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Urban Maize Meal Consumption Patterns

Strategies for Improving Food Access for Vulnerable Urban Households in Kenya

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Foreword

Policymakers generally assume that people's tastes and preferences are fixed or change very slowly. African policymakers have often based agriculture price and subsidy policies on this assumption, controlling markets by keeping food prices low while supporting agriculture with selected subsidies. Food security is the implicit objective in these policies.

International donors and analysts, on the other hand, generally accept the case that structural adjustment and food market reform reduce subsidies and open markets to competitive forces. This often results in higher food prices. The underlying philosophy is that structural adjustment and market reform will lead to more efficient markets, increased productivity, employment, and incomes, and higher food prices will not be a problem in the long run; in fact, they may stimulate agriculture production.

In 1987, the U.S. Congress passed the Development Fund for Africa (DFA) legislation, which put special emphasis on African food security. In spite of the DFA, however, spending on emergency food assistance for Africa has increased. As USAID Administrator J. Brian Atwood stated, "The United States is spending more each year to dress the wounds of disaster and civil conflict while spending less on the development programs that might prevent them."[1] One of the tasks of the Office of Sustainable Development is to analyze the effects of policy change on food security.

This report examines maize consumption patterns in response to policy changes in Kenya and the implications for urban food security. It is based on empirical evidence from a household survey. The researchers' five conclusions challenge conventional assumptions about fixed consumer tastes and preferences in relation to agriculture policy.

This report is one of a series of studies on food security being conducted by the Department of Agricultural Economics, Michigan State University through the Food Security II Project of the USAID Global Bureau. Funding was provided by the Africa Bureau, Office of Sustainable Development, Productive Sector Growth and Environment Division (AFR/SD/PSGE).

Curt Reintsma
Division Chief
USAID/AFR/SD/PSGE

[1] Testimony of J. Brian Atwood before the U.S. Senate Foreign Relations Committee, July, 1994.

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Executive Summary

This study reviews and analyzes urban maize meal consumption patterns and examines strategies for improving food access for vulnerable urban households in Kenya. It highlights the age-old, critical problem that African governments face, where on one hand, they attempt to keep food prices at tolerable levels for poor consumers, while on the other hand, they wish to see production incentives stepped up in order to stimulate domestic production and have subsidies eradicated.

This study generates five major conclusions using a logit modelling technique that analyzes data from an October 1993 survey of a stratified, random sample of 350 households in Nairobi. It concludes that:

- Consumer preferences can be largely policy-driven;
- Consumer subsidies on refined maize meal in Kenya have not necessarily promoted food security because they (and associated controls on maize marketing), have entrenched a relatively high-cost marketing system and impeded the development of lower-cost channels from developing;
- "Posho" meal consumption in Nairobi appears to be negatively related to household income, while sifted meal is positively related to income, thus subsidies on sifted meal were regressive and benefits were inversely related to household income;
- The time required to acquire posho meal is apparently an important factor influencing its consumption, thereby highlighting the importance of convenience and competing demands on household members' time; and
- Market reforms that allow consumer preferences to be better articulated through the food distribution system may facilitate:
  - improvements in access to food and the nutritional content of food consumed without need for subsidies;
  - productivity gains in the agricultural system through shifts in choice of technique; and
  - growth in employment and income distribution from shifts in volumes through alternative marketing channels and their associated technologies.

Glossary of Acronyms and Abbreviations

AFR	Bureau for Africa (USAID)
FS II	Food Security II
KMDP	Kenya Market Development Program
MSU	Michigan State University
PAM	Policy Analysis Matrix
SD/PSGE	Office of Sustainable Development / Productive Sector Growth and Environment Division (USAID/AFR)
USAID	U.S. Agency for International Development

Urban Maize Meal Consumption Patterns

Strategies for Improving Food Access for Vulnerable Urban Households in Kenya

1. Introduction

The case for structural adjustment and food market reform, while widely accepted by donors and international analysts, has not been fully convincing to many African policymakers. Even though numerous African governments have embarked on such reform programs, internal dissent can and often has overturned them and reimposed controls on food prices and trade.[1]

Throughout the reform processes, concerns have arisen regarding the social costs of food market reform, particularly the impact on low-income consumers. Subsidies on some staples have been so high that their elimination has entailed substantial price increases for consumers. A critical problem facing African governments has been how to keep food prices at tolerable levels for poor consumers at a time when production incentives must be increased and subsidies must be eliminated. The purpose of this paper is to determine how food consumption patterns might change in response to various relative price and convenience scenarios conceivable under market liberalization in Kenya, and to assess the implications of these findings for urban food security policy.

