

MOBILE PHONES IN THE JAMAICAN CONSUMER PRICE INDEX BASKET OF GOODS AND SERVICES

Introduction

This paper presents information on the inclusion of mobile phones in the CPI ‘basket’ of consumer goods and services used for the compilation of the CPI in Jamaica. It includes a discussion of the background of mobile phones in Jamaica, the source of weights, the sample of outlets, source of prices and the experience STATIN has had to date with pricing and compiling indexes for mobile phones. Jamaica presently has three mobile phone service providers in operation.

Background

The Statistical Institute of Jamaica (STATIN) introduced a revised Consumer Price Index series in August 2007. This revised index is now being used as headline inflation in Jamaica. In accordance with the ILO CPI Manual published in 2004, changes were made to the methodology applied, the ‘basket’ of consumer goods and services, and the pattern of expenditure weights. The weighting pattern and representative sample of goods and services for the new series were informed by the Household Expenditure Survey conducted over the ten month period June 2004 to March 2005. The new weight reference period is June 2004 to March 2005 with the weights updated for price change to the new price reference base of December 2006. The revised series replaced the previous series that had a base period of January 1988. Detailed methodology of the revised series was published by STATIN in the Consumer Price Index Revised Series January to June 2007.

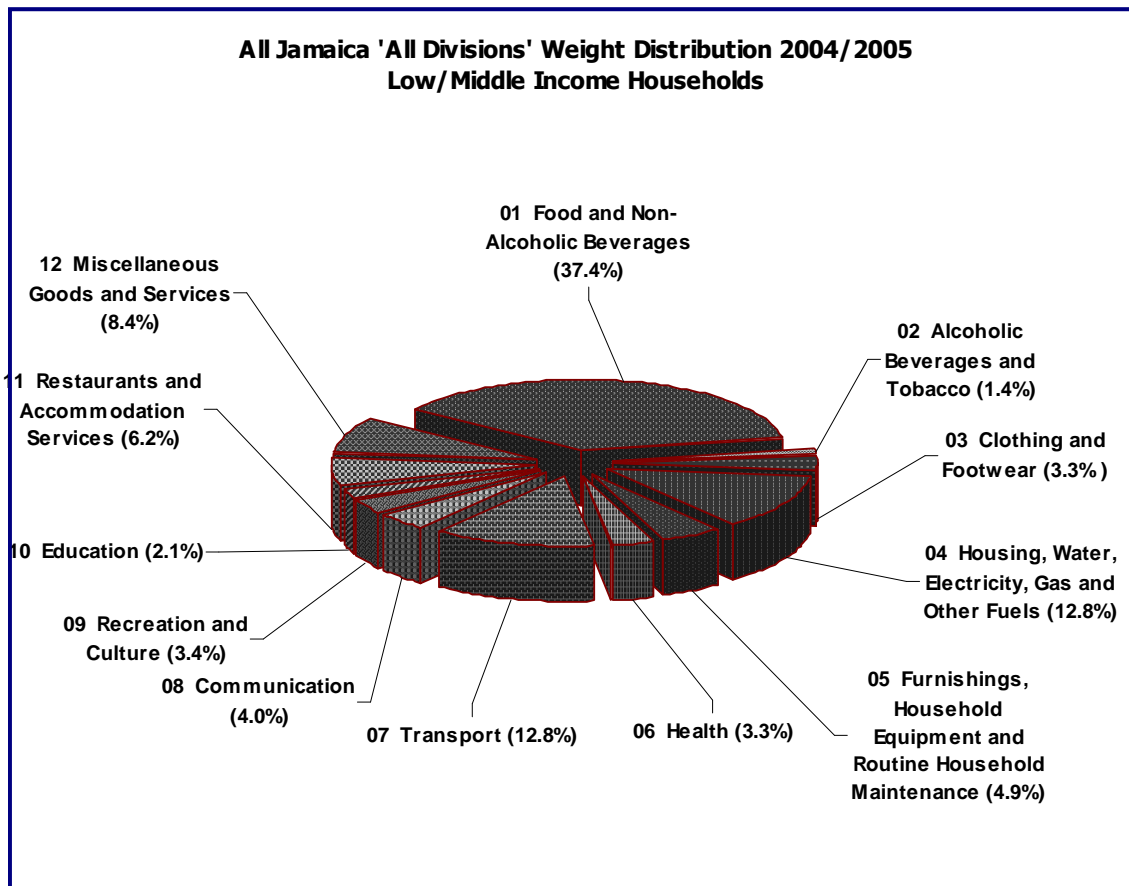
STATIN determined from the Household Expenditure Survey (HES) that 85 % of the Jamaican households represent the low/middle income group, which had a median expenditure of J\$309,000 per annum at the time of the survey. The maximum annual expenditure in the HES was J\$1.2million. The revised series (headline inflation) relate to this low/middle income group.

