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STAPLE FOOD CONSUMPTION PATTERNS IN URBAN KENYA: TRENDS AND POLICY IMPLICATIONS

By

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Table of contents

LIST OF TABLES

LIST OF FIGURES

Abstract

This study examines current consumption patterns of the main staple carbohydrate products in Nairobi -- maize, wheat, rice, and cooking bananas -- in an effort to update policy makers' knowledge of current urban food consumption patterns. The study also identifies the factors driving changes in the amount and form of urban maize meal consumption, in order to better understand how food security policy should be designed to respond to the needs of low-income consumers. The study reveals how consumption and expenditure patterns differ according to household income. The study also examines whether the marketing channels used by the poor to secure their staple carbohydrate products differ from those used by relatively high-income consumers. The data used in this study comes from a cross-sectional random survey of 542 households in Nairobi's urban areas and environs. The Tegemeo Institute in collaboration with the Central Bureau of Statistics (CBS) using the CBS's NASSEP IV frame implemented the survey in November/December 2003. An earlier analysis of household survey data conducted in 1995 involving a random survey of 549 in Nairobi was used was a baseline.

The results indicate that while generally the volumes of staple carbohydrate consumption have declined, it is the poorest section of the urban population that has been affected the most. Also, on average, there has been a decline in consumption of maize products and rice. The poorest have experienced the greatest decline. Consumption of wheat products has grown significantly among all groups, but particularly among higher income groups. These results also indicate a significant shift in maize meal consumption patterns. Even though posho meal consumption has declined, it continues to be a preserve of the poor because it is relatively inexpensive compared to sifted maize meal. Retail channels used to procure staple carbohydrate products vary substantially by income. The poorest income groups rely mainly on small shops (dukas) while well-off households rely both on dukas and supermarkets.

These findings hold some implications for food security policy. Because wheat is emerging as an important expenditure item among the urban households, even the poor, the duty on imported wheat and wheat flour, which currently stands at 35 percent and 60 percent, respectively, may have adverse effects on urban poverty. Because Kenya is a member of COMESA and WTO, there will be external pressures to reduce these duties over time. Measures aimed at enhancing productivity and marketing of domestically produced wheat so as to lower wheat prices for the benefit of the poor should be considered.

STAPLE FOOD CONSUMPTION PATTERNS IN URBAN KENYA: TRENDS AND POLICY IMPLICATIONS

INTRODUCTION

Since the early 20th century, maize has been the main staple crop of Kenya. Historically, urban food security has depended on ensuring adequate supplies of maize at tolerable prices. Maize consumption in Kenya has been estimated to be 98 kilograms per person per year, and this figure has for many years served as the basis for the computation of food balance sheets and other estimates of national cereal import requirements (Nyoro et al 2004).

This study examines current consumption patterns of the main staple carbohydrate products in Nairobi -- maize, wheat, rice, and cooking banana -- in an effort to illuminate policy issues affecting urban food security. We also identify the factors driving changes in the amount and form of urban maize meal consumption. To better understand how food security policy should be designed in order to respond to the needs of low-income consumers, we disaggregate consumption and expenditure patterns for low-, medium- and high-income groups. The study also examines whether the marketing channels used by the poor to secure their staple carbohydrate products differ from those used by relatively high-income consumers. The results hold important implications for policy makers by revealing how staple food consumption patterns are changing, and by identifying the types of investments that are needed to strengthen improve low-income consumers' access to food.

DATA AND METHODS

Data

The data used in this study comes from a cross-sectional random survey of 600 households in Nairobi's urban areas and environs. The survey was conducted in November-December 2003 and implemented by the Tegemeo Institute in cooperation with the Central Bureau of Statistics (CBS). The survey uses the CBS's NASSEP IV frame established using the 1999 nationwide population and housing census database. Census Enumeration Areas (EAs) were used as the primary sampling units (PSUs). The first step in developing the

frame involved allocating the PSUs to the districts considered as the strata. This was followed by selection of the PSUs using probability proportional to size.

Due to socio-economic diversity in the urban centers, the six major towns (Nairobi, Mombasa, Kisumu, Nakuru, Eldoret and Thika) were stratified into five income classes (strata): upper, lower-upper, middle, lower-middle and lower. Nairobi was allocated a total of 108 primary sampling units out of the 1800 units in the national frame. These were then allocated to the five strata using optimal allocation and the PSUs selected with probability proportional to size. The allocation of PSUs among the five strata is as follows:

	Income Strata	**Primary Sampling units (PSUs)**
1.	Upper	28
2.	Lower Upper	12
3.	Middle	16
4.	Lower Middle	36
5.	Lower	16
	Total	**108**

For the purpose of the household consumption survey, 30 PSUs were selected in Nairobi using systematic random sampling with the following distribution:

	Income Strata	**Primary Sampling Units (PSUs)**
1.	Upper	8
2.	Lower Upper	3
3.	Middle	5
4.	Lower Middle	10
5.	Lower	4
	Total	**30**

For each of the 30 primary sampling units, 20 households were then systematically selected, giving a total of 600 households covered in the city. Because of missing information on some surveys and other sources of attrition, the final sample size for analysis was reduced to 541 households.

Weighting Procedure

The weighting of the data from the household consumption survey takes into account the sampling procedures at each stage of selection and non-responses. Weights for each cluster were calculated based on their selection probabilities. Household weights were also

calculated based on their probabilities of selection. In cases where some selected households did not respond, the weights were adjusted by the following factor:

$$wi = k_i/n_i$$

where k_i = Number of selected households in the i^{th} cluster

n_i = Number of households that responded in the i^{th} cluster

Thus the overall household weights were calculated as follows

$$W_{ci} = D_{ij} * \underline{H_{si}} / H_{ri}$$

where D_{ij} is the sample weight of the j^{th} household in the i^{th} cluster.

H_{si} is the number of selected households in the i^{th} cluster

H_{ri} is the number of households that responded in the i^{th} cluster

Surveyed households were asked about their purchases and consumption of an array of maize products as well as wheat, rice, and other carbohydrate products that have traditionally constituted the important sources of calories in urban diets. The specific maize products that respondents were asked about include a) highly-refined sifted maize meal (e.g., "Hostess" brand); the less-refined packaged maize meal brands (e.g., "Jogoo," "Pembe," "Jimbi," etc); the less-refined posho meal (both dehulled and straight run); grain for posho milling (dehulled and straight run); grain for other dishes; and green maize. For wheat, respondents were asked about their consumption of bread, flour, spaghetti, macaroni, and pasta products. Consumption figures exclude food commodities consumed at the urban household premises but produced at households' rural farms and transported to town, as well as the relatively few cases of food commodities grown and consumed from households' urban plots.

As a baseline, we draw upon an earlier analysis of household survey data conducted in 1995, also in Nairobi (Jayne and Argwings-Kodhek, 1997). This study involved a random survey of 549 urban households implemented in October 1995. This was 20 months after the adoption of important maize marketing policy changes, the most important of which was a significantly smaller role of the National Cereals and Produce Board in the maize market and the elimination of controls on maize trading and maize meal pricing.

