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ENABLING SMALL-SCALE MAIZE MARKETING AND PROCESSING TO ASSURE SUPPLIES OF LOW-COST STAPLES

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INTRODUCTION: The current food crisis in Southern Africa has led to an urgent concern about how to make food affordable to low income consumers in both rural and urban areas when crops fail and local prices surge. We suggest in this policy synthesis that the more fundamental question is how to make markets work to provide more food security options for the poor in both surplus and deficit years. Policies that facilitate regular availability of low-cost staple foods to poor consumers during good harvest years will also increase the ability of markets to contribute to food security objectives during crises. The poor are always at risk of food insecurity, and markets always have a major impact on their ability to meet their food needs. Even during surplus years, rural net buyers (and urban consumers) depend on markets for some portion of their food needs. Likewise, even during periods of national food shortfalls, most rural and urban poor rely more on markets than on emergency distributions to secure their residual food needs.

Well designed targeted food assistance programs can be crucial to maintaining food security during crises. Yet the cost and logistical difficulties of such programs can become prohibitive if markets do not function effectively to move food to consumers with effective demand. Thus, a comprehensive food security strategy in southern Africa requires that maize grain and meal, and other food staples such as cassava or rice, are

accessible at affordable prices to consumers through the market.

OBJECTIVES: The purpose of this policy synthesis is to examine the role of low-cost food staples, such as maize grain and mugaiwa,¹ and the small-scale trading and milling sectors that provide them, in ensuring poor consumers' access to affordable food.² We focus on this marketing season's maize deficit in Zambia, and on current and past experience in Mozambique. We then identify opportunities for governments and the private sector to increase access to affordable food among rural and urban consumers on a regular basis, with especially high payoffs during crises.

BACKGROUND: The high proportion of households in 2002/03 in both countries that have been unable to cover their maize deficit through purchases confirms the serious nature of the current food crisis in southern

¹ Mugaiwa, also known as "straight-run" maize meal, is produced by milling maize grain through a hammer mill, using a sieve setting that produces no by-product.

² Though maize is the most important staple in both rural and urban diets in most of Mozambique, rice (most of it imported) is much more important there, especially in urban diets, than it is in Zambia. Cassava is also very important in rural diets. However, for ease of exposition across countries, we focus this paper on maize products.



parts of Zambia and Mozambique. In Eastern, Southern, and Western provinces of Zambia, an estimated 210,000 households required food relief. Yet an estimated 140,000 rural maize deficit households had the purchasing power to buy their maize requirements. In Mozambique, 650,000 primarily rural people require assistance in the southern provinces of Maputo, Gaza, and Inhambane, meaning that about 2.5m in these same provinces have been able to meet their needs through some combination of own production and market purchases (total rural population in these provinces is about 3.2m). To reduce the burden of drought relief programs, markets need to function well so that households with some purchasing power can purchase as much grain as possible with their income.

We suggest that the informal marketing and small-scale maize milling sectors play important roles in this regard, for four reasons:

1. Maize grain – the cheapest staple aside from manioc – is available to rural and urban consumers predominantly through informal markets. Purchasing grain, then either hand-pounding it or milling it in a local hammer mill, allows the poorest households with

the lowest opportunity cost of time to maximize the amount of food they can obtain with their limited budgets.

2. Ready-made mugaiwa is available almost exclusively in informal markets, and is generally much cheaper than refined meals.

3. Mugaiwa has a higher nutritional content than refined meals.

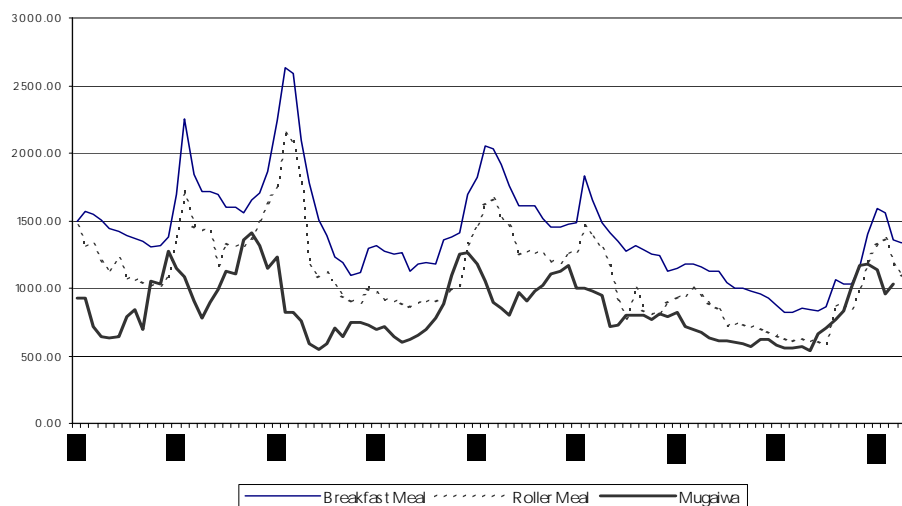
4. The hammer milling sector in both countries has substantial milling capacity, which is probably underutilized during significant portions of each year.