In much of Eastern and Southern Africa, there has been a longstanding perception that urban consumers strongly prefer the relatively expensive refined maize flour produced by large-scale industrial mills over less refined hammer-milled flour and are not responsive to relative price changes between them (Stewart 1977; Bagachwa 1992; Jayne and Rubey 1993; Guyton and Temba 1993). This view can be contrasted with the alternative hypothesis that maize meal consumption patterns are largely a manifestation of government policy over the decades. While consumption of the more costly sifted flour is partially determined by attributes of the product itself, its perceived popularity may have been exaggerated by decades of controls on maize marketing, which have restricted consumers' access to the less expensive, unrefined maize meal (posho) through informal trading and milling networks, and by large subsidies on sifted meal. The perception of strong preferences for sifted meal has been reinforced by substantial advertising by large-scale milling firms portraying refined maize meal as a sign of sophistication and modernity. An implication of the conventional wisdom is that market reforms that eliminated subsidies on refined maize meal would exacerbate food insecurity of low-income consumers without inducing a shift to cheaper maize products.

Ironically, while much research has been devoted to understand how producers and traders would respond to reform in the market for Kenya's main food staple, relatively little is known about the potential response by consumers. The empirical evidence presented in this paper is based on surveys of 344 households' maize consumption patterns in Nairobi during October 1993.[2] This report highlights five con-

[1] For examples in Tanzania, Zambia, and Kenya, see Amani and Kapunda (1990); Jones (1994); and Gordon and Spooner (1992).

[2] The October 1993 surveys were conducted when subsidies on sifted (refined) maize meal were in place. These subsidies and other market regulations favoring large-scale milling firms were subsequently eliminated in December 1993. The findings of this study therefore provide *ex ante* estimates of the behavioral responses of Nairobi consumers to the recently adopted marketing and pricing changes, and their implications for urban food security.

clusions with broader implications for food policy in Eastern and Southern Africa:

1. *Consumer preferences can be largely policy-driven.* Maize meal consumption patterns in Nairobi appear to largely reflect the influence of food policies that have affected the relative convenience and affordability of sifted flour in relation to posho flour. These results are in contrast to the conventional wisdom throughout much of Eastern and Southern Africa that urban consumers have an inherent and rigid preference for refined maize meal. More accurate *ex ante* knowledge of how consumption patterns might respond to policies that alter the attributes of particular products (such as convenience and relative prices) may raise policy makers' receptiveness to a liberalized marketing system. A corollary of this is that policy makers' may feel less compelled to reimpose controls at a later stage.

2. *Consumer subsidies on refined maize meal in Kenya have not necessarily promoted food security, because they (and associated controls on maize marketing) have entrenched a relatively high-cost marketing system and impeded the development of lower-cost channels from developing.* Regulations or inefficiencies at certain stages of the controlled marketing system may impose redundant costs that overwhelm the effects of direct government subsidies. Findings indicate that the subsidy on sifted flour during 1993 was approximately equal to the difference in milling margins between the large-scale roller milling firms and informal hammer mills.

3. *Posho meal consumption in Nairobi appears to be negatively related to household income, while sifted meal is positively related to income.* These findings indicate that the subsidy on sifted flour was captured primarily by high income consumers. These findings also suggest that posho meal is to some extent self-targeting—i.e., it would be the product of choice for many low-income households. These findings are consistent with recent findings elsewhere in Southern Africa (Rubey 1993; Diskin 1994; Jayne et al. 1994).