The time series information on monthly retail maize grain prices is drawn from the Market Information Bureau of the Ministry of Agriculture. Retail maize meal prices and the

urban CPI data are collected by the Central Bureau of Statistics. Estimates of monthly prices for unrefined maize flour ("posho" meal) were obtained based on estimates of posho milling charges at various intervals over the 1993-2003 period. Periodic visits to Nairobi markets by Tegemeo Institute researchers indicates that milling charges have been roughly constant over this period at between 4-6 Ksh per 2kg tin of maize grain. Thus, assuming a mean posho milling charge of 2.5 Ksh per kg, this fee is added to the retail price of maize grain to derive monthly posho meal prices. These prices do not account for the costs of consumers' time and transaction costs of acquiring the maize grain and standing in the posho mill queue.

Methods

Consumption patterns were converted to "adult equivalents" to standardize consumption units within households. Adult equivalents are commonly used technique that determines consumption on the basis of the sex and age of each specific household member. By aggregating the determined adult equivalents of the respective household members, the household's number of adult equivalents was derived.

Conversion Factors to Compute Adult Equivalents

	Adult Equivalence	
Age	***Males***	***Females***
Under 1 year	0.33	0.33
1 - 1.99	0.46	0.46
2 - 2.99	0.54	0.54
3 - 4.99	0.62	0.62
5 - 6.99	0.74	0.70
7 - 9.99	0.84	0.72
10 - 11.99	0.88	0.78
12 - 13.99	0.96	0.84
14 - 15.99	1.06	0.86
16 - 17.99	1.14	0.86
18 - 29.99	1.04	0.80
30 - 59.99	1.00	0.82
60 and over	0.84	0.74

As per the World Health Organization (Jayne and Argwings-Kodhek 1997).

Household income was derived as the sum of proceeds from employment and business earned by household members in the previous month. Remittances from household members not residing in the household and pension accruing to retired household members

were also included. Households in the sample were ranked by income per adult equivalent and then stratified into five income quintiles to assess potential differences in consumption patterns by income.

Estimates of household monthly expenditure on particular food products were derived as quantities purchased multiplied by the median price paid by all households purchasing the food item. The descriptive tables and graphs presented later in the paper are based on these expenditure computations. The surveys contained recall questions to explicitly record consumption levels in different periods of the year to account for seasonality. However, it was found that little seasonal variation existed in Nairobi consumers' consumption of the primary staple foods examined in this study. Hence, we report monthly consumption patterns of the most recent period (mid November to mid December, 2003) covered in the survey.

Descriptive time series analysis of monthly price trends and marketing margins for sifted vs. posho maize meal is carried out to explore whether potential shifts in consumption patterns are correlated with changes in relative prices.

RESULTS

Staple Carbohydrate Consumption

Maize continues to be the primary staple food in Nairobi in terms of kilograms consumed per adult equivalent. About 97 percent of the respondents reported to have purchased maize products (maize meal, grain or green maize). About 12 percent reported to have obtained maize grain or green maize either from relatives or their own farms in the rural areas during the month preceding the survey. Two percent of respondents had acquired maize products from their urban field.

Generally, total staple carbohydrate consumption has declined by 3 percent between 1995 and 2003 (Table 1). The extent of the decline decreases with income with the poorest 20 percent experiencing the largest decline (a 22% decline in gross kgs consumed between 1995 and 2003). The wealthiest 20% of urban households, by contrast, increased their carbohydrate consumption by 19 percent.

Nairobi households consume a monthly average of 5.67 kgs per adult of maize products, 3.83 kgs per adult of wheat products, 1.58 kgs per adult of rice, and 1.43 kgs per adult of cooking bananas. However, there significant differences in consumption patterns when the sample of Nairobi households are stratified by income group. After ranking all households by monthly income per adult equivalent and then stratifying them into five equal

groups, we find that households in the poorest income quintile consumes the most maize (5.90 kgs per adult), declining by 7 percent to 5.47 kgs per adult for households in the wealthiest income quintile. The inverse relationship between maize consumption and household income suggests that maize is an "inferior good."[1]

By contrast, the consumption of wheat products rise steadily as income rises. Wheat products in this study include bread, flour, spaghetti, macaroni, and pasta products. Data in Table 1 show that consumption of wheat products rises from 2.25 kgs per adult among households in the lowest income group to 5.58 kgs among households in the highest income group.

Table 1. Consumption of Primary Staples (kgs per adult equivalent) per month, Nairobi

Income Quintile	Maize Products		Wheat Products		Rice		Cooking Bananas		Total	
	2003 [a_1]	1995 [b_1]	2003[a_2]	1995[b_2]	2003[a_3]	1995[b_3]	2003[a_4]	1995[b_4]	2003 [c]	1995 [d]
1	5.90	8.95	2.25	2.11	1.16	1.45	0.75	0.34	10.06	12.85
2	5.61	8.39	3.08	2.66	1.55	1.56	1.19	0.12	11.43	12.73
3	5.74	7.90	3.47	3.73	1.38	1.82	1.88	0.23	12.47	13.68
4	4.32	6.97	4.76	3.56	1.79	1.86	1.81	0.63	12.68	13.02
5	5.47	5.78	5.58	4.06	2.01	2.13	1.52	0.28	14.58	12.25
Total	**5.67**	**7.48**	**3.83**	**3.27**	**1.58**	**1.78**	**1.43**	**0.33**	**12.51**	**12.86**
As a Percentage of Total Consumption of Primary Staples (2003 and 1995 respectively)										
	(a_1/c)%	(b_1/d)%	(a_2/c)%	(b_2/d)%	(a_3/c)%	(b_3/d)%	(a_4/c)%	(b_4/d)%	(c/c)%	(d/d)%
1	58.65	69.65	22.37	16.42	11.53	11.28	7.46	2.65	100.00	100.00
2	49.08	65.91	26.95	20.90	13.56	12.25	10.41	0.94	100.00	100.00
3	46.03	57.75	27.83	27.27	11.07	13.30	15.08	1.68	100.00	100.00
4	34.07	53.53	37.54	27.34	14.12	14.29	14.27	4.84	100.00	100.00
5	37.52	47.18	38.27	33.14	13.79	17.39	10.43	2.29	100.00	100.00
Total	**45.32**	**58.16**	**30.62**	**25.43**	**12.63**	**13.84**	**11.43**	**2.57**	**100.00**	**100.00**
Percentage Change in Staple Consumption from Base year (1995)										
	(a_1- b_1)/ b_1%		(a_2- b_2)/ b_2%		(a_3- b_3)/ b_3%		(a_4- b_4)/ b_4%		(c- d)/ d%	
1	-34.08		6.64		-20.00		120.59		-21.71	
2	-33.13		15.79		-0.64		891.67		-10.21	
3	-27.34		-6.97		-24.18		717.39		-8.85	
4	-38.02		33.71		-3.76		187.30		-2.61	
5	-5.36		37.44		-5.63		442.86		19.02	
Total	**-24.20**		**17.13**		**-11.24**		**333.33**		**-2.72**	
Proportional Change in Consumption of Primary Staples (Base year 1995)										
	(a_1- b_1)/ d%		(a_2- b_2)/ d%		(a_3- b_3)/ d%		(a_4- b_4)/ d%		(c- d)/ d%	
1	-23.74		1.09		-2.26		3.19		-21.71	
2	-21.84		3.30		-0.08		8.41		-10.21	
3	-15.79		-1.90		-3.22		12.06		-8.85	
4	-20.35		9.22		-0.54		9.06		-2.61	
5	-2.53		12.41		-0.98		10.12		19.02	
Total	**-14.07**		**4.35**		**-1.56**		**8.55**		**-2.72**	

Source: Tegemeo/MSU Urban Consumer Survey, 1995 and 2003.