In the next sections we touch on these issues with evidence from Zambia and Mozambique, and discuss key policy challenges to ensure regular availability of these products to low income consumers.

FINDINGS: Maize grain and the mugaiwa that is produced from it are substantially cheaper than refined meals, but government policy can undermine the ability of informal markets to make these low cost staples regularly available in markets.

Figures 1 and 2 show retail prices of white maize products in Lusaka and Maputo, respectively, from 1994 to the present. An important pattern immediately emerges in the Zambia data. Due to lower marketing

Figure 1. Breakfast, Roller Meal and Mugaiwa Prices in Lusaka (real Kwacha/kg, May 2002=100)



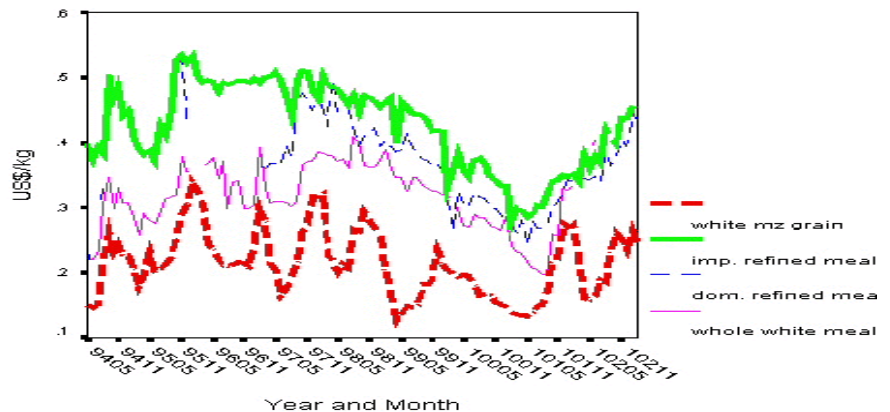


and processing costs, mugaiwa prices³ should normally be well below prices of breakfast and roller meal. This expected pattern prevails most of each marketing year, during harvest and post-harvest seasons. Yet near the end of the marketing year, computed mugaiwa prices typically rise to equal and sometimes exceed those of the more refined meals. This regular seasonal price spike in computed mugaiwa prices is due to the scarcity of maize grain in the small/medium-scale trading and public market distribution channels at the end of each marketing season, and means that the lowest income consumers face substantial increases in the cost of their food basket at this time of the year – more than they would if maize grain continued to be available to them.

Part of this seasonal scarcity of maize grain in public markets is likely due to dwindling supplies at the farm level, and limited ability of small traders to store grain into the lean season. Large millers, on the other hand, may have more financial capacity to store, or to import large quantities of grain if needed.

Yet experience of the past two years shows that government import policy exacerbates this pattern when it imports grain itself and channels it preferentially or exclusively to the large milling sector. This occurred in 2001/02, after government facilitated the importation of approximately 150,000 MT of maize, and channeled it exclusively through industrial mills. Low-income consumers were forced to pay a higher price for their maize meal than would have been the case if some

Figure 2. Prices of White Maize Grain and Meals in Maputo, May 1994 – February 2003 (US\$/kg)



imported grain were made available to small traders and consumers.

Government has not imported any significant amount of grain in 2002/03. Yet prices of grain in public markets are nearly as high as those of industrially milled meal. This price pattern suggests that the majority of formal and informal imports by the private sector from Tanzania, Mozambique, and South Africa have been made by, or have ended up with, large traders and millers. Little of this grain entered the informal markets, the only source by which consumers and small traders could purchase maize to mill into mugaiwa. This has especially jeopardized poor urban and rural consumers' access to food, as will be shown.

Table 1 illustrates the cost savings of the mugaiwa option for a low-income household in Lusaka (earning roughly 68,000 kwacha per month)⁴ when maize is not scarce in public markets. The table assumes that the household purchases 42 kg of maize meal each month, and then shows the cost difference of purchasing maize and taking it to a hammer mill to obtain mugaiwa, rather than purchasing the same volume of breakfast or roller meal. Compared to purchasing breakfast meal, the

³ Mugaiwa prices in Zambia were computed using maize grain public market retail prices, and adding hammer milling fees (Source: AMIC and CSO). It was assumed that the mugaiwa extraction rate is 100%. Prices in Mozambique are actual market prices of mugaiwa.