The revised Consumer Price Index basket of goods and services contains approximately 480 commodities classified into twelve divisions according to the international consumption classification system, the Classification of Individual Consumption According to Purpose (COICOP), developed by the United Nations Statistical Division (UNSD). Each item in the basket is assigned a weight which determines the relative importance of the item. The weight assigned to each division represents the percentage share of its expenditure to total expenditure. *See Table 1 and Chart 1: Consumer Price Index Weight Distribution by Divisions 2004/2005 and 1984 (Low/Middle Income Households)*

Table 1: Consumer Price Index Weight Distribution by Divisions 2004/2005 and 1984 (Low/Middle Income Households)

COICOP DIVISIONS	All Jamaica WEIGHTS	
	2004/2005	1984
01 Food and Non-Alcoholic Beverages	37.4	45.9
02 Alcoholic Beverages and Tobacco	1.4	3.9
03 Clothing and Footwear	3.3	4.9
04 Housing, Water, Electricity, Gas and Other Fuels	12.8	10.2
05 Furnishings, Household Equipment and Routine Household Maintenance	4.9	7.1
06 Health	3.3	1.4
07 Transport	12.8	6.2
08 Communication	4.0	0.5
09 Recreation and Culture	3.4	3.8
10 Education	2.1	1.1
11 Restaurants and Accommodation Services	6.2	7.8
12 Miscellaneous Goods and Services	8.4	7.2
TOTAL	100.0	100.0

Chart 1



Geographical Regions

The geographic regions that were reported on the old CPI series were All Jamaica, Kingston Metropolitan Area (KMA), Other Towns and Rural Areas. The 2004/05 HES confirmed that the expenditure patterns of these regions have remained distinctly different. The new CPI series reports on price changes for all these geographic regions.

In the new series there is, however, a change in nomenclature. The area previously defined as Kingston Metropolitan Area (KMA) is now referred to as The Greater Kingston Metropolitan Area (GKMA). The change became necessary as there is the need to standardise the definitions with those used in Census 2001. The boundaries of “KMA” as used in the CPI encompass the Kingston Metropolitan Area, Spanish Town and Portmore; whereas, in Census 2001, KMA is defined as urban Kingston and St. Andrew. The Greater KMA therefore represents the urban agglomeration of Kingston and St. Andrew, Spanish Town and Portmore. This region shows the similarity in socio-demographic and socio-economic composition of the region as a whole.

The name Other Towns has been replaced by Other Urban Centres. Other Urban Centres include the parish capitals (those not in GKMA) and 32 other urban centres across the country, which were identified in the Census 2001 and which are not a part of the GKMA. The Rural Areas represent all the remaining areas not identified as being part of the GKMA and the Other Urban Centres.

Mobile Phones in the Jamaican CPI

Among the ‘new’ items that were included in the ‘basket’ of consumer goods and services is the mobile telephone (the instrument) and provider services particularly the cost of making calls using the two leading service providers. Communication in the current series of the CPI occupies a significant weight. Jamaica has experienced a transition and an opening up in communication from postage and land or fixed line usage to mobile phones. *See Table 2 Consumer Price Index Weight Distribution for the Division Communication: 2004/2005 versus 1984 (Low/Middle Income Households)*

Table 2: Consumer Price Index Weight Distribution for the Division Communication: 2004/2005 versus 1984 (Low/Middle Income Households)