[1] In economic jargon, inferior goods refer to commodities for which consumption declines as income levels rise.

Consumption of rice also appears to be positively related to income. Consumption of cooking bananas is not strongly correlated with income, except that it appears to be relatively popular among households in the middle-income group. Consumption of cooking bananas has also risen moderately in absolute kg terms and substantially in terms of percentage change between 1995 and 2003. Rice and cooking bananas overall account for roughly 13 and 11 percent of the total kgs consumed of the staple food products included in this study.

The prominence of maize in urban staple grain diet has declined by 22 percent from 58 percent share in staple food 1995 to 45 percent in 2003. Maize accounts for 59 and 38 percent of the staple carbohydrate consumption among the 20 percent poorest and richest households (respectively). It is still the dominant staple food among the urban poor. However, among urban households in the top 40% of the income distribution, wheat has overtaken maize in terms of amounts consumed (Figure 1). Consumption of wheat products has grown significantly in the past decade, particularly among higher income groups. Its share has risen by 17 percent from 25 percent in 1995 to 31 percent in 2003. Wheat consumption accounts for 22 and 38 percent of the 20 percent poorest and richest (respectively) staple food consumption. The share of rice declined while that of cooked bananas tripled over the same period.

Figure 1: Per Adult Equivalent Consumption of Staples (Kgs)

Source: Tegemeo/MSU Urban Consumer Survey, 2003.

Staple Carbohydrate Expenditures

The survey results provide a perhaps surprising picture of expenditure patterns. Although maize products provide the greatest contribution to Nairobi staple food diets in terms of kilograms consumed (except for households in the highest income quintiles), wheat is now emerging as the most important carbohydrate expenditure item. This is because wheat is more expensive per kilogram than maize, and because the consumption of wheat products has risen over time while maize consumption has declined since 1995 (Table 2). Wheat products in 2003 accounted for 43.5% of total expenditures on the main staples (maize, wheat, rice and cooking bananas). Maize products have declined from 41.8% to 32.4% of staple carbohydrate expenditures between 1995 and 2003. Nairobi consumers' expenditures shares for rice were roughly constant between 1995 and 2003, while the expenditure share of cooking bananas has tripled, albeit from a small initial share in 1995.

Table 2. Staple Carbohydrate Expenditures Shares (Expenditure as a Percentage of Total Expenditures on the Top Four Staples) among Nairobi Consumers, 1995 vs. 2003.

	1995	2003
Maize Products	41.8	32.4
Wheat products	34.8	43.5
Rice	22.1	20.2
Cooking bananas	1.3	3.9

Source: Tegemeo Urban Household Consumer Surveys, 1995 and 2003.

In 2003, expenditures on wheat products were Ksh 170 per adult per month (Table 3). By contrast, maize and rice products accounted for Ksh 126 and Ksh 79 per adult per month respectively. Cooking bananas were relatively low at Ksh 15 per adult per month (4 percent of expenditures on the staple food products covered in this study).

When consumer expenditures are disaggregated according to household income, we observe some notable differences. As with wheat consumption, expenditures on wheat products increase greatly with income (Table 3 and Figure 2). Wheat expenditures were Ksh 98 per adult per month for households in the bottom income quintile, rising to Ksh 255 per adult per month for households in the highest income quintile. Rice expenditures are also positively related to income. By contrast, expenditures on maize products first rise then decline moderately as income rises. Maize products account for less than half of total expenditures on staple carbohydrate products for all income groups, ranging from 43.8% for the poorest 20% of Nairobi consumers, to just under 22% for the wealthiest 20%. Wheat

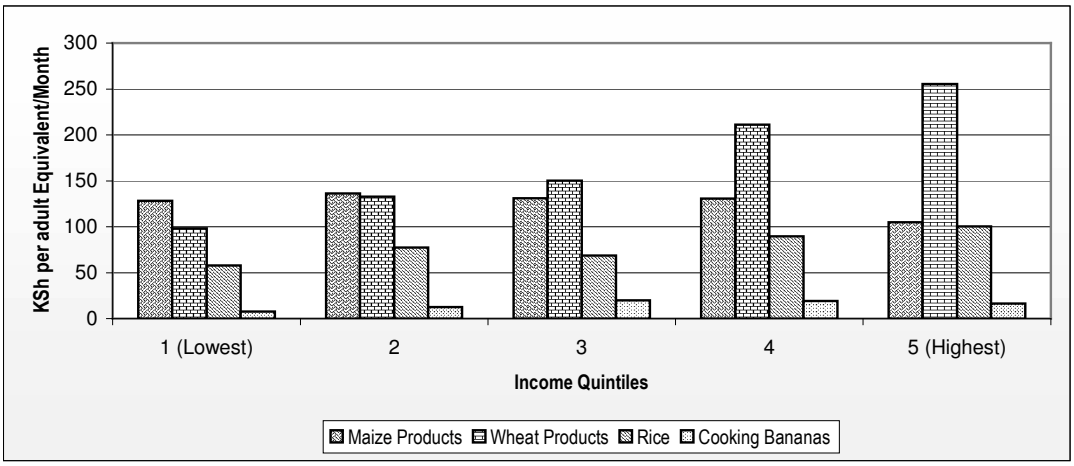
products rise from 34% of total expenditures on staple products for the poorest group to over 50% of expenditures for the wealthiest group. Rice products consistently account for roughly 20% of staple food expenditures across the income spectrum.

Table 3. Expenditures on primary Staple Commodities (Ksh per adult equivalent per month), Nairobi.

Income quintile	Maize Products		Wheat Products		Rice		Cooking Bananas		Total
	KShs/ae	% of total	KShs/ae	% of total	KShs/ae	% of total	KShs/ae	% of total	
1 (lowest)	128.21	43.79	98.47	33.63	58.10	19.84	7.99	2.73	292.77
2	136.30	37.95	132.85	36.99	77.30	21.52	12.69	3.53	359.14
3	131.29	35.45	150.14	40.54	68.82	18.58	20.11	5.43	370.36
4	130.78	29.01	211.06	46.81	89.66	19.89	19.36	4.29	450.86
5 (highest)	104.79	21.98	255.47	53.57	100.34	21.04	16.26	3.41	476.86
Total	**126.30**	**32.39**	**169.57**	**43.48**	**78.84**	**20.22**	**15.28**	**3.92**	**389.99**

Percentages add to 100% row-wise. Source: Tegemeo/MSU Urban Consumer Survey, 2003.