⁴ About 25% of urban households are estimated to have less than this monthly income and 75% are estimated to have more, according to LCMS estimates, reflat to 2002 price levels.



cost saving of the mugaiwa option is 20% of the household's monthly income. The household's remaining income after purchasing breakfast meal would have been around ZK 18,000, whereas the remaining income after purchasing mugaiwa would be ZK 32,000.

In Mozambique, maize grain and imported refined meal have been the most consistently available products. Mugaiwa was consistently available in Maputo retail markets – and was substantially cheaper than refined meals – until early 2002, when it disappeared from the city's informal markets. Domestic refined meal has been regularly available since early 1997. Over this time, the price difference between domestic refined meal and mugaiwa has steadily fallen, from an average of US\$0.08/kg during 1997 (or about 20% of the refined meal price) to about US\$0.04/kg in 2001 (15%). Over the same period, the price difference between grain and domestic refined meal has fallen from over US\$0.17/kg to under US\$0.11/kg.

As Figure 2 shows, a distinguishing characteristic of markets in southern Mozambique throughout the 1990s was the regular availability of maize grain and affordable mugaiwa in retail markets. Since May 2002, however, mugaiwa has been almost entirely absent from most southern markets, while continuing to be regularly available in most markets of the center and north of the country. Traders have indicated in interviews that the informal sector no longer imports maize grain from South Africa for southern markets, though it does continue to bring surplus production from the center to the south.

The reasons for these developments – absence of mugaiwa and termination of informal imports of grain from South Africa – are not yet fully understood. It is known, however, that the Government of Mozambique began to charge a 17% value-added tax on maize grain

Table 1. Comparison Between Savings Derived from Mugaiwa Consumption and Industrially Milled Mealie Meal

| | Breakfast | Roller | Mugaiwa |
|---|-----------|--------|---------|
| Price per kg (ZK, 2001/2002 avg.) | 1,184.74 | 975.64 | 855.07 |
| Average household's consumption (kg) | 42 | 42 | 42 |
| Monthly expenditure on mealie meal (ZK) | 49,759 | 40,977 | 35,913 |
| Difference in expenditure between mugaiwa and other types of meal (ZK) | 13,846 | 5,064 | - |
| Real income of Lusaka low-income household (ZK) | 68,182 | 68,182 | 68,182 |
| Cost saving by consuming mugaiwa instead of breakfast or roller meal as % of household income | 20.31% | 7.43% | - |
| Remaining household income after purchasing mealie meal requirement (ZK) | 18,423 | 27,205 | 32,269 |

Notes: 1. Assumed household size is 6 persons, 2. Estimated mealie meal consumption is 7 kg per person per month, 3. Lusaka income based on CSO Living Conditions Monitoring Survey, 1998, 4. Lusaka mugaiwa prices are estimated by adding milling charges to the maize grain retail price (source: AMIC), adjusted for inflation (source: CSO)

imports in 2000. Formal sector importers who process the grain into flour or animal feed are entitled to reimbursement of the VAT and have, after initial bureaucratic difficulties, been successful in obtaining that reimbursement. Informal importers who do not process the grain – the standard practice in the informal sector – are not entitled to any reimbursement. We hypothesize here that this unequal incidence of the tax, combined with lower unit procurement costs for formal importers producing refined meals, has undercut the ability of the informal sector to make whole meals available at prices sufficiently low to compete with refined meals. Research is currently underway to test this hypothesis.

The poorest consumers switch to mugaiwa when they have relatively modest price discounts compared to refined meals. Urban consumer research in Mozambique shows that the poorest consumers switch to mugaiwa when these have relatively modest price discounts compared to refined meals (Table 2).



| % discount on whole meal | % switching to whole meal | Cumulative % switching | Mean monthly income/AE of those switching (meticaís) |
|--------------------------|---------------------------|------------------------|--|
| 20 | 20 | 20 | 67,064 |
| 40 | 16 | 36 | 90,908 |
| 60 | 16 | 52 | 97,735 |
| >60 | 3 | 55 | 80,343 |

| Nutrient | Breakfast (65% extraction) | Roller (85% extraction) | Mugaiwa (99% extraction) |
|-----------------|----------------------------|-------------------------|--------------------------|
| Energy (kcal) | 334 | 341 | 343 |
| Protein (g) | 8.0 | 9.3 | 10.0 |
| Fat (g) | 0.5 | 3.5 | 4.0 |
| Calcium (mg) | 6.0 | 7.0 | 12.0 |
| Iron (mg) | 1.1 | 2.0 | 2.5 |
| Thiamine (mg) | 0.14 | 0.3 | 0.35 |
| Riboflavin (mg) | 0.05 | 0.08 | 0.13 |
| Niacin (mg) | 1.0 | 1.8 | 2.0 |
| Vit. C (mg) | 0 | 3.0 | 3.0 |