4. *The time required to process or acquire posho meal appears to be an important factor influencing its consumption, highlighting the importance of convenience and competing demands on household members' time.* Logit model results also indicate that a given Nairobi household's probability of consuming posho meal is positively related to proximity of the family's home to local hammer mills, and negatively associated with households where the woman of the household works in a full time job. The survey evidence suggests that posho consumption may be more strongly influenced by policies affecting the time costs of acquisition than policies affecting relative prices of sifted and posho meal.

5. *Market reforms that allow consumer preferences to be better articulated through the food distribution system may facilitate (a) improvements in access to food and the nutritional content of food consumed without need for subsidies, (b) productivity gains in the agricultural system through shifts in choice of technique, and (c) growth in employment and income distribution from shifts in volumes through alternative marketing channels and their associated technologies.*

2. Background

Several types of maize meal products are produced for human consumption in Kenya, but two are the most common: a highly refined sifted maize meal processed by large-scale urban roller milling firms (80 percent extraction rate), and an unrefined whole maize meal, lo-

cally known as posho, processed by small-scale hammer mills (96 to 99 percent extraction rate). Unit production costs for whole meal, excluding maize grain, are less than 28 percent those for the highly refined sifted maize meal (Mulinge 1992). In addition, whole meal is more nutritious than sifted meal.[3]

Sifted flour is actually a relatively new product. The roller mills that produce sifted flour were only established in Nairobi on any scale in 1955 (Stewart 1977). At that time, maize meal was produced almost exclusively by small hammer mills and hand pounding. However, within 25 years, urban maize meal consumption in Kenya was predominantly in the form of sifted flour. This substantial shift is, no doubt, explained by a combination of factors such as inherent taste and cooking attributes of sifted flour compared to whole flour, government policies affecting relative price and accessibility, and advertising. The relative importance of these factors has received little research attention, yet would have important implications for the development of strategies to promote vulnerable urban households' access to food. For example, if urban consumers have a strong taste preference for sifted flour, and are not responsive to price differences between various types of maize meals, then attempts to promote small-scale mills in urban areas would be unsuccessful in protecting consumers against sharp increases in the price of sifted flour. On the other hand, if low-income consumers would readily purchase whole meal if it were more accessible to them at some price discount relative to sifted flour, then market reform programs that entailed the elimination of subsidies on sifted flour distributed through the official marketing system may not adversely affect (and may even improve) household food security. The following sections examine these issues empirically.

[3] For example, whole meal has 18 percent more protein, 183 percent more calcium, 282 percent more iron, 114 percent more thiamin, 16 percent more riboflavin, and 80 percent more niacin, by weight, than sifted flour (West et al. 1987).

3. Method and Data

Analysis is based on data from a stratified random sample of 350 households in Nairobi in October 1993. The sample was derived from the Central Bureau of Statistics' Income and Expenditure sampling framework, which is designed to achieve representativeness with respect to population and average household income for each of Nairobi's 30 estate areas. Respondents were asked detailed questions about their maize procurement and consumption behavior over a normal week and month; more general information about consumption, production, income, and expenditure over the past marketing year (October 1992–September 1993); and whether there were any seasonal variations in the variables under analysis. Of the 350 households, 344 valid cases were obtained for tabular analysis, and 290 valid cases were obtained for logit analysis.

To quantify the *ceteris paribus* importance of factors likely to affect a Nairobi household's decision to consume posho meal, logit regression models were estimated using the survey data. Logit models are used to estimate a binary (yes or no) variable, and, in this case, indicate how the probability of consuming whole meal by a household is affected by particular attributes of that household. Maximum likelihood estimation was employed to carry out likelihood ratio tests on whether these attributes are statistically irrelevant in the determination of the probability of a given household consuming whole meal (see Kmenta 1986).

4. Results

Virtually all the households in the sample purchased maize meal. More than 41 percent received some maize grain from their rural homes and spent one to two hours on average to get the grain milled at a small-scale hammer mill. Less than 5 percent planted maize on urban plots. The average quantity of maize meal consumed

Figure 1. Maize Meal Consumption Patterns (Kgs per Month per Adult Equivalent [AE]) by Income Category

per adult equivalent (AE) was 1.68 kilograms per week (7.22 kgs per month). As per capita income increased, the total quantity of maize meal consumed decreased (Figure 1).

