- non-comparable

If the new and old product specification are considered <u>direct comparable</u>, e.g. the characteristics of the new product are essentially the same old product, the base period price for the new product is set equal to the base period price of the old product. The price comparison between the products is used in computing the index. It is assumed that no quality difference as occurred.

As a general rule when a product is permanently sold out, the price collector should find a direct comparable substitute. However, the reason why the product is out of stock could be the introduction of a new and better version that has taken over the market share of the old product. In this case the price collector will not be able to find a direct comparable substitute within the specific outlet. Substitutes that can not be directly compared to the missing products are called <u>non-comparable</u>. The difference in the characteristics between the new product and the old product are due to either quantity or quality. Lack of correspondence due to quality difference will be discussed further in chapter 3.3.

Examples of different quantum is when an outlet stop selling baking powder in boxes of 100 gram and instead offer only boxes of 200 gram or washing powder is no longer available in a 150 gram package but in packages of 500 gram. In case of difference in quantity the price collector has to obtain the new price for the new quantum. This requires changing the base period price according to the new price so that the prices in the two periods are comparable.

INE solves the problem of different quantum by estimating kilo-prices or prices per litre. When estimating a kilo-price one often will se that larger quantum gives a lower kilo-price due to "quantum rebate", se table 5.

Table 5. Item "Baking powder"

Brand	Quantum	Price	Estimated kilo-price
Royal	100 gram	10 000 Mc.	100 000 Mc.
Royal	200 gram	17 000 Mc.	85 000 Mc.

If switching to a box of 200 gram and not taking into account the "quantum rebate" when estimating a kilo-price, this will be noted as a price decrease of baking powder. In reality, the price of baking powder has remained constant if assuming that the box of 200 gram where available at the price 17 000 Mc. the previous month. A more correct way of handling a shift in the quantity of a product, is to change the base period price and thus assuming that the price ratios is equal to the ratios of sizes.

Price observation for the substitute should be linked into the index by imputing a new base period price based on the price observation within an elementary aggregate for the products available in both periods. This method is described in table 6.

3.3 Quality change and new products

3.3.1 Quality change
As discussed in chapter 3.2.4 several situations can lead to (permanent) missing price observations and requires a replacement, and sometimes a comparable product can not be found. Even in this case the price collector has to find a substitute. Lack of correspondence between the new and old product means that the characteristics of the new product and old do not match the characteristics of the old

product. When the price collectors must find a substitute, a comparison of the market prices and some basic characteristics is necessary to state whether the replacement is comparable or not. An example of a non-comparable substitute observed in the sample of outlets in Maputo is a Sony stereo at the market price 3.375 000 Mc. and a Sony stereo with karaoke at the market price 5.000 000 Mc. The karaoke-model is assumed to be of a higher quality. Other examples of substitutes with better quality are faster home computers, light bulbs that last longer and use less energy, etc.

Price changes due to quality changes should not be included in the IPC. To ensure that the index only reflects pure price movements, e.g. the sampled prices refer to products of the same (or equivalent) quality, an adjustment of the price of the substitute has to take place. Especially commodities that are undergoing rapid technical changes such as portable radios, microwave ovens, stereo equipment, colour TV's and computers are among items where the necessity of quality adjustment will occur. Adjusting prices to account for changes in quality is complex, especially with regard to the quality of services. Monitor changes in rail or bus tickets is fairly easy, but rather difficult to state if the price change is due to quality change. The assumption is generally made that the quality of the service provided remains unchanged. An example where quality adjustment of a service is necessary is the rehabilitation of the cinema at Avenida J. Nyerere. Before the rehabilitation the price of a performance was 3000 Mc. while after the priced increase to 50 000 Mc. If one assume that the consumers have a higher utility of watching a performance in the new cinema due to better seats, sound, pictures and other facilities, the price increase is due to higher quality and thus must be adjusted to measure the correct price change.