Figure 2: Expenditures on Primary Staple Commodities (Ksh per adult equivalent per month), Nairobi.



Expenditures on maize products exceed those on wheat for households in the bottom two-income quintiles (40% of the poorest households in Nairobi), but for the top three income quintiles (60% of Nairobi's population), wheat dominates staple carbohydrate expenditures. If these results are not simply a one-off phenomenon but reflect robust trends in consumption patterns, then there is need for a general updating of the widespread notion that urban Kenyan consumers are exclusively dependent on one crop – maize – for their staple food requirements.

There has been a general decline in staple carbohydrates real prices between 1995 and 2003 (Table 4). Even though maize products prices appear to have declined by a bigger percentage (16%) compared to wheat and rice, the difference in price in the same period is largest for rice and wheat products. It appears that the increased consumption of wheat among the higher income groups could reflect, to some extent, substitution in consumption on the basis of a decline in the wheat/maize price ratio.

Table 4. Staple Carbohydrates Real Prices (Ksh per kg), 1995 and 2003.

	1995	2003	% Change
Maize Products	26	22	-16
Sifted maize meal	28	25	-11
Posho meal	24	22	-8
Maize grain	22	18	-18
Wheat products	50	44	-12
Wheat flour	45	34	-24
Wheat bread	52	46	-12
Rice	57	50	-12
Cooking bananas	16	11	-31

Source: Republic of Kenya, CBS, Statistical Abstract (various issues) and Author Calculations

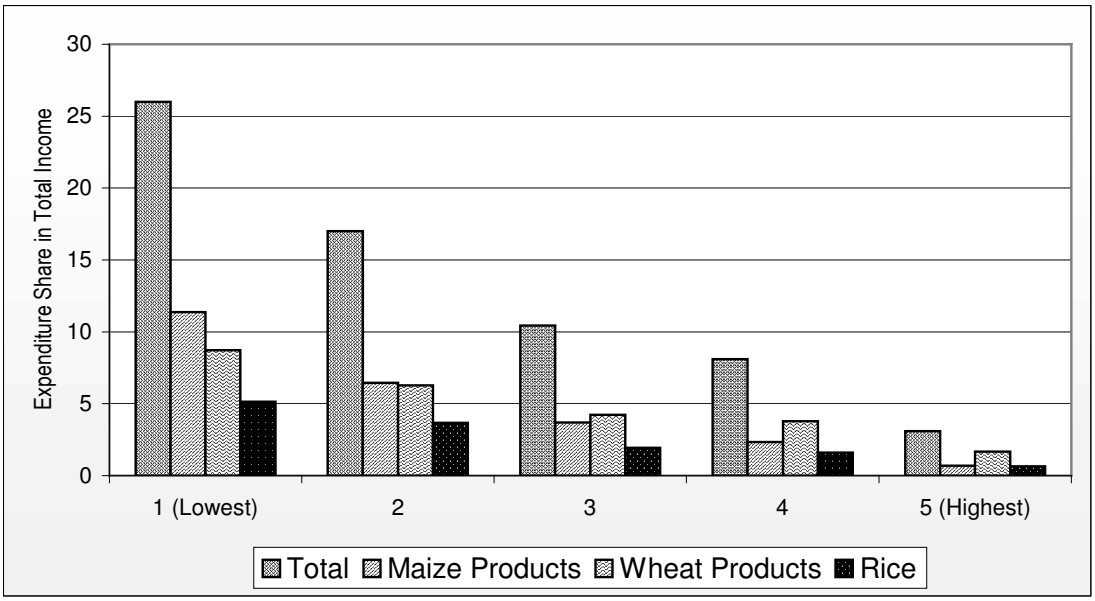
Expenditure Shares in Total Income

In some countries, the dominance of a particular staple commodity in consumption means that rapid increases in its price (due to drought or other supply disturbance) can have far-reaching economic reverberations on real wages and even macroeconomic effects. Such commodities are called "wage goods" because their prices tend to indirectly affect wage rates throughout the economy. An example of this would be rice in Indonesia, which accounts for over 75 percent of total cereal consumption and over half of total calorie intake (FAO, 2004). Maize has been considered to be a wage good in Kenya, and if rural consumption patterns are accounted for, the primacy of maize in the overall Kenyan diet would presumably still be clear.

However, the importance of maize in urban consumption appears to be declining over time. Overall, the expenditure share of all maize products in total income per adult equivalent in Nairobi is 4 percent (Figure 3). Among the poorest 20 percent of urban consumers, the expenditure share of all maize products in total income is 11 percent. In their 1995 survey, Jayne and Argwings-Kodhek (1997) found that the poorest 20 percent of urban households in Nairobi spent 17 percent of their total income on maize meal. This means that even among the relatively poor consumers of Nairobi, the importance of maize expenditures as a fraction of overall income has declined somewhat. Among the highest income quintile,

maize expenditures constitute a negligible 0.7 percent of total income, which is exactly consistent with the findings of the earlier 1995 study.

Figure 3. Expenditure Shares in Per Adult Equivalent Income



Source: Tegemeo Urban Household Consumer Survey, 2003.

We are not in a position to determine whether the general decline in maize consumption reflects a long-term secular decline or is a short-term result of temporary shifts in maize-wheat price ratios. However, based on secondary sources indicating a general rise in wheat and rice consumption in the east Africa region, it is quite possible that urban staple food consumption patterns are indeed becoming more diversified.

Disaggregating the Forms of Maize Consumption

There are three main types of products in which maize is consumed in urban Kenya. There are two main types of maize meal products: relatively expensive packaged sifted meal (with varying levels of refinement), and a less expensive and less refined "posho" maize meal (also with varying levels of refinement). Packaged sifted meal is produced by larger commercial mills and sold in retail outlets, while posho meal is typically obtained when consumers buy maize grain and take it to a small local hammer mill for grinding into meal. Green maize (roasted or boiled on the cob) is also popular. Whole or cracked maize grain is also prepared in some dishes.

In 2003, 92 percent of the households had bought maize meal. Out of these, 80 and 12 percent had bought sifted and posho meals, respectively. The number of households

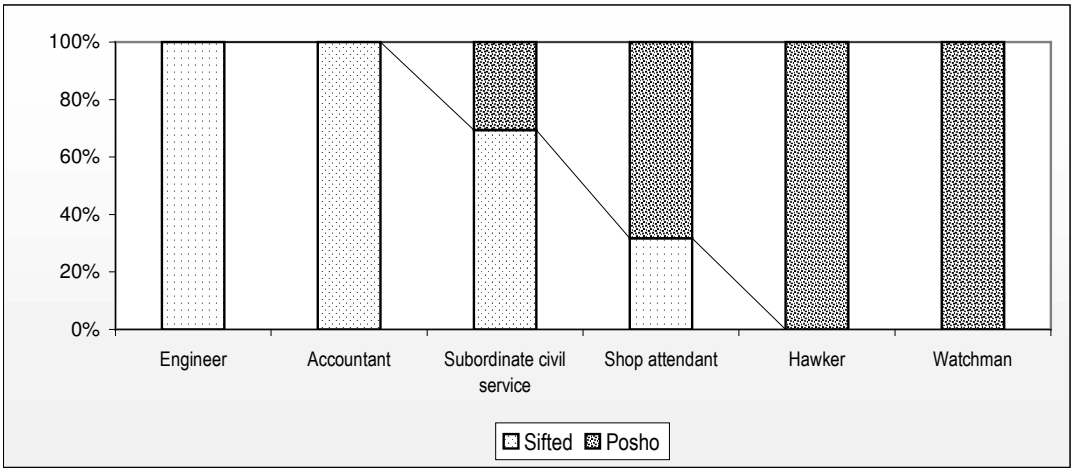
purchasing *both* sifted and whole flour stood at 8 percent, which is double the percentage in the 1995 survey.