The average household expenditure on maize was Ksh 988.5 per month. This is more than 12 percent of the average household income. Expenditure on maize as a percentage of total income decreases from 16 percent for the poorest 20 percent of the households to 1.3 percent for the richest 20 percent.

Maize Meal Preference by Type and Household Income

Figure 1 also presents the variation in maize meal consumption patterns by type of meal and income. Two points stand out clearly. First, at all income quintiles there are already some households consuming whole maize meal. This is contrary to the common view that posho meal is avoided by urban consumers (Stewart 1977). More than 30 percent of the households in the sample indicated that they consumed whole meal. Over 50 percent of the maize meal consumed by households earning less than Ksh 4,000 per month was in the form of hammer milled posho meal. By contrast, only 23 percent of the maize meal consumed by households earning more than Ksh 12,000 was in the form of whole meal.

Second, the quantity of whole meal consumed is negatively related to household income while the quantity of sifted maize meal consumed increased with income. This indicates that whole maize meal has inferior good attributes—i.e., it may actually be the meal of choice for low-income households. The findings also indicate that blanket government subsidies that encouraged the production and con-

Table 1: Primary Reasons for Consuming Alternative Forms of Maize Meal

Type of meal	Percent of respondents consuming	— Primary Reason for Consuming a Given Type of Meal— Relatively inexpensive	Convenient to procure and cook	More nutritious	More hygienic	Tastes better	Easy for children to digest
		percentage of consumers					
Sifted	66	7.8	64.3	1.3	3.4	18.2	5.2
No. 1	2	42.9	28.6	14.3	0	14.3	0
"Posho"	32	59.0	4.8	33.3	0	2.9	0

sumption of the more expensive highly refined maize meal were not only untargeted but actually regressive in terms of income distribution. Of the sifted maize meal consumers (66 percent of the total sample), only 7.8 percent were from the poorest 20 percent of the population.

Policy Regulations and Maize Consumption Patterns

The survey results suggest that sectoral policies have had an important role in the formation of present urban maize consumption patterns in Nairobi. Price and convenience, both of which are affected by policy, emerged as the two most important factors determining consumer choice for a given type of maize meal (Table 1). More than 64 percent of those households purchasing sifted maize meal chose it because it was convenient to procure compared to posho meal. By contrast, only 18 percent of the households purchasing sifted flour did so primarily out of a taste preference.

About 60 percent of those who consumed whole meal chose it because it was cheaper. It should be noted that during the survey recall period (October 1992–September 1993), prices at which most hammer millers and consumers purchased maize grain through the informal market were generally higher than the subsidized price at which sifted flour manufacturers purchased grain from the government marketing board. Hence, it is probable that the proportion of households consuming posho meal would have been somewhat higher if the maize procurement price for large-scale and small-scale millers would have been equal.[4]

Movement controls, milling quotas, and other policy regulations that restricted households' and informal millers' access to grain have had the effect of inflating the time costs of procuring maize grain for cheap whole meal production. In over 85 percent of the households, it is the wife who is expected to procure food supplies for the household. Given that more than 80 percent of these women have full-time jobs (in addition to homemaking), the opportunity cost of time spent procuring a given food product becomes a crucial determinant of whether or not it is consumed. This is especially the case when the cost advantage of posho meal is eroded by subsidies on sifted flour. Thus, by restricting assess to cheaper whole meal, policy has apparently biased present urban maize consumption patterns towards the use of the more expensive and less nutritious sifted maize meal.

[4] Lewa (1994) estimates that, after the removal of the subsidy on sifted flour in December 1993 and the consequent increase in sifted flour prices relative to posho, the proportion of Nairobi consumers buying posho meal rose to about 75 percent in January 1994.

