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SMALLHOLDER HOUSEHOLD MAIZE PRODUCTION AND MARKETING BEHAVIOR IN ZAMBIA: IMPLICATIONS FOR POLICY*

BY

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Key Messages:

- CSO/MACO nationally-representative rural surveys provide important insights on smallholder crop marketing behavior from the 2001 and 2004 harvests.
- Only about 25 percent of smallholder farmers in Zambia sold maize in both seasons, and about 15-20 percent of smallholders sold fresh horticulture as well as groundnuts, with 11-13 percent selling cassava. From 6-10 percent of farmers produced and sold cotton.
- Overall, Zambian smallholder agriculture has become more diversified over the past decade, with maize, cassava, groundnuts, cotton, horticultural crops, and animal products all becoming important sources of cash revenue as well as production for home consumption (except, of course, cotton). Importantly in both seasons studied, horticulture crop sales are roughly equivalent to the value of maize sales nationwide
- There is substantial variation in farm income and off-farm income across small farm households, owing to disparities in landholding size, other productive assets, and variables affecting access to markets. Two percent of all smallholder farms nationwide accounted for over 40% of all the maize sold by smallholder households in Zambia in 2000/01 and 2003/04. This same two percent of smallholder households also accounted for about 17% and 20% of the total value of all crop sales of the smallholder sector.
- Poverty reduction policy options are severely constrained by these production and marketing patterns especially if operating through programs that raise market prices for sellers and buyers.

PROBLEM: The ability of agricultural policy makers to promote national development objectives requires an accurate and reasonably current picture of what crops farmers grow, what they eat, the importance of various crops in their incomes, and how they spend their money. In Zambia's case, there is reasonably accurate information on production levels and trends in a specific set of crops grown by smallholder farmers, but there has been very little knowledge of how important these specific crops are in smallholders' total crop incomes, of the importance of crop production in total smallholder incomes (which include livestock and non-farm activities) and about how changes in crop prices affect smallholders' welfare.

OBJECTIVE: This policy brief highlights findings from a comprehensive study to better understand crop production and marketing patterns in Zambia's small- and medium-scale farm sector and to likewise examine how these patterns vary regionally, as well as to examine differences between poor and non-poor strata of the rural farm sector. The study focuses on 1999/00 and 2002/03 production years, corresponding to the 2000/01 and 2003/04 marketing years. Because so much policy attention in Zambia is focused on maize, the study provides a particular emphasis on small farmers' maize production and marketing behavior, and discusses implications of findings for policy.

INFORMATION UTILIZED: Insights from this study are derived from the nationally representative Post Harvest Surveys and two Supplementary Surveys to the Post Harvest Surveys (SS) conducted in 2001 and 2004 in collaboration with the Central Statistical Organization (CSO) and the Ministry of Agriculture and Cooperatives (MACO). The SS involved revisiting the same rural households that were interviewed in the 1999/00 PHS with a set of “supplemental” questions, which are not normally asked in the regular post harvest surveys. These questions pertained to access to land, production of a wider range of crops than those typically contained on PHS surveys such as fruits and vegetables, information on non-farm and animal product income, and household socio-demographic characteristics.

The first SS was conducted in May 2001 and the second SS was conducted in May 2004. The PHS/SS uses a sampling frame of about 8,000 small-scale (cultivating 0.1 to less than 5.0 hectares) and medium-scale farm households, (cultivating between 5.0 and 20.0 hectares). About 96% of the farms in these nationally representative surveys are in the small-scale (0.1 to 5.0 hectare) category, with the mean area per small-scale farm being 1.4 hectares. About 4% of the farms are in the “medium-scale” category. For ease of citation, we refer to the full sample of both categories as the “smallholder” farming sector.

HIGHLIGHTS OF MAJOR FINDINGS:

Crop production (including crops retained on the farm plus crops sold) accounted for 69.1 and 72.5 percent of total smallholder household income in the 1999/00 and 2002/03 crop years (Table 1). Income from animal product sales accounted for 2.8 and 5.1 percent, while off-farm activities accounted for 27.7 and 21.7 percent of total household income. The cereal crops (predominantly maize, but also sorghum, millet, and rice) accounted for 38.3 and 35.1 percent of total household income in the two seasons. Roots and tubers accounted for 14.2 percent of total household income in 2000/01 and 17.7 percent in 2003/04.

The value of cassava production is about 40-70 percent the value of maize production. There was an increase in production of 71% between 1992 and 1998 in Northern province alone. The bulk of this cassava is grown in the more rainfall abundant north part of the country. The increase can be attributed to advances in productivity through the introduction of early maturing, pest resistant varieties.