Sifted maize meal is the most common form of maize consumption in urban Kenya. As shown in Table 5, over the entire sample, sifted maize flour accounts for Ksh 91 of the Ksh 126 expenditure per adult per month on maize products (72 percent of expenditures), and 83 percent of the total quantity of maize meal consumed. Posho meal accounts for only Ksh 19 per adult per month, which amounts to 17 percent of consumption both in kgs and expenditure of total maize meal expenditure. Green/whole maize accounts for Ksh 17 per adult per month.

These results indicate a significant shift in maize meal consumption patterns since the 1995 survey by Jayne and Argwings-Kodhek (1997). In their analysis, posho meal constituted 46 percent of total maize meal consumption in Nairobi. The finding that posho meal consumption has declined from 46 to 17 percent of maize meal consumption is consistent with rapid appraisals of posho millers and other participants in Kenya's maize marketing system conducted in late September 2004.

The form of maize consumption varies substantially by income. Among households in the poorest income group, posho meal accounts for 2.03 kgs of the total 4.80 kgs consumed per adult per month (42 percent). This indicates that posho meal, because it is relatively inexpensive compared to sifted flour, plays an important role in poor people's diets in urban areas. Households headed by less professional individuals are more likely to consume posho meal (Figure 4).

Figure 4: Household Heads Economic Activities and Maize Meal Consumption



Source: Tegemeo Urban Household Consumer Survey, 2003.

To understand the importance of the informal markets and small-scale posho millers in reducing the costs of acquiring maize meal products for the poor, we ran some simple simulations to estimate the additional costs that consumers would pay if they had to exclusively purchase sifted meal. This would simulate the conditions that would exist if maize grain and posho millers were not available for consumers to purchase maize and mill it into posho meal. To estimate this, we multiply the kgs consumed of posho meal by the survey median price difference between sifted and posho maize meal for the various income groups shown in Table 5. We find that if household consuming posho or both posho and sifted meal were to shift their maize consumption to sifted maize meal (holding other factors constant), on average they would be forced to pay an additional Ksh 5 per adult equivalent per month (Figure 5).

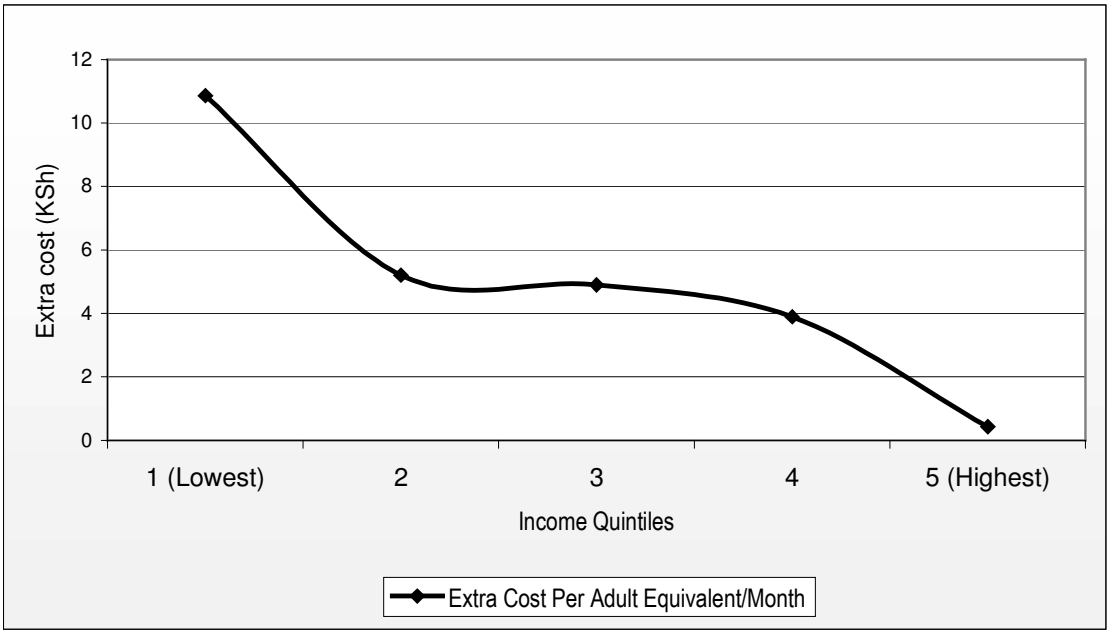
Table 5. Consumption and Expenditures of Main Carbohydrate Products (kgs per adult equivalent per month), by Household Income Quintile

Commodity		Median monthly income Ksh per adult equiv.	Mean consumption Kgs per adult equiv. per month	Mean expenditure Ksh per adult equiv. per month
Maize Sifted	1	1,127	2.77	70.51
	2	2,112	4.00	100.01
	3	3,548	4.03	101.80
	4	5,563	3.64	92.17
	5	15,337	3.47	89.21
	Total	3,548	3.58	90.74
Posho	1	1,127	2.03	39.90
	2	2,112	1.06	21.34
	3	3,548	0.87	16.78
	4	5,563	0.72	14.10
	5	15,337	0.14	3.02
	Total	3,548	0.96	19.04
Maize Meal (Sifted+ Posho)	1	1,127	4.80	110.42
	2	2,112	5.06	121.35
	3	3,548	4.89	118.58
	4	5,563	4.36	106.27
	5	15,337	3.61	92.23
	Total	3,548	4.54	109.78
Total Maize Products (Meal+ Grain+ Green)	1	1,127	5.90	128.21
	2	2,112	5.61	136.30
	3	3,548	5.74	131.29
	4	5,563	4.32	130.78
	5	15,337	5.47	104.79
	Total	3,548	5.67	126.30

Source: 2004 Tegemeo/MSU urban survey.

Households in the lower income quintiles would be the most affected, with the poorest 20 percent of Nairobi households paying Ksh 11 per adult equivalent per month, while the wealthiest 20 percent would pay 43 cents per adult equivalent. However, even among poor consumers, this is a very small amount, accounting for roughly 1% of household income among the poor. The importance of posho meal in maize consumption and its role in providing a cheaper alternative to sifted meal appears to have declined since the 1995 survey. This is because of two changes between 1995 and 2003: (1) the price difference between sifted meal and posho meal has declined, perhaps resulting from greater competition in the milling sector (there has been rapid expansion in maize milling investment in the past 10-12 years); and (2) a reduction in the amount of posho meal consumed by the poor in 2003.