Respondents were also asked to specify the most important attributes guiding their choice of maize meal. Of all the households that considered convenience as their main consideration, more than 95 percent consumed sifted maize meal. About 75 percent of those desiring a cheaper product consumed whole meal.

Apart from price and convenience, 13 percent and 12 percent of the respondents considered taste and nutrition, respectively, as the most important attribute in choosing a maize meal product. For those respondents most concerned with taste, 90 percent chose sifted flour. This supports the widespread perception that sifted flour is more preferred than whole meal on the basis of taste (other attributes held constant), but refutes it in that only a small percentage of households make their consumption choice on this criterion. More than 89 percent of those particularly interested in a nutritious maize meal consumed whole meal. This indicates that many urban households are already aware of whole meal's superior nutritional quality. Survey results also refute the notion that many consumers avoid hammer milled meal because it is not hygienically produced. Of those households consuming sifted flour or Number 1, only 3 percent stated that cleanliness was a major consideration. This factor may nevertheless be a contributing reason for avoiding hammer-milled meal, and may require further attention in the formulation of strategies to enhance low-income consumers' access to food through the development of small-scale milling.

Potential Changes in Urban Maize Meal Consumer Preferences under Market Reform

Maize market reform is expected to reduce marketing costs of maize traded through unregulated channels (Argwings-Kodhek et al. 1993; Odhiambo and Wilcock 1990). At the same time, the removal of subsidies forces large-scale maize millers who have in the past benefited from subsidized NCPB maize grain to pay more for their supplies through the official channel. Indeed, immediately after the removal of controls and subsidies on December 28, 1993, the price of sifted maize meal rose by more than 53 percent. Yet urban consumers can still obtain whole posho meal at prices generally below the previously subsidized price of sifted maize meal. This is because the reforms increased urban households' access to maize grain, which then enabled them to take advantage of a lower-cost hammer milling technology relative to the higher-cost (albeit subsidized) roller-milling technology.

The demand for convenience may have a similar, if not greater impact on maize consumption patterns than the reduction in the price of whole meal relative to sifted meal (Table 2). Holding convenience constant and varying the price discount of whole meal from 12 percent to 22 percent, the proportion of households choosing to buy whole meal hardly changes. However, this proportion increases from 38 percent to 58 percent if price is held constant and the time required to procure whole meal is varied from two hours to zero. Half of those households in the lowest income quintile who were consuming sifted maize meal indicated they would switch to consuming whole meal if it were readily available at their regular shop at a 12 percent discount.[5] These results highlight the critical importance of lower time costs of maize meal procurement in strategies designed to promote household food security through shifts to lower cost maize products.

However, the dominance of convenience may not hold for all income groups. There is abundant empirical evidence that low-income consumers are quite price sensitive (Mellor 1973). In a reformed market where the price differential between sifted and posho meal is likely to increase, a greater proportion of low-income consumers might change to whole meal. This is supported by the Nairobi survey, which indicates a substantial change in purchasing

[5] Twelve percent is a conservative figure compared to the actual price discounts observed since the reforms of December 1993.

Table 2: Percentage of Households Preferring Whole Meal under Alternative Price and Convenience Scenarios

Price discount of of whole meal sifted to flour	— Time Needed to Procure Grain and Mill It into Whole Meal —		
	0 hours	1 hour	2 hours
— % discount —	— % of respondents stating a preference for whole meal —		
0	42	na	na
12	58	40	38
22	59	40	39

na: data not available for this scenario.

behavior among the lower-income households when posho is more readily available and at a price discount. For example, 74 percent of the households earning between Ksh 6,000 and 8,000 stated that they would buy whole meal if readily available at a 22 percent price discount.

5. Logit Model Results

A logit model was specified to quantify the *ceteris paribus* importance of factors likely to affect a Nairobi household's decision to consume posho meal. The general specification of the logit model is:

$$\log p(y=1)/p(y=0) = C + O\ B_i X_i$$

where $p(y=1)$ is the probability that variable y equals one, and $p(y=0)$ is the probability that y equals zero, C is a constant, X_i is the vector of explanatory variables and B_i are the associated i coefficients. Note that $p(y=1)/p(y=0)$ is the ratio of the odds of y=1 against y=0.