ITEM etc.	WEIGHTS 2004/2005				WEIGHTS 1984			
	AJ	GKMA	OUC	RUR	AJ	GKMA	OUC	RUR
08 COMMUNICATION	3.99	4.28	4.19	3.68	0.47	0.60	0.51	0.27
08.1 POSTAL SERVICES	0.00207	0.00062	0.00329	0.00256				
08.1.0 Postal services (S)	0.00207	0.00062	0.00329	0.00256	0.16	0.24	0.24	0.16
Postage Stamps	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
08.2 TELEPHONE AND TELEFAX EQUIPMENT	0.15	0.17	0.12	0.16				
08.2.0 Telephone and telefax equipment	0.15	0.17	0.12	0.16				
Telephone	1.83	1.56	0.39	2.52				
Cordless Telephone	0.29	0.48	0.00	0.23				
Cellular Phone	97.88	97.96	99.61	97.25				
08.3 TELEPHONE AND TELEFAX SERVICES	3.83	4.10	4.08	3.52				
08.3.0 Telephone and telefax services (S)	3.83	4.10	4.08	3.52	0.43	0.28	0.04	0.43
Telephone Card (Phonecard)	70.65	56.60	70.72	82.25				
Telephone (Land)	28.05	40.60	28.63	17.36	100.00	100.00	100.00	100.00
Telephone (Cellular Service)	0.85	1.97	0.25	0.23				
Internet Fees	0.45	0.83	0.40	0.16				

Before 1995, communication by telephone with family and friends living in Jamaica and abroad presented a challenge as a result of the expense and the absence of convenience associated with making calls. In addition, difficulties also included the unavailability of land lines or fixed lines in some of the Rural Areas. During this period Telecommunication of Jamaica Limited now Cable and Wireless Jamaica Limited was the monopoly in telecommunications and land or fixed lines. This service was largely available in the urban areas of Jamaica.

The availability of telephone lines increased significantly in the late 1990s when Cable and Wireless Jamaica Ltd replaced Telecommunications of Jamaica Ltd (in February 1998) and made a concerted effort to bring phone lines to the towns in Jamaica's rural interior.

The Government of Jamaica changed its policy and opened up the market for mobile phone service providers and in April of 2001, an Irish telecommunications company Digicel entered the telecommunications market. Digicel placed mobile phone en masse in many remote regions of Jamaica, unlike Cable and Wireless Jamaica, which introduced mobile phones in the 1990s but restricted its coverage almost exclusively to major towns and urban centres. Digicel sold basic handsets for \$US 30–50 (equivalent to one week's salary for an individual employed in domestic work), which made mobile phone purchases more accessible to a wide section of the population.

Additionally Digicel offered both postpaid and prepaid services. The prepaid service was one of the appeals of the mobile phone (as opposed to a house phone) as users were able to control costs through the use of prepaid calling cards. This has resulted in Cable and Wireless introducing a prepaid service in August 2006 for the fixed or land line phone network that it now calls homefone prepaid.

Digicel sold prepaid calling cards that could be purchased individually or in bulk and resold at 20–30 per cent mark-up. The most popular denomination was a J\$100 calling card that could be purchased at a rate of J\$120–135 inclusive of the general consumption tax and vendor's mark-up. Digicel deducted credit per second rather than per minute as charged by their competitor Cable and Wireless Jamaica. In 2004, calls within Jamaica could be made for J\$8 a minute to another Digicel phone (Digicel, personal communication).

When calculated within the household as a whole, a Cable and Wireless house phone was still considerably cheaper than a mobile phone. However, the mobile phone was preferred. In 2004, placing a phone call overseas using a mobile phone cost the same as the J\$17 call to another company's mobile phone in Jamaica. The mobile phone became the preferred communication tool irrespective of the cost associated with its use.

Mobile phones were not previously included as part of the Consumer Price Index 'basket' of consumer goods and services. In fact, telephone in the group 'Communication' referred to land lines because when that Household Expenditure Survey was conducted in 1984 that was the only telephone service that was available. The telephone instrument was not included as an item because that was rented to the customer as a part of the service. As shown in Table 2, expenditure on mobile phones has become a significant consumption item of the Jamaican Households. There are now the major expenditure items in the COICOP Classes – "Telephone and Telefax Equipment" and "Telephone and Telefax Services". The 'Communication' class which previously had a weight of 0.5 per cent in the CPI basket is now 4.0 per cent.