Figure 5. Extra Costs If Households Consuming Posho Meal were to Shift to Sifted Meal



Source: 2003 Tegemeo Urban survey results.

Over the same period (1995 to 2003), maize meal consumption per adult equivalent dropped from 6.9 to 5.8kgs per month. The expenditure and consumption per adult equivalent varies inversely with household income per adult equivalent. The highly refined meal (Hostess brand) seems to be a preserve of wealthier households. Roughly 57 percent of households consuming this brand were within the wealthiest 20 percent income group.

Box 1: A Typical Posho Consuming Household in Nairobi

Esther Waithera is divorced. She is 31 years old and lives with her five children in Maili Saba slums. Three of her children are in primary school while the other two are yet to attain school-going age. Even though Esther is a form four leaver, she has not managed to secure a well paying job, thus turning to hawking as a source of livelihood for her family. She is making Ksh. 2,400 on average monthly. Her family live in a single room iron-sheet roofed and walled rented house with earth floor. Her family neither has a television set, a transistor radio nor a mobile phone.

During the month prior to the interview, Waithera had spent Ksh 1,000 on family food; Ksh 200 on food outside the household; Ksh 300 on house rent; and Ksh 100 on transport (fare). On water and fuel, she had spent Ksh 240 and Ksh 256 respectively. Over the year preceding the interview, she had spent Ksh 200 on medical bills. Since her children are not yet in the secondary school, which is relatively expensive, and given that primary education is now for free, she had only spent Ksh 500 on school fees.

Maize is the main Waithera's family source of carbohydrates. Over the last one month she had purchased ten *gorogoros* (2kg cooking fat tin containing approximately 2.25kg of maize grain) of maize grain from the posho mill (hammer miller) at KSh 35 per *gorogoro*, which was subsequently milled into posho. Waithera prefers posho meal because it is because it is cheap compared to sifted maize meal. She had also bought two *gorogoros* of maize grain for *githeri* (a mixture of maize and beans meal) and 20 pieces of green maize at Ksh 4 per piece from the local market. Waithera's household had also bought 4 kilos of rice at Ksh 30 per kg and 4 loaves of bread at Ksh 20 from the local *duka* (shop).

Waithera concurs that posho meal is cheaper compared to sifted meal but quickly adds that it is not convenient to obtain considering that one has to procure the grain and take to the *posho* mill. It takes her approximately 15 minutes to buy maize grain, about 5 minutes waiting time while in the queue at the posho miller and about 15 minutes to walk home with posho meal. Besides, during the months of April, May and June maize grain is scarcely available in the market forcing prices to shoot.

She occasionally receives farm produce from her relatives living in the countryside. For example, over the year preceding this survey, Waithera household had received 2 *gorogoros* of irish potatoes; 10 cabbages; half *gorogoro* of green peas and 3 litres of milk.

Reasons for the Recent Shift toward Sifted Maize Meal

These results from the foregoing analysis indicate a significant shift in maize meal consumption patterns since the 1995 survey. Respondents were asked the reasons behind their current maize meal consumption patterns. Thirty-seven (37) percent of the households compared to 58 percent in 1995 consumed sifted maize meal because it is convenient to procure and cook (Table 6). While sifted maize meal can be obtained from retail outlets easily, with posho meal (69% of the posho consuming households) one has to procure the grain first, then take it to hammer miller for milling. Most of the posho-consuming households (86%) could at least access a hammer miller within 15 minutes of walk. From the households consuming sifted meal solely, about 35 percent could not access posho mills within 15 minutes walk.

Table 6. Primary Reasons for Consuming Alternative Forms of Maize Meal, 2003

Reasons	Sifted Meal					Posho Meal				
	Income Groups					Income Groups				
	1 & 2	3	4 & 5	Total (2003)	Total (1995)	1 & 2	3	4 & 5	Total (2003)	Total (1995)
Relatively inexpensive	11	13	11	12	2	61	47	44	56	67
Convenient to procure and cook	39	32	39	37	58	6			4	4
More nutritious	3	1	3	2	1	3			2	13
More hygienic	10	6	7	8	8					1
Tastes better	19	13	21	18	20		11	10	3	6
Fill stomach better		2	2	1		18	43	46	27	
Habit	12	23	15	16	11	10			7	
Other	6	9	4	6		2			2	9

Source: 1995 and 2003 Tegemeo Institute/Michigan State University Urban Household Surveys.
Note: percentages in the columns add up vertically to 100

Taste (18%) and sheer habit (16%) are also other important considerations behind the consumption of sifted meal. Compared to 1995, 12 percent of the households are finding sifted meal less expensive. Primary reasons behind the consumption of sifted meal do not vary with income.

Less households, 56 percent, compared to 67 percent in 1995 are considering posho meal reasonably priced compared to sifted meal. Preference of posho meal on basis of price varies inversely with income with 61 and 44 percent of the poorest and wealthiest 40 percent consumption of posho meal based on affordability.

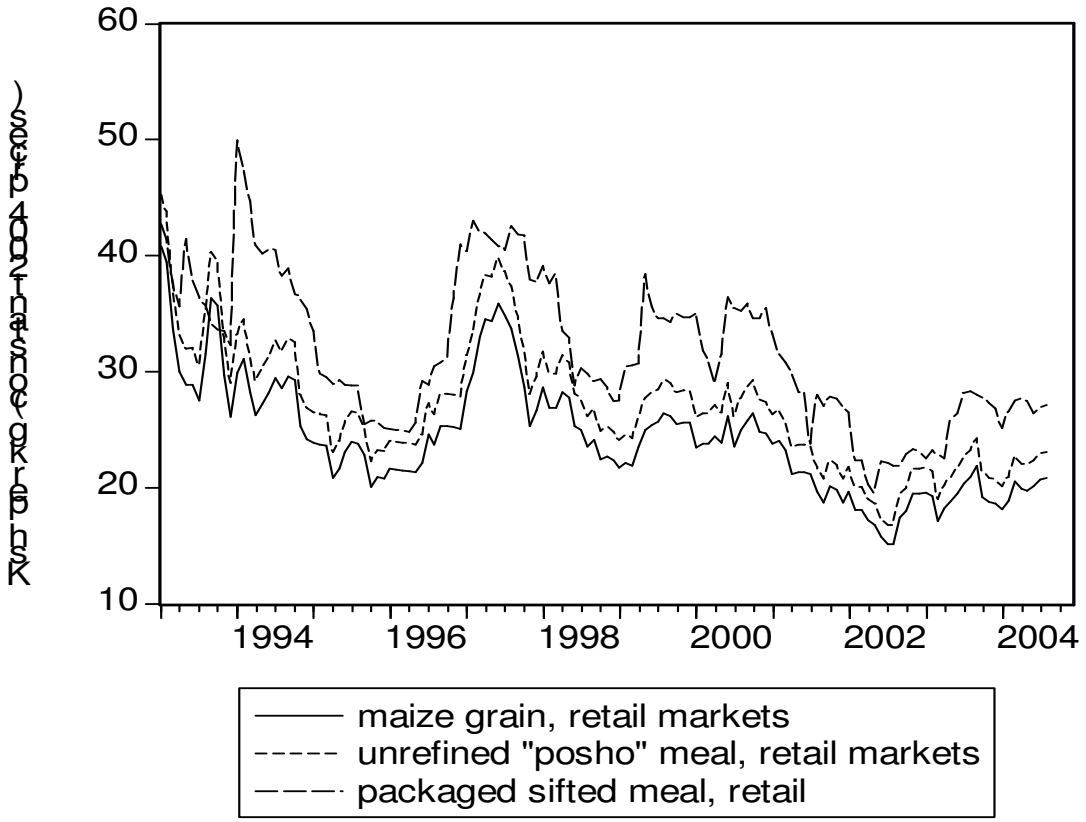
The profound ability of posho meal to "fill the stomach" for a longer time was the primary reason behind 27 percent of the households consuming posho meal. This attribute (*filling stomach better*) appears to vary directly with income, with more households (46%) in the 40 percent wealthiest income group preferring posho meal on that basis.

