

# **Patterns of Maize Farming Behavior and Performance Among Small- and Medium-Scale Smallholders in Zambia**

**A Review of Statistical Data From the CSO/MACO Crop Forecast Survey  
2000/2001 to 2007/2008 Production Seasons**



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## Objective and Overview

**Objective:** This is a “draft for comment” version of a time-series statistical compilation of Crop Forecast Survey Data (CFS) covering small- and medium-scale smallholder holdings in Zambia (holdings are also referred to herein as households or farms.) The objective of preparing and circulating this statistical document is to assist Zambian policy and program decision makers, and donor partners, with as much timely and up to date empirical information as possible on the nature of the smallholder farming sector in Zambia. As interested users review the data and identify questions or make suggestions for additional statistical tables to consider including, the final version of the document can also be enhanced for stakeholder use. This information is presented in this timely working format in light of national and international concern in 2008 about increasing food and agricultural input prices.

**Overview:** The Government of Zambia places a very high priority on collecting systematic information each year in order to assess the forthcoming agricultural crop. Each year in February the Central Statistical Office (CSO) and the Data Management Unit (DMU) of the Ministry of Agriculture and Cooperatives (MACO) work together to prepare for the implementation in March and April the Annual Crop Forecast Survey covering both smallholder and commercial farmers. On May 6, 2008, Honorable Sarah Sayifwanda, MP, Minister of Agriculture and Cooperatives held a press conference at MACO Headquarters to announce the results of the Crop Forecasting Survey for the 2007/2008 agricultural season, and to distribute the food balance status for the 2008/2009 marketing season. CSO, MACO and FSRP analysts teamed up in April 2008 to verify and analyze the 07/08 data collected in March, so that a timely crop report could be released by Honorable Minister Sayifwanda. Since February 2008, FSRP analysts also worked with MACO (DMU) and CSO colleagues to obtain all the historical CFS data bases back to 2000/2001 to be able to join these together with 07/08 to examine trends in the basic variables which are covered in a typical CFS. This data base thus constitutes the source of the statistical information used for this CFS compilation.

- This statistical report includes detailed data only for small- and medium-scale holdings covered in the CFS each year. Without considerable additional analytical work and data clarification, the sample size, sample stratification and the response rate for surveys of the commercial farming sector (roughly 1200-1500 farms) are not sufficient to allow reliable disaggregated analysis of the commercial farm sector. Some aggregate information on commercial farmers is presented.
- CSO, MACO and FSRP are also in the process of cooperating to implement a nationally representative Post Harvest Supplemental Survey - SS - (the 3<sup>rd</sup> supplemental survey to the 1999/2000 Post Harvest Survey - PHS) which covers small- and medium-scale holdings in Zambia. The nationally representative survey is being conducted in May and June 2008. Data verification and preliminary analysis of this large data base will require 4-6 months beyond the end of data collection. When this is available a more comprehensive picture of patterns and trends in smallholder crop production and marketing, animal production, off-farm income-earning activities, and livelihoods will be available. In the meantime, however, the GOZ must implement timely strategies for both farmers and consumers to adjust to the problems and opportunities arising from the soaring regional and world commodity prices and agricultural input costs.
- The CSO/MACO Crop Forecast Survey data provides some potentially important insights on a wide range of issues. Due to the large sample size since 06/07, it can produce valid national estimates as well as selected estimates at the district level. But the CFS also has limitations due to its priority focus on production of just 13 crops. Evidence elsewhere indicates that some crops not covered in the CFS are becoming more important in smallholder cultivation patterns. Moreover, the CFS contains no information on off-farm income, total incomes, farmer purchases of food, or enhanced demographics/mortality. However because it is household data collected from a systematic random sample frame with proper stratification to account for farm size differences, it