Y is specified to take on a value of 1 if the household consumed posho meal and 0 for sifted flour. This variable is regressed on a constant *(C)* and the following variables that are considered predetermined and representative of purchasing power, procurement convenience, and other structural factors affecting choice of meal (expected sign of coefficient in parentheses): household income *(INC / -)*; adult equivalents in consumption *(AE / +)*; a dummy variable, *REGION*, with value 1 if household originates from the western maize-surplus areas of Kenya and 0 otherwise (+); the number of grinding mills within 5 kilometers of the household premises *(MILLS / +)*; and *JOB*, a dummy variable with value 1 if the woman of the household works in a full-time job and 0 otherwise (-).

Results are presented in Table 3. The model correctly predicted 76.6 percent of the 188 households consuming sifted flour and 62.7 percent of the 102 households consuming posho flour. The value of the likelihood ratio index was .175. Likelihood ratio tests rejected the null hypothesis that X is irrelevant in the determination of $p(y=1)/p(y=0)$ at the .05 level for each variable except *JOB* and *MILLS*. All of the coefficients had the expected signs. The significantly negative coefficient on household income supports the earlier contention that whole meal is an inferior good—i.e., its consumption tends to fall as incomes rise. Results indicate that a Ksh 1,000 increase in monthly household income is associated with a 6 percent reduction in the probability that a given household will consume posho meal. Large family size was also significantly associated with the likelihood of consuming posho. An additional adult-equivalent in the household increased this probability by 6.3 percent. Households originating

Table 3. Logit Regression Results

Dependent variable is household consumption of posho meal during 1992/93 season (consumed posho=1; did not consume posho=0)

	Explanatory Variable						Accuracy in Predicting	
	C	INC	AE	REGION	MILLS	JOB	y = 0	y = 1
Coefficient	-2.08	-0.24	0.25	1.52	0.11	-0.48	140/188	65/102
(t-statistic)	(-4.36)**	(-3.43)**	(3.27)**	(5.42)**	(1.38)	(-1.79)*	(74.5%)	(63.7%)

** Significant at the .05 level
* Significant at the .10 level

from western surplus areas (primarily Luo, Luhya, and Kisii ethnic groups) were also more likely to consume posho meal than their eastern neighbors.

JOB and *MILLS* are included to capture womens' opportunity cost of time for procuring posho meal and the convenience of hammer mills' location to the home. While the coefficients of both variables were of the expected sign, neither were significant at the .05 level, and only *JOB* was significant at the .10 level. If the woman worked in a full-time job, the estimated probability that her household would consume posho meal decreased by 12 percent. These results provide weak support to the survey data in Table 2 suggesting that convenience is a critical dimension of the demand for posho flour.[6]

[6] These variables are clearly imperfect proxies for the convenience of procuring posho meal. *JOB* is relevant primarily if there is no one else in the family who might procure and mill maize. This is probably not the case for some proportion of the sample. Also, *MILLS* is only a proxy for the more relevant but unobserved variable indicating how much time a family member must spend getting to the mill and waiting for the grain to be processed.

6. Maize Meal Consumption Patterns in Historical Context

The survey findings suggest that existing maize meal consumption patterns are largely, but not exclusively, a function of differences in price and procurement convenience between the various types of meal. These factors are, in turn, a function of the policy environment. This section presents a reconstruction of the possible evolution of maize consumption patterns in urban Kenya (as well as much of Southern Africa). The model presented is in contrast to the conventional perception that taste preferences for sifted flour have been primarily responsible for the fundamental shift in urban maize meal consumption from posho to sifted flour in the course of three decades.