In addition to this the past withdrawal of price supports for maize may have led farmers to diversify their energies to a crop that is suited to the agro-ecological conditions in the northern part of the country, which is cassava. An unanswered question concerns how the recent re-introduction of maize price supports (including pan-seasonal and pan-territorial pricing) and fertilizer subsidy programs will affect the growth in cassava production.

Table 1. Production Income Shares in the Small- and Medium-scale Farming Sector, Zambia.

Crop /Livestock Enterprise	2000/2001	2003/2004
	Marketing Year	Marketing Year
	% of total income	
Crop production (of which)	69.1	72.5
<i>Cereals</i>	38.3	35.1
<i>Roots and Tubers</i>	14.2	17.7
<i>Beans and oilseeds</i>	8.3	9.6
<i>Non-food cash crops</i>	2.4	5.5
<i>Fruits and vegetables</i>	5.9 ¹	4.6 ¹
<i>Other crops</i>	-- ²	.1
Animal products	2.8	5.1
Off-farm activities	27.7	21.7

Source: Supplemental surveys to the 1999/00 PHS survey, implemented in May 2001 and May 2004. Notes: Crop production is gross value not deducting input costs. Horticultural (fruit and vegetable) production was not collected but sales were. ¹For purposes of computing income shares, horticultural crop production, which was not collected in the SS or PHS surveys, are estimated as double the value of horticultural sales. ²Other crops included in 2003/04 but not captured in 2000/01 are velvet beans, paprika, popcorn, sugarcane, sugar beans, green gum and guine peas.

Table 2. Farm Production Patterns of Small- and Medium-Scale Agricultural Households in Zambia.

Crop / Livestock Enterprise		% HHs Producing	Total Production (MT)	Gross Value of Production (000 US\$)	% HHs Selling	Total Sales (MT)	Gross Value of Sales (000 US\$)	Sales as % of Production – Mean Across Households	Sales as % of Production – national	% of Gross Farm Sales Revenue - national	Consumed on Farm (MT)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Maize	2000/2001	77.9	1,260,123	102,531	25.5	272,950	23,647	12.2	23.1	10.3	987,173
	2003/2004	79.9	1,365,103	140,575	28.4	370,332	38,955	13.5	27.7	10.2	994,771
Sorghum	2000/2001	12.4	41,976	4,653	1.9	3,614	398	6.1	8.6	.2	38,363
	2003/2004	10.3	40,887	4,574	2.0	5,378	602	7.7	13.2	.2	35,509
Sweet potato	2000/2001	27.6	178,863	8,466	9.8	37,869	1,711	18.4	20.2	.7	140,994
	2003/2004	18.8	138,227	5,127	7.7	51,581	1,918	24.6	37.4	.5	86,646
Cassava	2000/2001	37.7	794,824	19,383	12.7	87,776	2,117	10.6	10.9	.9	707,049
	2003/2004	38.8	836,057	50,905	11.1	70,491	4,339	9.2	8.5	1.1	765,566
Cotton	2000/2001	5.7	43,359	10,491	5.5	41,938	10,147	96.6	96.7	4.4	1,421
	2003/2004	10.5	123,085	31,259	10.3	118,461	30,087	96.5	96.2	7.9	4,624
Tobacco	2000/2001	1.1	5,679	3,735	1.1	5,263	3,466	94.3	92.8	1.5	416
	2003/2004	1.4	13,005	11,725	1.4	12,678	11,418	97.8	97.4	3.0	327
Mixed & ground beans	2000/2001	13.0	27,297	7,735	6.7	10,782	3,088	29.7	39.9	1.4	16,516
	2003/2004	17.2	35,460	9,423	9.5	15,704	4,177	30.3	44.3	1.1	19,756
Groundnuts	2000/2001	35.8	56,586	17,089	13.8	14,672	4,475	19.2	26.2	2.0	41,914
	2003/2004	42.1	89,100	26,871	20.1	24,409	7,345	23.0	27.3	1.9	64,691
Vegetables and Fruits	2000/2001	---	---	---	20.8	---	25,699	---	---	11.2	---
	2003/2004	---	---	---	16.3	---	35,427	---	---	9.3	---
Livestock products	2000/2001	---	---	---	32.3	---	13,058	---	---	5.7	---
	2003/2004	---	---	---	44.5	---	33,206	---	---	8.7	---

Source: Supplemental Survey to the 1999/2000 Post Harvest Survey, Central Statistical Office, 2000/2001 & 2003/2004 Marketing Season

Notes: 2000/2001 marketing year refers to April 2000 to March 2001; 2003/2004 marketing year refers to April 2003 to March 2004.