can be used to gain many potentially valuable household-level insights. Since it does not capture a full measure of smallholder household income, the best proxy for income is the total area cultivated by each farmer to the 13 crops covered. Prior analysis of PHS and Supplemental Survey data has found a close relationship between area cultivated and household income as well as other variables (see results in Annex One, Table 1.) Clearly off farm income opportunities and education level of household heads are also factors associated with rural smallholder household welfare. However, given the strong correlation between area cultivated and other measures of landholding size, and with household wealth and total income (based on other survey data from Zambia), many of the following tables stratify results according to household size of area cultivated each year. For comparison, Table 2 in Annex One also presents results from the 1999/2000 SS survey on smallholder land holding size, when combining both small and medium scale farms into one smallholder category and then arraying information by quartiles of landholding size per household, including cultivated area and other land use categories.

## Selected Observations on Basic Patterns Shown About Small- and Medium-Scale Holding in Zambia

**Introductory Comments:** About CSO/MACO data in the CFS, Tables and Figures

- Tables showing aggregate values by year are straight forward. Most columns show a breakdown of small-scale and medium-scale and then the total for all smallholders. Definitions of each category of smallholder are covered in 2.1 and 2.2 below. Table 11 is a breakdown of aggregate statistics to examine differences within each of these two categories of smallholders, as the overall averages for small-scale and medium-scale hide considerable variation. Table 11 breaks each category into 4 equal groups (quartiles) and displays quartile average.
- This version of the CFS time series statistical compilation focuses primarily on maize, as this is the principal and traditional crop of concern in Zambia for assuring food security, and there is some urgency in getting detailed statistical information about smallholder maize and related farming practices circulating as soon as possible. But there are other food crops of growing significance in recent years that should also receive attention as additional analysis is completed, such as sweet potato or cassava, not to mention traditional cash crops that help assure farm and national level food self reliance. This topic can be partially addresses in the future with CFS data, and it will also be possible to examine this more fully with the new SS panel data being collected in June of 2008. See Annex Table 3 for examples of prior production and marketing information on a full set of food and cash crops for 2001/2001 and 2003/2004 marketing seasons.
- It is also not possible with the CSO/MACO CFS time series data to understand the importance of purchases of maize on the part of those smallholders who are not able to produce enough for home consumption and who are able to purchase or barter for maize for home consumption. This is also covered in the SS panel data being collected. See Annex One Table 4 for results of analysis of SS panel data from the 2003/2004 marketing year in Zambia to examine characteristics of rural households according to their position in maize and maize meal markets, that is according to the various types of maize seller and/or buyer households.
- Figures display the pattern of concentration over each year of the time series. For the most part the Figures measure concentration on different dimensions among smallholder households growing maize. These are included to be helpful in seeing if there has been any major shift in the degree of concentration of the number of smallholders accomplishing a particular result, whether it be the concentration of production, marketing, area planted, or use of fertilizer on maize.

**Observation 1:** Table 1a. *Zambian Maize Production by Smallholder and Commercial Farmers 2003/04 - 2007/08*

- Table 1a. This statistical report does not focus on any disaggregated analysis of CFS data for commercial farmers. But it is important to examine the aggregate levels and possible trends surrounding the importance of commercial farmer contributions to maize production and marketing, especially in 2008 and for 2009 when Zambia is facing potential food shortages and/or could have profitable opportunities for supplying regional markets with surplus maize. Production and marketing results for commercial farmers in Table 1a do show a possible downward trend, if the production season 2002/03 is used as the beginning of the series. However the table shows considerable production variability, and choice of the beginning of the series can influence the results. An important issue for further analysis and consultation with industry leaders is the extent to which these are believed to be reasonably accurate data that

reflect what is happening with commercial production and marketing of maize. Clearly if the data are roughly accurate, there is an important pattern of commercial farmers shifting away from maize production and marketing. It is also important to understand why commercial farmers are shifting away from maize and why when they do cultivate maize they are able to harvest on average a much higher level of area planted, as compared to smallholders.