As mentioned earlier, commercial maize roller milling firms began operating in Nairobi in 1955. At this time, maize distribution into urban areas was tightly controlled by the colonial government. A monopoly Maize Board and associated controls on informal maize trade had existed for two decades. The primary motivations for the controls were to stabilize producer prices and, relatedly, to protect white settler producers from being undercut by cheaper African production.[7] But the controls on

[7] For a detailed account of the evolution of maize controls in Kenya, see Mosley (1975).

interdistrict maize movement also had the effect of restricting grain access to traders, millers, and consumers in deficit districts through informal channels. By restricting supplies, the controls also raised the price of the limited quantities of grain that were sold informally in these deficit areas. The main source of maize supplies in urban areas was therefore the state Maize Board, which sold maize only to registered buyers. Selling grain to a relatively small number of large-scale buyers had distinct advantages to the Government, because this reduced per unit transaction costs (compared to selling small amounts to numerous buyers) and, more importantly, facilitated the implementation and monitoring of price controls on maize meal. Therefore, the rise of a few large industrial maize processors to link downstream distribution activities into the official maize marketing system created a convenient and easily managed system of supplying the urban population with staple food at prices easily controlled by the state.

However, roller mill technology involves larger unit milling costs than hammer mill technology (Stewart 1977; Mulinge 1992; Bagachwa 1992; Rubey 1994). While movement controls on grain were in force during the period of initial investments in roller mill technology, there were no formal controls on the movement of maize meal. The large roller mills were therefore potentially vulnerable to cheaper posho meal transported into food deficit areas from maize surplus districts. Whether it was for this or other reasons, controls on interdistrict movement of maize meal were imposed sometime between 1953 and 1966.[8] With these controls to augment the existing ones on maize grain, the subsequent pattern of maize milling investment was substantially determined.

However, in addition to a policy environment favoring large-scale roller milling firms, the taste and cooking attributes of sifted flour that at least some percentage of the urban population found preferable over posho meal should not be underemphasized. The removal of the germ and pericarp makes refined meal look whiter, last longer, and taste sweeter than whole meal. The preference for refined meal over posho meal—price being equal—has also been confirmed by recent household surveys in Zimbabwe, Zambia, and South Africa (Jayne et al 1994).[9] However, what consumers preferred to buy under historical price conditions does not necessarily indicate what they would have bought if the market accurately reflected the cost of production difference between the two types of meal. For several decades, the ability of urban consumers to make this choice has, to varying extents in Kenya, Zimbabwe, South Africa, and Zambia, been impeded by policy.

Therefore, within a span of three decades, urban consumption of maize meal consumption switched almost entirely from whole posho meal to sifted roller-milled meal. It is not surprising that many policy makers' perceived this shift to reflect an inherent superiority of sifted meal. As demand patterns evolved with (*a*) the evolution of policy that favored the development of large-scale roller-mill technology, (*b*) the consequent suppression of decentralized system of informal grain movement and hammer milling, and (*c*) substantial advertising by large milling firms, the general public began to view urban con-

[8] I.e., between the writing of the Ibbotsen Report (1952), stating that controls on maize end with the ex mill sale of posho), and the Report of the Maize Commission of Inquiry (1966), by which time maize meal trade was controlled.

[9] Some analysts have also contended that households may be averse to posho meal because of its shorter shelf life (posho meal contains oil from the maize germ). According to the Nairobi respondents that consumed it, posho meal has an average shelf life of 3.7 weeks. For a family of three adult-equivalents in consumption, and a rate of maize meal consumption of 1.68 kgs per adult-equivalent per week as determined by the survey results, a 10 kg bag of posho would be consumed in two weeks. The shelf life problem is probably more relevant to potential commercial manufacturers of whole meal, who would have to be concerned about timely distribution to retail outlets after milling to avoid spoilage.

sumption of sifted flour as a phenomenon of urbanization, modernity, and technological progress, rather than at least a partial response to policy.

The hypothesis that roller milling firms were able to shape consumer preferences through advertising is supported by statements of large-scale millers themselves. Stewart (1977) quotes the general managers of two major sifted flour manufacturers: "The sifted maize meal was something my Company pioneered in this country, and it has created a market for itself" (p. 213) and "...we have considerable advertising and pains and personal contacts and what-not to pick up a good market" (p. 213).[10] These and related statements support Stewart's observation of "the inherent contradiction between taking consumers' preferences as the ultimate guide to production decisions and welfare, and spending money on determining these tastes" (p. 213).