Several techniques are available for adjusting prices to account for quality changes. The methods may be categorised as:

- direct quality adjustment
- imputation

Direct quality adjustment would give a more precise way of handling quality difference than imputation. This method involves assigning a monetary value to the quality difference and then adjusting the price observation for the quality difference. It is a complex method and requires substantial knowledge of product differences and detailed information to make statistical estimates of the effects of quality change. Imputation requires the use of observed price information when the price index is compiled.

The easiest way of estimating a constant-quality price change by imputation is to impute a new base period price for the substitute based on the average price change of the other products available within the elementary aggregate the actual month, se table 6. Another way of imputing a base period price of a non-comparable product is to use the "overlap price" method as shown in table 7. Both methods assume that the ratio of prices between the old product and its replacement is assumed to equal the ratio of qualities.

Table 6. Quality adjustment based on average price change

Outlet	Product	Base price	January	February
Outlet 1	OSAKA stereo	1.200 000	1.300 000	1.300 000
Outlet 2	SONASH stereo	1.550 000	1.610 000	1.610 000
Outlet 3	SONASH stereo	1.550 000	1.610 000	-
	Substitute 1	2.100 00		2.100 000
Mean price		1.433 333	1.506 666	
	Index	100	105,1	104,4

The arithmetic mean price based only on observations from outlet 1 and 2 is based on the original products from outlet 1, 2 and 3 and the index of January is computed by the price ratio of 1.506 666/1.433 333 In February the arithmetic mean price is based on the original products from outlet 1 and 2 and the substitute from outlet 3. The new base price for the substitute is imputed and used in computing the index of February.

The "overlap price" method requires that the price collector when finding a substitute obtain the price of the previous month for the substitute. This makes it possible to link the price of the substitute directly to the price of the old product. No explicit quality judgement has to be done. The quality difference is assumed to be the difference in the price of the old and the new product the current month.

Table 7. Quality adjustment based on "overlap price period"

Outlet	Product	Base price	January	February
Outlet 1	OSAKA stereo	1.200 000	1.300 000	1.300 000
Outlet 2	SONASH stereo	1.550 000	1.610 000	1.610 000
Outlet 3	SONASH stereo	1.550 000	1.610 000	-
	Substitute 1	**2.021 739**	(2.100 00)	2.100 000
	Index	100	105,1	105,0

For simplicity we assume that the substitute was available in January at the same price as in February. The price ratio in January between the old and new product is used to estimate the base period price for the substitute. In February the index is computed based on the price observations from outlet 1, 2 and the substitute from outlet 3.

Recommendation:
One of the most difficult conceptual problems faced in compiling a price index is the treatment of quality changes and ignoring such changes can result in substantial overstatement of price changes as prices increase due to quality improvements are included in the index. However, which method to use in the treatment of quality changes is above all not trivial. Both methods described above make it possible to link the price of the substitute directly to the old without an explicit quality judgement and assume that price changes reflect the quality change. The use of overlap pricing is limited to situations in which old and new products both are available, and may have a downward effect on the index when the price of the old product is discounted due to introduction of the new product. However, if no overlap price is possible, imputing a base period price of the substitute as shown in table 6 is the most appropriate. Especially when outlets are being replaced, this method is common. In the future more effort should be put into taking advantage of the price collectors possibilities to judge differences in the characteristics of the substitute and the product it replace. This information can be used to direct adjust the price, e.g. give the quality change a monetary value, when the price change does not fully reflect the quality change.