**Observation 2:** Table 1b. CFS Data and Population Estimates of Numbers of Small and Medium Scale Agriculture Households

- 2.1 Table 1b shows the basic CFS sample size for smallholders and the estimated total population of smallholders derived from this sample. The CSO made some important changes in its methods in 2002/03, moving from a set of enumeration areas weighted according to population estimates from the 1990 census to an updated set of enumeration areas weighted according to population estimates from the 2000 census. The post 2002/03 estimates of total smallholder population are believed to be more accurate and close to reality as compared to prior years. For these reasons, the first two to three years of data shown in these tables for 2000/01 and 2001/02 and possible 2002/03 are to be used with caution. More discussion with analysts from CSO and MACO are required to determine how these first years of the entire time series should be used, if at all. The most conservative position is to examine trends from 2002 or 2003 onward.
- 2.2 The changes in sampling procedures make it difficult to identify real trends as distinct from differences in sampling. For example a possible notable trend observed in this table is the apparent rise over time in the number of small-scale (defined as households cultivating less than 5 hectares) and medium-scale farm households (defined as farms over 5 and up to 20 hectares). However if the first two-three years of the time series should not be used, then there is a much more modest growth in the number of both small-scale and medium-scale farm households. This is an important issue, especially to find out if more rural households are able to move up to the status of medium-scale farms.

**Observation 3:** Table 2. Zambian Small- and Medium-scale households sampled in CFS that did not grow crops, 2000/01 to 2007/08.

- 3.1 Of the roughly 1.1 million small-scale farm households in Zambia, less than 30,000 of them do not grow crops. This is, at most, 2.7 percent of small-scale farmers. Less than 1 percent of medium-scale farms were not growing crops in the period 2000-2008. Overall, based on the CFS sample frame at least 98% of the smallholder households nationwide cultivated crops in any particular year.

**Observation 4:** Table 3. Production and Intended Sales of Maize Among Zambian Small- and Medium-Scale Agricultural Households, 2000/01 to 2007/08

- 4.1 Maize production appears to have increased from both small-scale and medium scale farm sectors in the past 3 years (2005/06 through 2007/08) compared to earlier years. Not included in this disaggregated compilation is farm-level information on production and sales of maize by commercial farmers in Zambia (farmers cultivating more than 20 hectares and have leasehold title to their land). As discussed under Observation 1, the aggregate data may show a downward movement of both production and sales of maize by commercial farmers.
- 4.2 Intended maize sales volumes for the 2008 marketing year declared in the CFS by both types of smallholders also have been relatively high in the past 3 years compared to previous years. Overall, maize sales from the smallholder sector have been between 350,000 and 400,000 metric tonnes per year.

- 4.3 Each year, roughly 25 to 30 percent of all smallholder farms nationwide declared their intentions to sell maize in the past 3 years, up from 17 to 30 percent in previous years, if estimates from the early years are used.

**Observation 5:** Figures 1 and 2. Concentration of Maize Production and Intended Maize Sales by Small and Medium Scale Farm Households

- 5.1 Each year since 2000/01, roughly 20 percent of the smallholder farms account for 60 percent of all of the maize produced by the smallholder sector. Roughly 10 percent of the smallholder farms account for 45 to 50 percent of all of the maize produced by the smallholder sector. Alternatively some 60 percent of all smallholders only account for about 20 percent of production.
- 5.2 The pattern of concentration of intended maize sales reveals that pretty consistently not more than 25-30 percent of smallholders that grow maize are able to have enough production to be able to consider selling some of it. These declarations of intentions are very consistent with actual smallholder sales report in the post-harvest and supplemental surveys (see Annex Table 3.) The pattern of slightly more smallholders selling since 2005/2006 is shown, although the decrease in concentration is minor, given the importance of those smallholders primarily responsible for sales of maize. That is, the top 10% of smallholder farms account for at least 80 percent of all of the maize to be sold by the smallholder sector. This result is consistent across all survey years since 2000/01.

