

POLICY SYNTHESIS
FOOD SECURITY RESEARCH PROJECT – ZAMBIA

No. 2

(Downloadable at: <http://www.aec.msu.edu/agecon/fs2/zambia/index.htm>)

January 2001

**IS THE GLASS HALF-EMPTY OR HALF FULL?
AN ANALYSIS OF AGRICULTURAL PRODUCTION TRENDS IN ZAMBIA**

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BACKGROUND: Zambia has implemented major reforms to its agricultural sector since the early 1990s. The effects of these reforms have been the subject of considerable speculation in Zambia. The conventional tone in the local press and the general public is that the sector is in decline. However, this notion has rarely been evaluated through comprehensive empirical analyses and is often simply asserted on the basis of anecdotal or partial evidence.

In response to these information gaps on basic trends in Zambian agriculture, the Agricultural Consultative Forum and the Ministry of Agriculture, Food and Fisheries (MAFF), convened a Workshop on Developments in the Agricultural Sector, held on June 28, 2000 in Lusaka. During the workshop it became apparent that the agricultural sector has made considerable strides that have been largely underappreciated given the tone of policy discussions in the country. However, it was also argued that, despite the progress made, the benefits may not have been broadly shared as yet. Some government officials have questioned whether many smallholders in the more remote areas of the country have benefitted from the reforms. This raises key issues about the costs and benefits of alternative policy options and investment strategies to improve smallholder welfare in these areas.

OBJECTIVES: This policy brief highlights some of the key trends in Zambia agricultural production since the implementation of partial agricultural reform. Readers interested in the

detailed findings, including provincial-level analyses, are referred to the full working paper¹ from which these highlights are drawn.

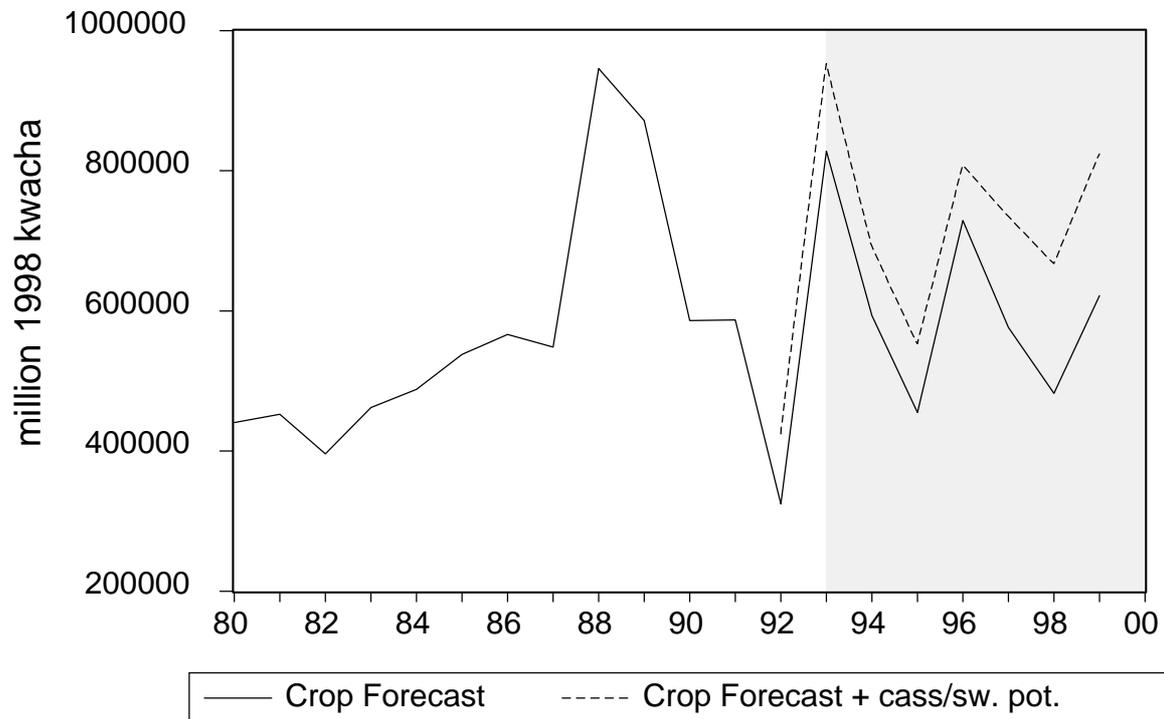
Apart from the 1990 agricultural census, agricultural statistics in Zambia are derived from the Post Harvest Survey (PHS, small and medium scale farmers) and Crop Forecasting Survey (CFS, includes large scale farmers). Both surveys are carried out by the Central Statistics Office commissioned by MAFF. These two surveys form the basis of the analyses in the main report.