3.3.2 Distinction between quality change and new products
Table 6 and 7 describe situations where an existing product in the IPC undergoes a technical change and thus become of a higher quality. The distinction between quality change and wholly new products need to be explained further. The difference between a wholly new products and quality change is that wholly new products have some characteristics which were not present in any of the products being sold previously. Quality change arises when a product entering the marked has a different combination of characteristics of the products that were available in the price reference period. When a total new product plays a major role in the consumer's purchase and has to be brought into the index through a new elementary aggregate, a new weight will be required. This situation takes place when new weighs occur due to results from a new (revised) IAF. The items "Home computer" and "Cellar phone" are examples of items that is not yet included in the IPC and no weights are defined through the result of the IAF. However, as discussed in chapter 2.4.2, new items can be introduced into the basket as long as they fit within a 4-digit group and the weights are being redistributed. Examples are the introduction of compact disc instead of long play records or tape cassettes.

3.4 Non-constant quantity (montinhas)

In the informal markets some of the foodstuff like fresh fruit and vegetables are not sold in standardised weights or quantities, but by heaps (montinhas) or bundles. Every third month the price collectors are buying some of the products and weigh them at the headquarters to estimate a kilo-price. Due to lack of recourses there is no possibility of purchasing every month all of the vegetables sold in montinhas. If the weight of the montinhas are fairly stable, the price collector are likely to measure the correct price change as long as the quality (measured by the size) of the vegetables in the montinhas is

similar to the montinhas at the previous price collecting. But, if the montinhas do not have a stable weight, that means the number of the vegetables within the montinhas varies from each time prices are obtained, this could cause a measurement problem.

The montinhas tends to consist of vegetables of the same size, e.g. small, medium or large tomatoes. To solve the problems of estimating a correct kilo-price of montinhas, INE should when purchasing the foodstuff from the market, scale a unit weight of a vegetable (or a fruit) from a specific montinhas. Each time the price collector obtains the prices, he or she also should count the number of the vegetables within a montinhas. In this way one can estimate the weight of the whole montinhas by multiplying the number with the established unit weight of one vegetable without purchasing the whole montinhas. To compute a kilo-price for the specific vegetable, the price of the montinhas is divided by the estimated weight of the montinhas. In case of not frequent re-weighting, the method is of course assuming that a vegetable of e.g. medium size has a fairly stable weight. The need of updating the unit weight for a specific vegetable depends of the variability of the weights during the different seasons.