Horticultural (fruit and vegetable production was not collected but sales were. Column 9 figures are computed as the weighted mean across all households level, i.e., (sales/production)*100). Column 10 figures aggregate total weighted sales and production across all farmers, then takes the mean of this, i.e. (total sales/total production)*10

Turning to smallholder income from selling crops, Table 2 shows the number of smallholder farm households cultivating each crop, total production, sales, and on-farm consumption of selected crops and livestock products (enterprises) for the marketing years of 2000/2001 and 2003/2004. Column 3 reports the percentage of households cultivating each crop. Roughly 78 to 80 percent of all smallholder households plant maize. The next most commonly cultivated crops were cassava, which was grown by 38 percent of the households in the 1999/00 crop season and 39 percent in the 2002/2003 crop season. Groundnuts were the third most commonly cultivated crop, with 36 percent of households growing in 1999/00 and 42 percent growing in 2002/2003. Sweet potato was fourth, cultivated by 28 percent and 19 percent of the households in 1999/00 and 2002/2003. Each of the remaining crops were grown on fewer than 20 percent of smallholder farms nationwide, however, data on cultivation of fresh fruits and vegetables or livestock products were not available.

While maize remains the dominant crop in production, income from crop sales are considerably more diversified (Column 8 Table 2). In particular, there appears to be a great rise in smallholder revenue from sale of fresh fruits, vegetables and non-food cash crops. In both the 2000/01 and 2003/04 marketing years, horticultural crop sales were roughly equivalent to the value of maize sales nationwide. Sales of animals and animal products are also shown to account for a substantial portion of sales revenue in the smallholder farm sector, accounting for about 50% to 75% as much sales revenue as that generated from maize sales.

The emergence of cotton and tobacco over the three years is also noteworthy. The combined value of cotton and tobacco sales was less than that of maize in 2000/01 but exceeded the value of maize sales in 2003/04. Livestock product sales also appear to have risen dramatically between 2000/01 and 2003/04, accounting for over US\$33 million in the latter year. Very important for decision makers, with supportive policies and public investments, to

enhance private actions, these crops and animal income activities could be further expanded in the small-scale farm sector and could prove to be an important engine for poverty reduction in rural Zambia.

There are significant regional variations in the composition of crop production and sales. In the high-rainfall areas in northern Zambia, sales revenue from fresh fruits and vegetables exceed that from either maize or cassava. In the north, a shift from maize to cassava has been well recognized, but there appears to have been a largely unrecognized shift in production and sales from maize to fresh fruits and vegetables. Maize production in the more remote northern areas of Zambia has become less attractive after the withdrawal of NAMBOARD (and other subsequent government organizations) pan-territorial support prices, and the reduction in the volume of subsidized fertilizer distributed through government programs (which were primarily used on maize).

This pattern may change if recent high levels of government purchases of maize at above-market prices continue. In the lowest rainfall zone of southern Zambia, income from animal production is relatively large, accounting for over 25% of gross farm sales revenue in both 2000/01 and 2003/04. In the middle rainfall belt, cotton, tobacco, and other non-food cash crops accounted for 33% to 50% of total gross revenue among smallholder farmers.

At the household-level, there is a strong positive correlation between households' net maize sales, household income, landholding size, value of other crop production, off-farm incomes, value of farm assets, and education levels. Results in Table 3 reveal, that after ranking all households from low to high income, those in the top income tercile are generally sellers of maize, while households in the bottom income tercile are buyers of maize. Nationwide, roughly 17 and 20 percent of the smallholder households in Zambia sold maize in 2000/01 and 2003/04. Another 5% of these farm households bought and sold maize but were net sellers. Roughly 35% of the smallholder households nationwide only

Table 3. Attributes of the Highest 5% of Maize Sellers Versus the Rest of Maize Sellers & Households not Selling Maize in the 2000/2001 & 2003/2004 Marketing Years (US\$ and Kwacha)