Considerable cost-competition by large millers has lowered sifted meal prices motivating preferences for sifted meal over posho meal. Prior to market deregulation, the large millers were oligopolistic in nature due to due to regulatory barriers. Since then, many new entrants have come aboard and competition stiffened. Interviews with millers revealed that to compete effectively, large millers had to reduce the grain-to-meal extraction rate. Also bulk grain storage enables millers to smooth their annual grain supply to guard against meal price fluctuations. They have also adopted other strategies like bulk packaging (90-kg) of

sifted meal which can be further *broken* on demand to small quantities as small as a quarter of a kg by the retailers.

At the time of the 2003 survey (November/December), the price of sifted in real terms was relatively low, and the price difference between sifted and posho was lower than in most years between 1993 and 2004 (Figure 6). When the price difference is narrow between sifted and posho meal, a shift in consumption toward sifted meal is to be expected, and we might also expect a shift back from sifted to posho in years when the price discounts for posho become relatively large again, if consumers (especially the poor ones) are conscious to price variations.

Figure 6. Inflation-adjusted Prices of Retail Maize Grain, Posho Meal, and Sifted Meal, Nairobi Markets, 1993-2004.



Source: CBS for CPI and sifted maize meal prices; Ministry of Agriculture for retail maize grain prices; authors' derivation for posho meal as described in data section.

Posho millers are also operating on an uneven playing ground with the large millers. While the large millers can procure grain cheaply and in bulk (thus enjoying economies of scale) either directly from farmers or the NCPB, the posho millers are relegated to grain

procured through the informal market channels that is relatively expensive. Furthermore, the duty free maize being imported currently is likely to disproportionately benefit the large millers.

Interviews with the posho millers indicated that the initial cost of starting the business, the increasing cost of diesel and electricity, and over-investment as some of the major reasons bedeviling the posho milling industry. Fuel and electricity costs account for about 50 percent of the posho mill operating costs. Due to a lack of alternative standby power arrangements, the posho mill industry has also been bedeviled by frequent power failures. Cost of licenses and rent are the next most important costs to posho millers.

Most of the posho millers are operating at 10 percent of their installed capacity, doing between one and two 90-kg bag in a day on average. This means the milled volume in a day is lower than what can be done in one hour. Inter-posho miller competition is based on milling charges and ability to source relatively cheap maize grain. Posho mill owners are also employing persons to aggressively for their business. If one is able to stock maize grain, then he/she stand a chance of milling more compared to the one who relies on customers coming with their own maize grain. Thus, for competitiveness, posho millers struggle to get and stock cheap maize grain. Locating a mill near a grain market is another business strategy.

Consumers' Use of Alternative Marketing Channels for Primary Staple Products

Nairobi consumers use a range of alternative marketing channels for procuring their main staple food products. These include duka shops (small retail stores), large national supermarket chain stores, smaller supermarkets, open markets, kiosks (stalls), and posho millers. Table 7 presents the importance of various retail channels by which urban consumers procure their primary staple products. The table also shows the respective values of primary staples (maize products, rice, wheat products and cooking bananas) purchased from each retail channel. Staples worth Ksh 473 million are sold through *duka*/shop in a month representing 50 percent of the market share. Large supermarkets follow handling 17 percent of the market share valued at Ksh 160millions in a month. Other important channels include small supermarkets (12%), markets (10%) and kiosks (9%).

The importance of these retail channels varies substantially by income. The majority of the households (64%) in the poorest income quintile prefer duka/shops, spending Ksh105 million in a month on this channel (Table 7). Open markets are the next most important means by which the poorest consumers obtain staple products, accounting for 14% of their

expenditures. Among the 2nd poorest income group, the most important retail outlets are dukas/shops, roadside kiosks, small supermarkets, and markets. Only among the top income quintile did national supermarkets account for more than 20% of total expenditures on the main staple food products. Among this relatively wealthy group, *duka*/shops accounted for 38% of expenditures on the top four staples, while the national supermarkets accounted for 37%.

Table 7. Consumers' Use (Ksh Millions) and Market Share (%) of Alternative Retail Channels for Primary Staple Products[2], by Income Group, 2003

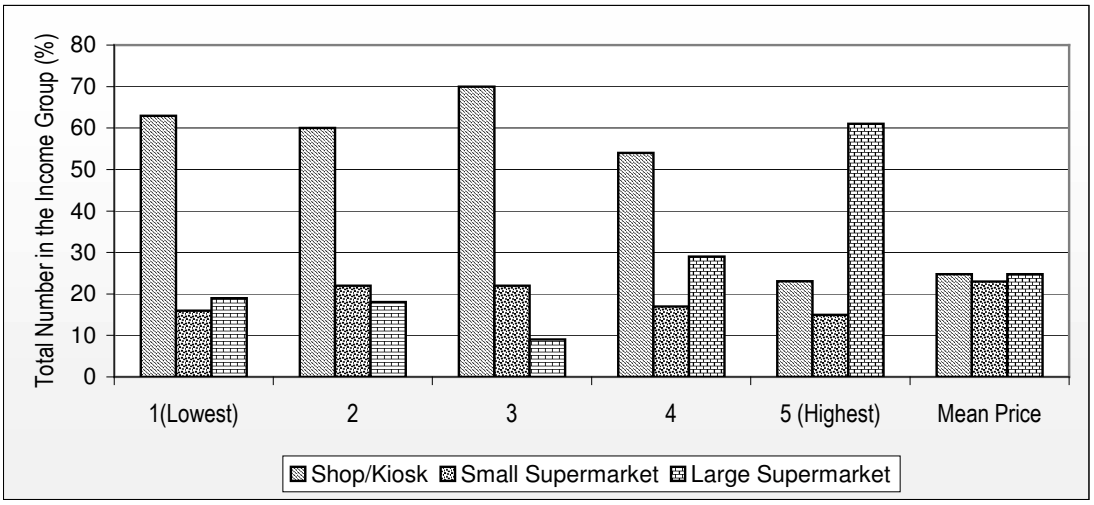
	Income Quintiles										Total	
	1(Lowest)		2		3		4		5 (Highest)			
Retail Channel	Ksh	%	Ksh	%	Ksh	%	Ksh	%	Ksh	%	Ksh	%
Duka / shop	105	64	81	49	94	57	105	47	88	38	473	50
Large supermarket	7	4	11	7	17	10	40	18	85	37	160	17
Small supermarket	14	8	22	13	28	17	20	9	26	11	111	12
Market	23	14	17	10	15	9	30	13	10	4	94	10
Kiosk / kibanda	10	6	29	18	7	4	24	11	18	8	88	9
Posho mill	6	4	4	2	3	2	2	1	0	0	16	2
Other[3]	1	1	2	1	1	1	0	0	4	2	8	1
Total	**165**	**100**	**165**	**100**	**166**	**100**	**222**	**100**	**231**	**100**	**950**	**100**