TRENDS IN VALUE OF PRODUCTION: Figure 1 shows the value of agriculture production of 13 food and cash crops from 1980 to 1999. The solid line represents the real value of production using CFS production data and the broken line is derived from CFS plus PHS production data for cassava and sweet potato (which are excluded from the CFS survey). Values are based on average price levels for each crop over the 1993-1998 period applied to production levels over the entire 20-year period.

The data suggest that the mean value of crop production displays a fairly constant long-term trend) albeit with substantial fluctuation from

¹ **Is the Glass Half-Full or Half-Empty? An Analysis of Agricultural Production Trends in Zambia**, Working Paper No. 3. Food Security Research Project, Lusaka, Zambia. Downloadable at: <http://www.aec.msu.edu/agecon/fs2/zambia/index.htm>

Figure 1. Value of Zambia Crop Production, CFS



one year to the next. If one adds sweet potatoes and cassava production to the picture, the trend tilts slightly upwards after 1991 (broken line). If PHS-derived trends are used, the data suggest that the national value of small-holder crop production shows no clearly discernable rise or fall during the mid to late 1990s.

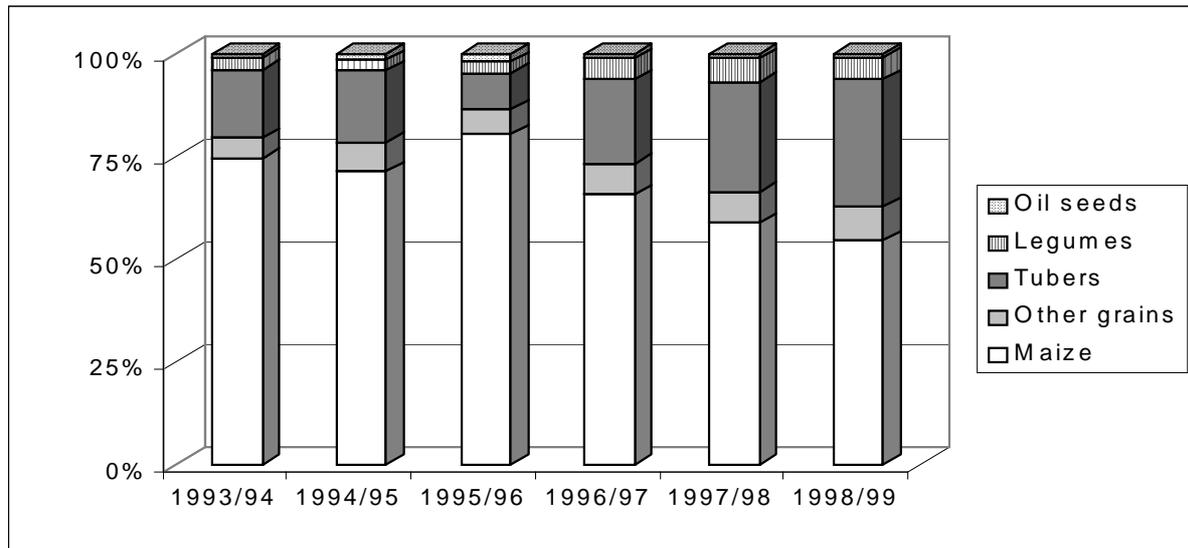
Crop Diversification Evident: When these trends are disaggregated by crop, major shifts in crop production become apparent. At national level, maize's share of crop production is clearly declining, especially in the more remote areas where smallholders have returned to more traditional diversified cropping and consumption patterns which were in place before large public expenditures were introduced in the 1970s and 1980s to support smallholder maize production. According to the Crop Forecast Survey data, maize area has decreased by 165,007 hectares from 1990 to 1999, a 22% decline. Soyabeans and sunflower areas have decreased by 18,100 (a 60% decline) and 30,933 hectares (a 70% decline) respectively. These crops have been partially

substituted by a 55,000 hectare increase in cotton area since 1990 (+65%); a 40,000 hectare rise in groundnut area (76% increase), a 130,000 hectare increase in cassava area (65% increase), and an increase in sweet potatoes by 7,000 hectares (54 % increase).

In the 1980s, maize accounted for roughly 70% of total cropped area. In the past five years, this share has declined to about 55%. The largest decline in maize area has been in Northern Province, which has simultaneously experienced a large increase in cassava production.