Pricing fresh fruits and vegetables that are sold on a unit basis e.g. lemon can be solved the same way as the montinhas. However for fruits and vegetables sold on a unit basis, one should consider the variability among individual vegetables when establishing a unit weight. By taking the average weight of two of the vegetables, helps to reduce the variability. In computing the price per kilo the weight of two lemons is divided by two and the price of a lemon is divided by this average weight.
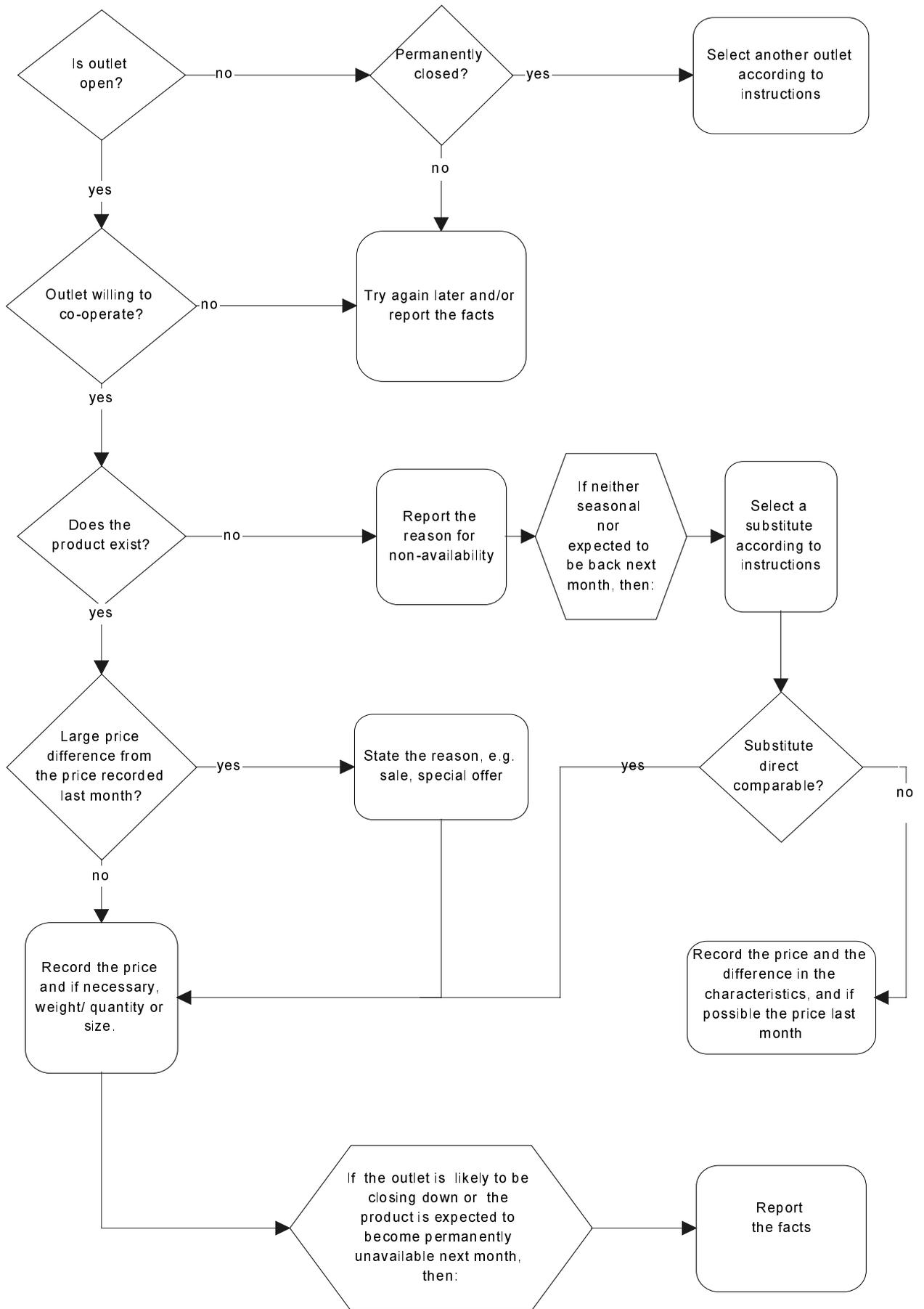
By establishing unit weight for different sizes of vegetables (small, medium and large), is it possible to estimate the weight of different types of montinhas. In this way one can always estimate a kilo-price whether the price collector are only able to obtain price of one size (type) of montinhas if e.g. montinhas consisting of large and medium vegetables are out of stock.

However, some vegetables like lettuce, spinach, etc. are sold in bundles only. For those vegetables the method of establish a unit weight is not possible. The same goes for pepper, garlic, mushroom, piri - piri, etc. Buying and weigh these kinds foodstuff every month from some few selected markets and assume that the weight is representative for the rest of the markets is may one way to solve this problem. Otherwise, the price collector has to use a subjective judgement to state whether the size and the quality of the bundle are the same as last price collecting.

3.5 Flow-chart of price collecting phase

The price collecting procedures are summarised in the flow chart below.

Figure 1. Flow chart - price collection

Is outlet open? —no→ **Permanently closed?** —yes→ Select another outlet according to instructions

Permanently closed? —no→ Try again later and/or report the facts

Is outlet open? —yes→ **Outlet willing to co-operate?**

Outlet willing to co-operate? —no→ Try again later and/or report the facts

Outlet willing to co-operate? —yes→ **Does the product exist?**

Does the product exist? —no→ Report the reason for non-availability → If neither seasonal nor expected to be back next month, then: → Select a substitute according to instructions → **Substitute direct comparable?**

Does the product exist? —yes→ **Large price difference from the price recorded last month?**

Large price difference from the price recorded last month? —yes→ State the reason, e.g. sale, special offer

Large price difference from the price recorded last month? —no→ Record the price and if necessary, weight/ quantity or size.