Source: 1995 and 2003 Tegemeo Institute/Michigan State University Urban Household Surveys.

Considering the different retail channels specifically for sifted maize meal, we find that about 60 percent of the 20 percent poorest and the wealthiest obtain their supplies from duka/kiosk and large supermarkets, respectively, even though there doesn't seem to be a marked difference in the retail price (Figure 7). Small supermarkets are offering a slightly lower price but that not withstanding; only about 18 percent are using them on average. Majority of the households (70 percent) consuming the extremely refined brand (Hostess) procure it from large supermarkets while 15 percent buy from small supermarkets.

[2] Maize and wheat products, rice and cooking bananas
[3] Hawker, manufacturer, factory, green grocer, neighbor, bakery, place of work and colleagues

Figure 7. Alternative Retail Channels for Sifted Maize Meal, 2003



Source: 2003 Tegemeo Institute/Michigan State University Urban Household Surveys.

CONCLUSIONS AND POLICY IMPLICATIONS

This study has identified the factors driving changes in the amount and form of urban staple carbohydrates consumed. Wheat products, maize products, rice, and cooking bananas were the main staple carbohydrate products consumed by Nairobi consumers. The results indicate that the volumes of staple carbohydrate consumption have remained roughly constant between 1995 and 2003. However, among the relatively wealthy group, consumption has increased while among the poorest groups, consumption has declined. On average, there has been a shift in consumer expenditures from maize to wheat products. Wheat now appears to be the dominant staple in terms of expenditure, accounting for 43.5 percent of total expenditures of the main staple carbohydrate products, while maize products account for 32.4 percent in 2003. Consumption of wheat products has particularly increased among higher income groups. However, among the poorest 20 percent of Nairobi consumers, maize meal remains the dominant staple, although even among this group, wheat consumption has risen. The expenditure shares of rice and cooking bananas are roughly 14 percent and 4 percent, respectively.

In some countries, the dominance of a particular staple commodity in consumption means that rapid increases in its price (due to drought or other supply disturbance) can have far-reaching economic reverberations on real wages and even macroeconomic effects. Such commodities are called “wage goods” because their prices tend to indirectly affect wage rates throughout the economy. An example of this would be rice in Indonesia, which accounts for

over 75 percent of total cereal consumption and over half of total calorie intake (FAO, 2004). Maize has been considered to be a wage good in Kenya, and if rural consumption patterns are accounted for, the primacy of maize in the overall Kenyan diet would presumably still be clear. However, in urban areas, staple food expenditures appear to have become considerably diversified. In some respects, this is a positive trend as it reduces the strategic political importance of a single commodity and the likelihood of civil disruption when the price of that commodity rises.

We are not in a position to determine whether the general decline in maize consumption reflects a long-term secular decline or is a short-term result of temporary shifts in maize-wheat price ratios. However, based on secondary sources indicating a general rise in wheat and rice consumption in the east Africa region, it is quite possible that urban staple food consumption patterns are indeed becoming more diversified.

These results also indicate a significant shift in maize meal consumption patterns. Even though posho meal consumption has declined from 46 to 17 percent of maize meal consumption on average, it continues to be an important commodity among the poor. The driving force behind the consumption of posho appears to have little to do with its nutritional supremacy. Primarily, low-income earners consume posho meal because it is relatively inexpensive compared to sifted maize meal. However, because the price of posho meal (price of grain plus milling fee) relative to the price of sifted meal has narrowed between 1995 and 2003, this may account for why consumption of posho has declined somewhat over this period. Part of the reason for the narrowing of the relative costs of posho meal vs. sifted meal has been because the large millers have reduced the degree of refinement of their products in response to great competition from the posho millers since the market liberalization process of the mid-1990s. The development of informal maize markets in urban areas induced rapid investment of small-scale mills in urban areas, taking away market share from the large millers. The large millers' attempts to cut costs by reducing the level of refinement of sifted maize meal products has put downward pressure on maize meal prices, to the benefit of poor consumers. This response has narrowed the price difference between sifted and posho meal, and it appears that this is a major factor accounting for the loss of posho millers' market share in recent years after having enjoyed strong demand for their products in the mid- to late-1990s, especially among poor consumers.

These findings hold some key policy implication imperative to assisting low-income consumers access to staple carbohydrates. Wheat is emerging as an important expenditure item among the urban households. This is a clear signal to the policy makers that wheat

should not be left out when formulating food security policies. The country domestic production is 67,000 metric tones and imports 570,000 metric tones annually (republic of Kenya 2004). The domestically produced wheat costs US $224 per ton. Duty on imported wheat and wheat flour stands at 35 percent and 60 percent respectively. The imposition of duties on wheat imports is forcing consumers to take expensive wheat products. However, import duty is bound to diminish in the long run because Kenya is a member of the Common Market for Eastern and Southern Africa (COMEAS) and the World Trade Organization (WTO) and has trade agreements with the European Union under the African Caribbean Pacific (ACP)-European Union (EU) Cotonou Agreement. These agreements require lowering of tariffs.

This should also send a signal to wheat farmers that potential market exist for increased production and enhanced productivity. Thus, measures to aid farmers improve on productivity to lower wheat prices include encouraging wheat farmers to grow higher yielding varieties and application of improved agronomic practices; improved infrastructure development (roads, railway and storage); farm inputs supply (fertilizer and agro-chemicals); fuel; and reducing local authorities fees and direct and indirect taxes (estimated at between US$23-35 per ton) farmers pay in the course of meeting their production costs.

The findings indicate that retail channels use for staple carbohydrates vary substantially by income. Shops (*dukas*) are popular with the poorest income group. Mostly, large supermarkets are the preserve of well-off urban households, and even for them, *dukas* were the primary source for their staple carbohydrate products. It is possible that this is changing rapidly. Regardless, policy measures aimed at reducing the costs incurred by dukas in their operations and assisting these shops to continue serving the poor sections of the urban population efficiently should be explored, given their primary importance for urban consumers, and especially the poor.

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