The shift from maize to other food crops is also evident from Figure 2 which depicts the proportionate contribution of the various food crop categories to total food crop production by smallholders expressed in energy terms per rural capita.

Strong Relationship Between Production and Rainfall: The value of agriculture production in the post 1991 era was prone to fluctuations

Figure 2. Proportionate Production of Smallholder Food Crops (kCal/rural cap)

largely due to extreme weather conditions (rainfall). There was a country-wide drought in 1992, a partial drought in 1995, and the El Niño phenomenon in 1998. Policy environment notwithstanding, rainfall is a crucial factor in crop performance especially since the country's agricultural production system's water requirements are largely rain-fed.

Agricultural Subsidies Declined, Production Not So: The value of agricultural production in constant 1998 kwacha terms has remained stable despite substantial reductions in government subsidies to the maize sub-sector since the 1980s. Figure 3 shows the value of production (solid line) and government subsidies to maize and fertilizer (broken line). Maize and fertilizer subsidies reached their peak in the late 1980s and have declined substantially since 1992. The value of crop production has remained basically constant despite a reduction in government subsidies to agriculture.

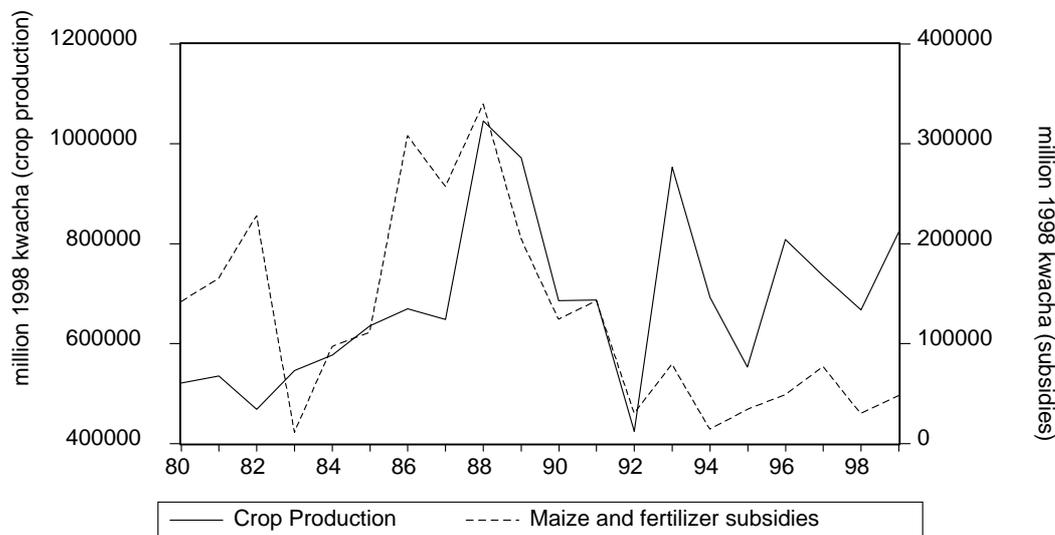
Highlights of Provincial Production Value Trends: Using PHS data, the provinces with the highest growth rates are the provinces where cassava is the main food crop, i.e., Luapula (7.8%) and Northern (5.8%). In these provinces crop diversification has been mainly from maize to cassava. The urbanized provinces of

Copperbelt and Lusaka have demonstrated stable or increasing output of maize, a commodity that is intensively consumed in these two provinces. This suggests that liberalization is encouraging the growth of this high-bulk, low-value crop closer to its primary consumption areas. Eastern and Southern provinces have displayed roughly 2% annual growth in crop output. The provinces with the lowest growth rates are Western (0), Central (-2.2%) and Northwestern (-6.2%). According to the data, these provinces show little diversification or increased intensification of any major crop, particularly cash crops.

TRENDS IN PRODUCTION OF ENERGY BY SMALLHOLDERS: Using PHS production data for maize, other grains, tubers, legumes and oilseeds (1993/94 through 1997/98) and CFS data (1998/99), caloric values have been computed and expressed as energy available in rural areas on a per capita basis.

Energy Production Trend From Smallholder Food Production at National Level Increasing?: At the national level, rural per capita energy from food crops produced by smallholders appears to be stable, and may even exhibit a moderately increasing trend. However, because a proportion of food

Figure 3. Crop Production Value and Government Subsidies to Maize and Fertilizer



produced is marketed and not necessarily retained within the rural areas, it is difficult to draw any further conclusions as to the actual utilization of the available energy by rural versus urban consumers.