Substitute direct comparable? —yes→ Record the price and if necessary, weight/ quantity or size.

Substitute direct comparable? —no→ Record the price and the difference in the characteristics, and if possible the price last month

Record the price and if necessary, weight/ quantity or size. → If the outlet is likely to be closing down or the product is expected to become permanently unavailable next month, then: → Report the facts

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4. Revised publication

The contents of a publication depend of the purpose of the publication, e.g. the fit for use. Consultation with internal and external users of the IPC is recommended when making a new publication. Existing publications from other countries should be used as a starting point.

Lines of a new publication - suggestions of what to include;

- All-item index and subgroups should be compared with the previous month and for the same month last year (year to year difference).
- When publishing the December-index INE should also publish the annual rate (annual average). The annual rate is computed by dividing the mean of the 12 all-item indices for the current year with the mean of the 12 all-item indices the previous year.
- Major components of the changes in the all-item index should be identified and their price movements should be described.
- Price movements of any special sub-indices that are of wide interest should also be described.
- When special conditions (like the flood situations in February) causes large price movement of some sub-indices, the reasons should be stated, e.g. due to higher transport costs the prices of coconuts increased dramatically in February.
- Average prices for reasonably homogenous items like diary produce, flour and other items of major importance among the consumers, where the number of price observations is large and/or price variations are small can be published. Though, their nature and limitation should be explained.
- The publication should contain a short methodological description of the index. This includes the scope and coverage of the index, details of weights, purpose of the index and how the index is calculated. The scope of the index indicates the whole range of the populations, groups, regions, items and type of outlets to with the index relates. Coverage describes the extent of the date actually obtained.

5. What to focus in short and medium term

5.1 Improving the sample of outlets and items
Objectives:
A sample which reflects the consumption patterns of the reference population and take into account the dynamic aspect of the continuously introduction of new varieties, models and outlets and the disappearance of old products.

Activities:
- develop regular annual routines of updating the sample of outlets according to the shopping patterns of the consumers
- develop routines for random or probability sampling of outlets
- consider to expand the IAF by a point of purchase survey
- develop regular annual routines of updating the sample of items and revising the specifications of the representative items
- re-consider price collecting zones
- include more provinces
- introducing the international consumption classification, COICOP

Outputs:
- improved accuracy of the IPC
- operational practices of sampling outlets and items.

5.2 Improving the data collection
Objective:
A more effective price collecting and improved quality of the index due to an increased number of price observations.

Activities:
- abandon the 4 weeks program of collecting prices
- decrease the number of price observation of fairly homogenous items
- increase the number of price observations for heterogeneous items
- introduce standard procedures to find replacement of products and outlets due to non-response
- develop standard procedure of comparing the substitute and the old product due to quality change
- develop standard procedure for handling quality differences
- Instruction and training of the price collectors

Output:
- improved accuracy of the IPC
- increased number of price observations

5.3 Develop the new IT-system
Objectives:
An effective system for data entering, control, identification of error and computing the index based on common statistical methods and thus requiring less subjective judgement when handling possible errors and outliers.

Activities:
- complete the data entry system
- separate the data entry phase from the identification of outliers and analyses of possible quality difference
- establish routines for control, identifications of error and outliers and imputations
- introduce the geometric mean formula in computing the price indices for an elementary aggregate

- develop new routines for estimating the indices, e.g. a short-term link with December the previous year as the price reference period (equal 100) and a long-term link (the published index) with 1998 as a index base period
- build a routine for production of standard tables used in publishing
- establish a system of catalogues for keeping the consumption classification, item descriptions, outlet register and weight data. Clarify who should have the authority to update the different catalogues

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