Source: Food Composition Table, Technical Centre for Agriculture and Rural Cooperation, Wageningen Agricultural University, The Netherlands

Consumers in Maputo were asked in 1994 what products they would choose under different price scenarios, and were also asked about their actual market purchases over the past month. While 94% of

respondents preferred refined meals over whole meals if the two carried the same price, 20% of consumers in Maputo indicated that they would switch to mugaiwa if these were discounted 20% relative to refined meals. Those indicating they would switch at these prices had the lowest average incomes of any group, 27% below the sample average. Forty-five percent of households indicated they would not switch to mugaiwa at any conceivable price discount, and these households had average incomes 12% above the sample average. Similar findings have been generated in Zimbabwe (Rubey, Ward, and Tschirley 1997).

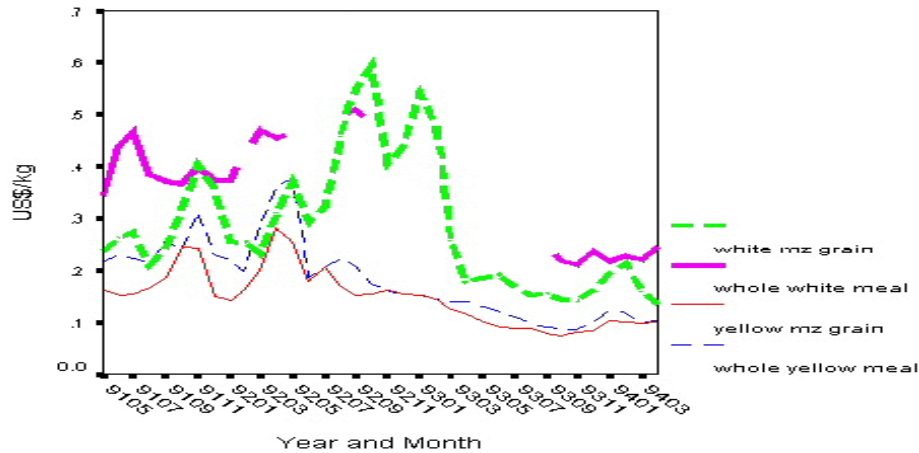
The nutritional value of mugaiwa is superior to industrial meal. Table 3 shows the nutritional composition of mugaiwa, roller meal, and breakfast meal. Mugaiwa is substantially more nutritious than the industrially milled mealie-meal because all of the germ is retained in the meal. Moreover, because it is less expensive, the nutritive advantages of mugaiwa is even more pronounced when expressed in monetary terms

The hammer mill sector in both countries has substantial capacity, which is likely underutilized during significant portions of each year: Hammer mills are found throughout both countries, in both rural and urban areas, and produce mugaiwa. In Zambia, until public market maize supplies dwindle towards the end of the marketing season, hammer mills appear to process as much maize grain as the industrial mills. They can also produce other products such as roller and breakfast meal by first de-hulling the maize and using finer sieve settings. All hammer mills provide custom milling services for customers who bring relatively small maize quantities to be milled. Some hammer mills in Zambia have also started commercial milling and sell their product to the public.

The hammer mill sector in southern cities of Mozambique boomed during the early 1990s, due in large part to the ready availability of yellow maize grain from monetized food aid. The informal marketing and hammer milling sector played a major role during the 1992 drought maintaining affordable food prices for consumers (Figure 3): while white maize and meals nearly disappeared from the market and their prices skyrocketed, yellow grain and yellow mugaiwa were



Figure 3. Retail Prices of Various Maize Products In Maputo Markets Before, During, and after 1992 Drought (US\$/kg)



consistently available throughout the south at affordable prices which actually declined over the course of the drought.

Indications from a recent survey are that the hammer milling sector has declined in southern cities over at least the past year, while it has maintained itself or even expanded in the center of the country. The reasons for

this apparent decline are being researched in combination with the impacts of the value-added tax mentioned earlier.

Hammer millers' fees in both countries for grinding maize grain into mugaiwa are substantially less than large-scale commercial millers' costs of milling maize into roller and breakfast meal plus the packaging and retailing costs incurred on these kinds of maize meal. Because of this, consumers buying maize grain and milling it into mugaiwa at a local hammer mill pay only about 60% to 80% of the cost of purchasing breakfast or roller meal in retail stores.