Attribute	Marketing year		Highest 5% of Maize Sellers (n= 14,261 in 2000/01) (n=17,974 in 2003/04)	Rest of Maize Sellers (n=272,805 in 2000/01) (n=341,916 in 2003/04)	Households not Selling Maize (n=839,855 in 2000/01) (n=907,255 in 2003/04)	National Total (n=1,126,921 in 2000/01) (n=1,267,145 in 2003/04)
	----- Mean Values -----					
Total household income	(US\$)	2000/2001	2,528	577	318	409
		2003/2004	3,847	675	415	534
	(Kwacha)	2000/2001	12,123,104	2,765,156	1,525,246	1,959,518
		2003/2004	18,449,496	3,239,131	1,999,788	2,569,387
Value of off-farm income	(US\$)	2000/2001	1,102	276	168	206
		2003/2004	1,453	282	190	233
	(Kwacha)	2000/2001	5,282,832	1,323,951	804,711	987,078
		2003/2004	10,335,555	2,081,427	1,655,130	1,927,706
Gross value of sales	(US\$)	2000/2001	1,009	141	48	82
		2003/2004	1,828	196	97	148
	(Kwacha)	2000/2001	4,840,614	674,563	228,401	394,775
		2003/2004	8,765,399	941,093	466,223	712,076
Gross value of maize sales	(US\$)	2000/2001	646	53	0	27
		2003/2004	983	62	0	38
	(Kwacha)	2000/2001	3,098,547	253,692	0	129,227
		2003/2004	4,711,587	298,680	0	184,442
Value of productive assets	(US\$)	2000/2001	1,071	180	117	144
		2003/2004	1,731	317	231	275
	(Kwacha)	2000/2001	5,138,034	864,792	558,789	690,816
		2003/2004	8,301,493	1,519,196	1,107,085	1,320,334
Value of income from livestock products	(US\$)	2000/2001	97	14	9	12
		2003/2004	175	31	21	26
	(Kwacha)	2000/2001	463,877	69,045	44,258	55,569
		2003/2004	891,651	172,615	131,264	155,961
Distance to nearest tarmac road	(km)	2000/2001	15.00	23.17	26.12	25.27
		2003/2004	14.66	24.54	25.79	25.29
Total area under crops	(hectares)	2000/2001	4.91	1.92	1.26	1.47
		2003/2004	6.22	2.04	1.29	1.56

Source: Supplemental Survey to the 1999/2000 Post Harvest Survey, Central Statistical Office, 2000/2001 & 2003/2004 Marketing Season.

Notes: 2000/01 marketing year refers to April 2000 to March 2001; 2003/04 marketing year refers to April 2003 to March 2004

purchased maize or maize meal, while another 3% both bought and sold but purchased more than they sold. Contrary to conventional beliefs that many smallholder farmers sell grain after harvest and buy back grain later in the season, only about 8% sell and buy back maize according to data from the two seasons.

The picture that emerges from Table 3 is an extremely skewed distribution of farm income and off-farm income, owing to disparities in landholding size, other productive assets, and access to markets. The top 5% of maize sellers account for about 1.3 and 1.4 percent of the total number of smallholder households in Zambia in 2000/01 and 2003/04. Yet, despite their relatively small numbers, these households accounted for almost half of the maize sales from the smallholder sector, and about 17% and 20% of the total value of crop sales of the smallholder sector.

The households not selling maize, which make up roughly 75% of the total number of smallholder farms in Zambia, are largely subsistence oriented farmers, selling very small surpluses of other crops, have relatively small farm sizes, are generally further from markets and roads, have relatively little off-farm and livestock-related sources of incomes, and therefore have very low total incomes.

Various indicators of household welfare for these three groups of households are shown in Table 3. There are remarkable differences between these three groups. For example, mean household income for Group 1 (the top 5% of maize selling households) was US\$2,528 and US\$3,847 in 2000/01 and 2003/04 compared to US\$577 and US\$675 for the remaining 95% of maize selling households, and US\$318 and US\$415 for the rest of the farm households in Zambia not selling any maize. Household incomes of the top 5% of maize selling households were 8 to 9.2 times higher, on average, than the households not selling maize, who account for around 75% of all of Zambia's smallholder households.

Table 3 also indicates that the total area under crops among the top 5% of maize sellers is 3.9

to 4.8 times greater than the non-maize selling households and 2.5 to 3 times greater than the rest of the maize sellers. The households that sold smaller quantities of maize cropped 1.5 times the area of non-maize sellers. The value of off-farm income among the top 5% of maize sellers was four to five times higher than off-farm income of the smaller maize sellers and seven times higher than that of households not selling maize. The top 5% of maize sellers also had 5 to 7 times as much revenue from livestock products as the smaller maize sellers, and 8-10.5 times as much as the households not selling maize.

These numbers indicate a great degree of heterogeneity within Zambia's small farm sector. Policies aimed to support the prices of maize may be benefiting a relatively small and relatively well-off group of farmers and bypassing the majority of small farmers in Zambia. As seen in the full report, there are a few groups within this group of households not selling maize that are doing relatively well, but the majority clearly do not.

Overall, these study results show that about 40-45% of the total marketed supply of maize from the smallholder farm sector was produced by only 2 percent of the smallholder farms, indicating a very high concentration of the marketed surplus. The facts that household maize sales are correlated with income and wealth and that more farm households are buyers or net buyers of maize than sellers imply that the majority of small-scale farm households may be adversely affected by price and trade policies designed to raise market prices of maize, and that these policies might have anti-poor distributional consequences.

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*The full FSRP Report No 22 that this brief is based on (Smallholder Household Maize Production and Marketing Behavior in Zambia and Its Implications for Policy is downloadable at: <http://www.aec.msu.edu/fs2/zambia/research.htm>