Apart from the stable or increasing trend in food production, increased smallholder cash crop production, especially in Eastern and Southern Province, has augmented the purchasing power of many rural households in these areas. For example, the value of seed cotton and burley tobacco produced by smallholders has more than tripled during recent years.

DIFFERENCES IN LAND AREA AND PRODUCTION AMONG SMALL-HOLDERS:

Having identified national and provincial crop production trends, we then used data from the most recent PHS survey available (1997/98) to analyze household-level differences in the contribution of small and medium scale farmers to agricultural production. Below, the distribution of land (area cultivated) and crop income are indicated by quartile (quartiles were established by ranking small and medium scale producers by area cultivated per household (hh) and per

person (cap), and subsequently dividing the sample thus obtained into four equal groups).

	<u>Land</u> (ha/hh)	<u>Land</u> (ha/cap)	<u>Crop Income</u> (ZK/cap)
1 st Quartile	0.39	0.07	14,773
2 nd Quartile	0.82	0.14	23,630
3 rd Quartile	1.31	0.22	37,720
4 th Quartile	2.95	0.53	60,226

High Variability in Area Cultivated Among Smallholders: In every province, the top 25% of small and medium scale farmers cultivate at least six times more land per capita than the bottom 25% of farmers. These findings do not include the large-scale commercial sector. If large-scale farmers were included, the skewness of land cultivation would obviously be even greater.

The finding of large variations across households in the amount of land cultivated per capita equally holds when the analysis is done at the district level. This shows that the results are not due to differences in population density across provinces, but hold even at a relatively small geographic level of analysis. There are obvious reasons why land cultivated at the household level may vary from one household to the next (e.g., differences in family size, access to animal traction, the stage in the

household life cycle, land quality), but preliminary ANOVA analysis indicates that these factors explain only a small portion of the total variation in household crop area, and that there may be important differences in smallholders' relative access to land, which subsequently influence poverty and vulnerability to food insecurity. This is a subject of on-going research.

High Variability in Value of Production Among Smallholders: The value of crop production at the household level varies closely with the amount of land cultivated per capita. The fact that there is a strong link between area cultivated and crop output is not surprising. However, what may be surprising is the degree to which crop production varies among small and medium scale farmers. In Central, Eastern, and Southern Provinces, for example, the value of crop output per capita produced by the top 25% of farmers (ranked by land quartile) is eight to ten times higher than the value of crop output per capita produced by the bottom 25% of farmers. This large variation in crop income between the top and bottom land cultivation groups holds across every province in the country.