Source of weights

The basket of goods and services included in the CPI should be representative of the pattern of expenditure of the typical consumer. The Household Expenditure Survey identified those items which are important in the consumption pattern of Jamaican households. The level of expenditure on the commodities was the primary consideration in their selection. Another criterion for the final selection of the basket of goods and services was the feasibility of obtaining accurate and reliable prices. The expenditure on each commodity covered by the survey was examined. Where the expenditure on a commodity was considered not significant for inclusion in the basket, or it was not feasible to obtain accurate and reliable prices, the expenditure was re-distributed proportionately among the other commodities in the sub-group to which it related.

The new series has a total of **480** commodities when compared with **280** in the previous series. A commodity is defined as a good or service consumed by the household. However, a commodity may be broken down into more than one item for which price data are collected. For example, the commodity men's shirt includes the items polo shirt, sport or dress shirt. Each item in the basket is assigned a weight which determines the relative importance of the item. The weight assigned to each division is the percentage share of its expenditure to total expenditure.

Sample of outlets

The urban and rural market centres selected for price collection were chosen from all over the country. The market centre is any geographical area or town within a parish¹ where there is some amount of commercial activity. Within each market centre, collecting points or outlets were chosen. Selection of outlets was done by purposive or judgment sampling i.e. non-random sampling in collaboration with experienced field officers who have a good knowledge of the geographic locations where people live and shop and are familiar with the general popularity of the stores among the target population.

The following factors were considered when selecting the outlets:-

- i) Locations with a concentration of the targeted income groups
- ii) The availability of goods and services in selected retail outlets
- iii) The extent to which outlets cater to the target income groups

In respect of items like the utilities such as electricity and telephone rates are collected from the service providers concerned, while information on rental of dwellings is obtained from a sample of dwellings. Outlets are visited monthly by field officers who collect prices for all items with the exception of a few, such as insurance coverage and school fees which are collected quarterly and by the term.

Source of prices

Selection of mobile phones for pricing by the Statistical Institute of Jamaica is done based on particular specification, for example; dimensions, weight, type, size, numbers in phone, calls missed, dialed and received. These are standard features that most if not all phones have. Outlets that are used are main offices of particular providers. STATIN uses data from the largest service provider for the pricing of the instrument. However, information on the pricing of the service is obtained from all major service providers.

Price collection for phones is done on a monthly basis, the first full week in each month. Methods of collection vary from calling the main outlet and getting prices for particular phones to going online to gather price information. Personal visits are made if either of the two methods do not gain any results for one reason or another.

The price collected for service for mobile phones is mainly based on the cost of prepaid phone or calling cards. To date, all increments of service such as 100 minutes usage, 500 minutes of usage, and 1000 minutes of usage have the same per minute charge. Thus, at this point in time any increment of usage has the same per minute price. However, in the future, providers may offer discounts for larger volume users and STATIN will have to implement the new usage increments with the different price levels.

¹ A parish is an established legal division that serves as the primary administrative division of the country. The island of Jamaica is divided into 14 parishes. (See Appendix)

Methodology for computation of the Consumer Price Index

The compilation of the Consumer Price Index is done in three stages:-

- Price Collection
- Editing and Averaging
- Index Computation

Price Collection

The CPI is designed to measure price changes for a fixed basket of goods and services. Price movements must be monitored in several retail outlets from which households do their shopping and also from various business organizations which provide services to households. Monthly, quarterly and annual pricing surveys are carried out at outlets such as: grocery stores, markets, clothing and footwear stores, furniture and appliance shops, garages, doctors, dentists, law offices, schools, insurance companies and beauty and barber salons.

Additionally, price data for labour rates, telephone and electricity charges, and education and hospital fees are collected from the appropriate authorities. In total, over 10,000 individual price quotations are either collected and/or reviewed each month to compile the Consumer Price Index.