This report therefore suggests that the historical evolution of sifted flour consumption in urban Kenya may be better accounted for by a model that endogenizes consumer preferences, rather than treats them as exogenous. The policy-driven aspects of this model are presented schematically in Figure 2.

The model can be used as a partial explanation for the slow and sporadic pace of maize market reform in Kenya over the past decade. If the conventional view of strong inherent preferences for sifted flour is to be accepted, the ability of informal hammer mills to produce whole meal for the same price as highly subsidized industrial meal would have appeared largely irrelevant because of the perception that urban consumers would not accept hammer-milled meal. This perception may have narrowed policy makers' view of the feasible set of food market reform options, especially those involving removal of subsidies on industrially produced sifted flour and the promotion of competitive small-scale maize trading and milling networks in urban areas.

[10] Stewart cites evidence from one inquiry indicating that advertising expenses account for as much as one-third of roller-mill production costs.

7. Policy Implications

Five main policy implications emerge from the analysis. First, *subsidies on refined maize meal may suppress the development of lower-cost marketing networks which might make available a wider range of goods, some of which might actually be preferred by low-income consumers whom the subsidies were designed to protect.* The existence of large subsidies on consumer staples through the official marketing channel does not necessarily mean that the removal of these subsidies would force consumers to pay higher prices for maize meal, if associated market reforms would improve consumers' access to less expensive close substitutes through alternative distribution channels. By broadening urban maize meal consumer choice, maize market reform may be a more cost-effective way of targeting the food security of low-income urban consumers. If whole meal is an inferior good, as this report's survey results indicate, any public intervention in the market targeted to posho millers either through subsidies, income support, or food aid would create less leakage than an untargeted subsidy on sifted flour.

Second, *fewer than 20 percent of urban consumers in Nairobi appear to have a strong taste preference for the more expensive sifted meal.* Urban maize meal consumption patterns are more strongly determined by procurement convenience and relative prices—largely a function of prevailing and historical government policy. Policy regulations that increased time costs for procuring whole meal and increased its relative price to sifted maize meal have apparently biased urban maize consumption patterns towards the latter. This has hurt low-income urban consumers who would have preferred to consume cheaper and more nutritious whole meal but were forced to consume

Figure 2. Interactions between Maize Sectoral Policies and Evolution of Maize Meal Consumption Patterns in Urban Kenya, 1955–1980

the relatively more expensive sifted maize meal.

Third, *an increase in the demand for hammer-milled posho meal would reduce the volume of imported maize required to meet domestic needs, although it would also reduce the volume of by-product available for stockfeed and oil.* This is because the extraction rate of whole meal is 24 percent higher than the sifted meal (Grade 1). If the 472,000 tons of maize grain typically processed into sifted flour in Kenya were to be milled into whole meal instead, this would save more than 92,600 tons (i.e 472,000 t * .99 – 472,000 t * .80), which is more than 34 percent of the national strategic maize reserve requirement. In a net import situation, this would amount to huge savings in foreign exchange earnings.

Fourth, *Kenyan small-scale mills have a higher labor-to-investment ratio and labor-to-output ratio than large-scale milling* (Mulinge 1992; Stewart 1977). Therefore, increased small-scale milling would be expected to enhance employment growth and income distribution because of the its low start-off capital costs.

Fifth, and most important for future research, is *the importance of ex ante analysis that informs decision makers regarding how preferences may change with policy, instead of implicitly taking preferences as given and formulating food policies around prevailing consumption patterns.* Existing consumption patterns may be largely policy-driven. When given a wider range of products differentiated by price, consumer choices may be more flexible than supposed by conventional wisdom.[11] Improved knowledge of consumer behavior can widen policy makers' perceptions of feasible options to protect vulnerable groups and increase receptivity to sustaining the recent policy changes in Kenya's maize system.

[11] There has already been a rapid increase in the number of registered small-scale mills in Nairobi between 1988 and 1993 under the Cereal Sector Reform Program (Mulinge 1992).

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