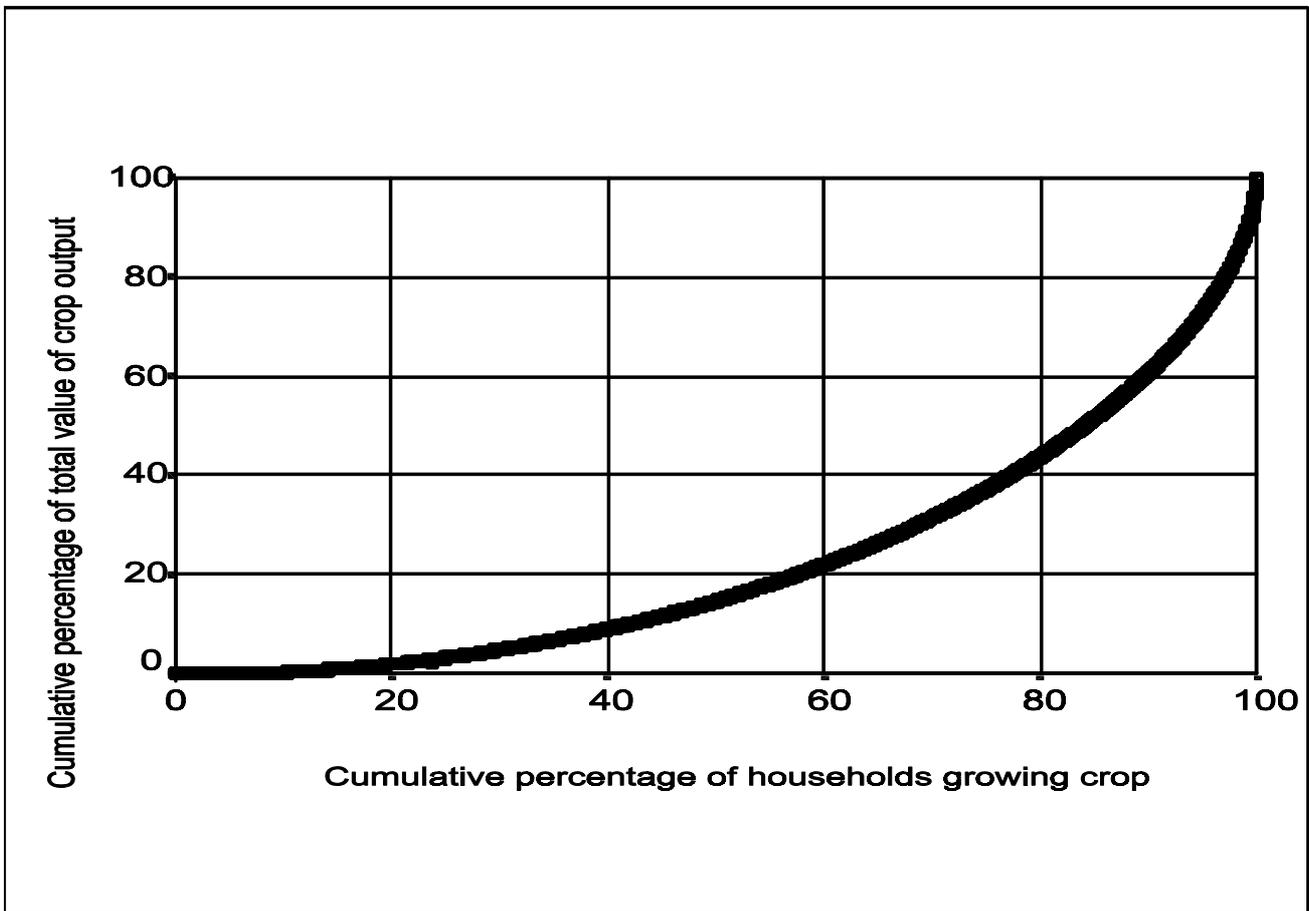
These results indicate that the value of crop production is highly related to the distribution of cropped area, i.e., the skewness of land allocation is driving the skewness of income derived from crop production. While data on household non-farm income are not contained in the CFS or PHS surveys, and such information must be obtained to make any firm conclusions, these findings begin to suggest that limited access to crop land at the household level may be a key factor associated with rural poverty. As the variation in land cultivated per capita holds even at the district level, as does the relationship between crop income and land cultivated, this raises the question as to whether the determinants of rural poverty are perhaps a household-level phenomenon as much or more than a geographic one. This is the topic of ongoing research.

Distribution of Smallholder Production Uneven: 80% of all households produced about 40% of the value of the national crop output. This means that about 60% of the value of crop output is produced by only 20% of farming households (Figure 4). This could imply that many of the benefits of liberalization of the agricultural sector could be accruing to only a relatively small proportion of farming households.

POSSIBLE POLICY IMPLICATIONS: The findings of this study, based on assessments of trends for 15 crops in Zambia, demonstrate that erroneous conclusions about agricultural sector performance can be drawn by focusing on trends in one crop – maize. While the agricultural reform policies in Zambia have been only partially implemented so far, they have changed the composition of crop production, creating a largely underappreciated growth in smallholder crops such as sweet potato, cassava, cotton, groundnuts, and tobacco. As a result, the overall trend in the value of crop output appears to be steady or increasing slightly during the 1990s despite the fact that maize production has clearly declined. Agricultural policy formation would be well served to reflect the fact that household food security is influenced by the performance of a wider range of commodity supply-chains than during the control period. The relative importance of these alternative commodities varies regionally.

There is an important link between household crop production and land holding size, suggesting that programs aimed at increasing access to land and/or off-farm opportunities for those households cultivating little area may be an important element in rural poverty reduction strategies. But the growth of off-farm employment opportunities is dependent on agricultural growth, which is the main source of income growth in agrarian economies to fuel demand for off-farm employment. These findings also have implications for land settlement and spatial rural investment policies,

Figure 4. Concentration of Crop Production in Zambia, 1997/98



issues which are being currently addressed by government-supported research and policy initiatives in Zambia.

The Food Security Research Project is a collaboration between the Agricultural Consultative Forum, the Ministry of Agriculture, Food and Fisheries, Michigan State University's Department of Agricultural Economics, and the United States Agency for International Development in Lusaka. The Zambia FSRP field team is comprised of Jones Govereh, Billy Mwiinga, Jan Nijhoff, Gelson Tembo, and Ballard Zulu. MSU-based researchers in the FSRP are Cynthia Donovan, T.S. Jayne, David Tschirley, and Michael Weber.

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