Editing and Averaging

Once the prices for goods and services have been collected, they are examined individually to ensure the validity of the data being used in the CPI calculations. Prices are compared with the previous month's data in an effort to monitor price fluctuations and maintain consistency from month to month. Based on the recommendations of the ILO outlined in the CPI Manual 2004, the geometric mean is used to arrive at average prices; as opposed to the arithmetic mean used in the previous series. The geometric mean formula (G_M) requires the computation of the n th root of the product of the various prices collected for each elementary item in any given month. For example:

$G_M = \sqrt[n]{p_1 \times p_2 \times p_3 \times \dots \times p_n}$, where p represents the price for each variety of the item for which prices have been collected this period.

The old CPI used the Dutôt method for calculating the elementary item indices in which the arithmetic average of the prices in the current period was divided by the arithmetic average of the same varieties' prices in the base period.

Adjustment for missing prices

The price of an item may not be collected in some period because the item is missing temporarily or because it has permanently disappeared. The two classes of missing prices require different

treatment. In the case of temporarily missing observations, the New ILO CPI Manual recommends one of four actions:

- Omit the item for which the price is missing so that a matched sample is maintained (like is compared with like) even though the sample is depleted.
- Impute the missing price by the average price change for the prices that are available in the elementary aggregate; i.e. where the geometric mean prices are computed.
- Impute the missing price by the price change for a particular comparable item from another similar outlet.
- Carry forward the last observed price (this will only be used as a last resort).

Quality Adjustment

A quality change in an item occurs when the change in specification has resulted in a significant difference in the functionality (utility) to the consumer between the new variety of the good or service and the one that had previously been selected. A quality adjustment is therefore defined as a procedure for making an allowance for the quality change by increasing or reducing the observed price by a factor that is equivalent to the quality change.

In keeping with the international guidelines, quality adjustments methods will be applied when there is need for:

- Imputation – where no information is available to allow reasonable estimates to be made of the effect on price of a quality change. The price changes of all items, or of more or less similar items, are assumed to be the same as that for the missing item;
- Overlap – used where no information is available to allow reasonable estimates to be made of the effect on price of a quality change, but where a replacement item exists in the same period as the old item. The price difference between the old item and its replacement in the overlap period is then used as a measure of the quality difference;
- Direct comparison – if another item is directly comparable, that is, it is so similar that it can be assumed to have had more or less the same quality characteristics as the missing one, its price replaces the unavailable price. Any difference in price level between the new and old is assumed to arise from price changes and not quality differences;
- Explicit quality adjustment – where there is a substantial difference between the quality of the old and replacement items, estimates of the effect of quality differences on prices are made to enable quality-adjusted price comparisons to be made.

The Matched Model method is applied in the quality adjustment for mobile phones. This method is seen to be the most appropriate for mobile phones and also requires the monitoring of changes in the availability of phones on the market and patterns of consumption. This technique also collects information on the instruments that are entering the market and those that are being phased out. This ensures that as the instrument becomes unavailable in the market the substitution can be made. The model phone used last month may not be available this month so a substitution is made to the most comparable model. In some instances, this means that the previous month's price for the new model (which was not used in the previous

month's index calculation) will be collected and used to determine the current month's index. The matched model method ensures that the price change for each observation represents products of similar quality. The difference in prices between the old model and the new model is treated as a quality difference when the index is calculated.

Computation of the CPI

The computation of the monthly CPI involves calculating a series of index numbers at the detailed level of the index and adding them to derive an aggregate index number.

Indexing

This is the final stage in the calculation of the index which utilizes the short-term price relative version of the Laspeyres price index. The Laspeyres index measures by how much percent would expenditure change if people bought this year the same selected goods and services that were bought in the base period.

The first step is to calculate the price index for each elementary item. A price relative is calculated comparing the current month (t) geometric average price with the previous month ($t - 1$) geometric average price. This price relative is then used to move the previous month elementary index forward to the current month, starting with the new base price period of December 2006.

The mathematical formula for calculating an elementary index is:

$$I_i^t = \frac{\bar{p}^t}{\bar{p}^{t-1}} \times I_i^{t-1}, \text{ where}$$

I_i^t is the price index for elementary item i in period t ;

\bar{p}^t is the geometric mean of the various variety prices collected in period t ;

\bar{p}^{t-1} is the geometric mean of the prices collected in period $t - 1$ for the same varieties as in period t ; and

I_i^{t-1} is the price index for elementary item i in period $t - 1$.