Hammer mills are important to many urban and rural consumers' food security. About 80% of rural households' total maize and maize meal purchases in Zambia is in the form of maize milled into mugaiwa; the remaining purchases are in the form of packaged industrial meal. This implies that most rural consumers

prefer to satisfy their remaining maize needs by purchasing maize grain and having this grain hammer milled into mugaiwa rather than purchase relatively expensive roller or breakfast meal. Urban consumption of mugaiwa is also known to be important, particularly for low-income consumers. However, during times when the availability of maize grain through the small-scale public market distribution channels is constrained, i.e., nearly every year during the lean season and also when national maize shortages occur,

industrial mills have traditionally been able to import maize, or have preferential access to government-imported maize, resulting in a temporary increase of the market share for industrial mealie meal versus hammer meal.

RECOMMENDATIONS: If mugaiwa consumption through the availability of maize grain and custom milling services is to be facilitated, policy in each country must avoid disrupting the ability of informal traders to obtain grain from the lowest cost source. *In Zambia*, government should seriously consider allowing the private sector to handle **all** needed imports. If government chooses, instead, to continue its involvement in imports, its most important steps would be to ensure that its announced intentions are realistic and feasible and that its actions are then fully transparent to the private sector. If government decides to subsidize the sale of its imported grain below what the private sector could sell it for, then it must also supply some quantity of grain through the small and medium scale trading, milling and public market distribution channels during those months of the season when local small-scale supplies normally "dry up." If government does not do this, the informal sector will be unable to compete with large industrial millers receiving the subsidized grain, and consumers will be unable to access cheap grain and mugaiwa.



These efforts should not be restricted to large urban centers, and should include the rural maize trade and hammer milling sector. The proposed Crop Marketing Authority may be able to play a useful role in this respect.

For future deficit seasons, Zambia can increase poor households' real incomes by channeling part of its intended maize imports through small and medium scale traders and small-scale commercial mills.

The Food Reserve Agency in Zambia performed a retail function several years ago, as has the Grain Marketing Board (GMB) in Zimbabwe. The latter set up small sales offices at their depots, following which an active market developed for GMB grain to be milled by small traders and millers who would sell it in urban and small town markets in the form of mugaiwa. Other millers stacked the maize that they bought from GMB depots outside their mills, and allowed consumers to buy the grain and then custom mill it for a fee. Similar marketing practices have been witnessed at Soweto markets in Lusaka, and illustrate that consumer demand for low-cost food is substantial.

In Mozambique, policy has generally been quite favorable for the informal marketing and hammer milling sectors. Management of monetized food aid during the 1992 drought is a clear success story showing how markets can reduce the cost and increase the effectiveness of emergency response. The country has maintained an open border policy on both exports and imports of maize since that time. However, the application of the VAT to maize imports may currently be limiting the informal sector's ability to import maize grain when needed, and may be raising staple food prices to low income consumers in southern cities. Government needs to review this policy, starting with a clear understanding of the effects that it has had on marketing and availability of maize grain and mugaiwa.

REFERENCES

Rubey, Lawrence, Richard W. Ward, and David Tschirley. 1997. Maize Research Priorities: The Role of Consumer Preferences. In *Africa's Emerging Maize*

Revolution, ed. Carl Eicher and Derek Byerlee. Boulder: Lynne Rienner.

FS II Policy Syntheses relevant to policies and practices to ensure broad availability of low-cost food staples (available on the Web at:

<http://www.aec.msu.edu/agecon/fs2/psynindx.htm> or in url's specified below)

Mwiinga, Billy, J.J. Nijhoff, T.S. Jayne, Gelson Tembo, and James Shaffer. 2002. *The Role Of Mugaiwa In Promoting Household Food Security: Why It Matters Who Gets Access To Government Maize Imports*. Policy Synthesis No. 5. Lusaka, Zambia.

<http://www.aec.msu.edu/agecon/fs2/zambia/polsyn5zambia.pdf>

SIMA Team. 1997. *Designing Market-based Approaches to Short and Long-run Emergency Assistance in Africa*. Flash No. 11E. MADER/Michigan State University.

<http://www.aec.msu.edu/agecon/fs2/mozambique/flash11e.pdf>

MSU Research Team. 1994. *Who Eats Yellow Maize? Some Preliminary Results of a Survey of Consumer Maize Meal Preferences in Maputo*. Research Report No. 18. MADER/MSUMOA.

<http://www.aec.msu.edu/agecon/fs2/mozambique/wps18.pdf>

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