This approach allows for the replacement of missing items and introduction of new items in the basket of goods and services.

Price indices are next computed for the higher level indices such as groups, divisions, and all items by aggregating the elementary item indices and weighting them by their relative importance in the CPI basket.

The mathematical formal for calculating an aggregate index is:

$$I_A^t = \frac{\sum_{i=1}^n I_i^t \times w_i}{\sum_{i=1}^n w_i}, \text{ where}$$

I_A^t is the aggregate price index for the n elementary item indices included in the aggregate, and w_i is the relative importance (expenditure share) of the elementary item index i in the CPI basket.

Using this formula, price indices are computed for each class e.g. Meat, Fish and Seafood, Vegetables and Starchy Foods, etc. These index numbers are then combined to obtain the aggregate index number for each division. Once indices have been derived for each of the twelve divisions of the CPI, they are weighted together to give an average price movement that represents all goods and services in the CPI basket.

Indices are computed for each geographic region, namely Greater Kingston Metropolitan Area, Other Urban Centres and the Rural Areas. These indices are then aggregated to arrive at an All Jamaica “All-items” CPI.

Experience to date with pricing and compiling indexes for mobile phone

To date, the respondents have been very cooperative. STATIN has had very few difficulties with price collection. Even when preparing this paper frequent calls were made to the various companies of the service provider in order to obtain and verify the relevant details. Like personal computers the technology for mobile phones changes with some frequency. This makes it difficult for the pricing of the same instrument each month.

The task of collecting data for mobile phones is certainly not as daunting as it appears on the surface. In 2002, when the Household Expenditure Survey instrument was being designed several issues were raised. These included the convenience of pricing mobile phones on a monthly basis. However, by using the Matched Model technique as well as consistently liaising with the service providers who also sell the instruments a great deal of information has been obtained. In addition, the CPI compiler has to keep abreast of the developments in the telecommunications market. This is a product whose specification is constantly changing.

APPENDIX

List of Collection Points

GREATER KINGSTON METROPOLITAN AREA		
<ul style="list-style-type: none"> • Kingston • Urban St. Andrew • St. Catherine <ul style="list-style-type: none"> - Spanish Town - Portmore 		

Parish	Other Urban Centres	Rural Areas
St. Thomas	Morant Bay Port Morant Yallahs	Golden Grove Lyssons Seaforth
Portland	Buff Bay Port Antonio	St. Margaret's Bay Hope Bay
St. Mary	Annotto Bay Highgate Oracabessa Port Maria	
St. Ann	Brown's Town Claremont Ocho Rios St. Ann's Bay	Moneague
Trelawny	Clarks Town Duncans Falmouth	Albert Town Dunkenfield Troy Warsop
St. James	Montego Bay	Cambridge Jericho
Hanover	Lucea	Hopewell
Westmoreland	Darliston Grange Hill Mandeville Negril Sav-la-Mar	Green Island Whitehouse

Parish	Other Urban Centres	Rural Areas
St. Elizabeth	Black River Junction Santa Cruz	Gutters Malvern Maroon Town Southfield
Manchester	Christiana Porus	Devon Spauldings
Clarendon	Chapleton Frankfield Lionel Town May Pen	Alley Kellits Race Course York Town
St. Catherine	Bog Walk Linstead Old Harbour	Guy's Hill Lluidasvale Riversdale

Note:

Jamaica is the third largest island located in the Caribbean. The island has a population of 2.6 million people (Jamaica Census 2001). The island's 4,400 square miles or 10,964 square kilometers comprise a beautiful mountainous interior ringed by a necklace of golden beaches lined with tall palms. Jamaica was once the crown jewel of the British sugar empire, and its capital is Kingston.

Jamaica has 14 parishes, the collection points were selected based on observing the main shopping areas in each parish. This was further classified according to geographic regions that is whether Greater Kingston Metropolitan Area, Other Urban Centres or the Rural Areas.