**Observation 6:** Table 4. Area Planted and Harvested of Maize, and Differences Over Years

- 6.1 According to the CFS, only 55 to 80 percent of the total maize area planted by smallholder farmers was actually harvested. This ranged from a low of 50.6 percent in 2004/05 (a drought year) to 83 percent in 2003/04. Medium-scale smallholders seem to have a slightly better track record of harvesting planted area, although both categories of smallholders are leaving considerable area unharvested for one reason or another. As will be shown in Table 11 for the year 07/08, the amount of maize area left unharvested was primarily due to water logging and flooding.
- 6.2 The percentage of maize area planted that was harvested is higher for smallholder farmers using fertilizer (ranging from 65 to 90 percent depending on the year) and relatively low for farmers (ranging from 50 to 80 percent) not using fertilizer. More work is need to better understand this seemingly important difference.
- 6.3 Overall the amount of area that is left unharvested by smallholders in Zambia is highly variable, but even in the lowest years, the seeming loss of resources and smallholder labor is quite significant. More analysis is needed to understand this problem and to come up with practical ways to assist smallholders to increase significantly the use of area planted.

**Observation 7:** Figure 3. Pattern Over Time of the Concentration of Maize Area Harvested

- 7.1 The top 20 percent of smallholder households account for almost 60 percent of total maize area harvested in the smallholder sector. This finding is highly consistent across all years since 2000/01. This pattern also helps explain the importance of area planted and harvested towards explaining the amount of production and marketing.

**Observation 8:** Table 5. Aggregate Fertilizer Use by Zambian Small- and Medium-Scale Agricultural Households, 2000/01 – 2007/08

- 8.1 Setting aside data from the first two years because of definition change, fertilizer use has risen for small-scale farmers from 39,888 tons in 2002/03 to 64,628 tons in 2007/08 (an important increase given the large number of smallholder farmers in this category). For medium-scale farmers, fertilizer use has increased from 10,417 tons in 2002/03 to 16,623 tons in 2007/08. The vast majority ( over 90 percent) of this fertilizer has been applied to maize by both small- and medium-scale smallholders.
- 8.2 The percentage of maize-growing smallholder households using fertilizer on maize has increased slightly from 32 percent in 2002/03 to 36 percent in 2007/08.
- 8.3 Maize yields for smallholders using fertilizer has risen importantly, from around 2.2 tons per hectare in 2002/03 to roughly 2.5 to 2.7 tons per hectare in the past three seasons (2005/06 to 2007/08). Note that for the present analysis, maize yield information was obtained by dividing total production by total area harvested. Yield estimates would be lower if we used area planted, which is the standard way that MACO and CSO report yield. Additional analysis will examine yield using both area planted and area harvested, seeking to understand the degree to which inputs into maize are underutilized and if possible the factors responsible for this. Major improvements in resource use and performance might be achieved if these patterns can be better understood among the different types of smallholder farmers.
- 8.4 Maize yields for households using fertilizer were considerably higher than for households not using fertilizer (roughly 2.4 to 2.5 tons per hectare compared to 1.4 to 1.5 tons per hectare in the past 3 years. However, many households using fertilizer are likely to be located in relatively high-potential areas compared to those not using fertilizer, and they are also more likely to be using other inputs more intensively than households not using fertilizer. For these reasons, one cannot attribute fully to fertilizer the difference in maize yields between fertilizer users and non-users.
- 8.5 Maize yields among smallholder household not using fertilizer have changed very little over the period 2002/03 to 2007/08. The very low yield for medium-scale smallholder in both 2004/05 and 2007/08 are most likely due to location and weather conditions, as well as the reduced number of observations making up these results.

**Observation 9:** Figures 4a-h. Concentration of Smallholder Fertilizer Application to Maize in Zambia.

- 9.1 Roughly 70 percent of all the fertilizer applied on maize grown by smallholder farmers is used by only 10 percent of the farmers. This relative concentration has been pretty consistently high over the period of the data, although it seems to have gone down ever so slightly in the past three years.

**Observation 10:** Table 6. Fertilizer use on All Crops and on Maize by Main Source of Fertilizer – Zambian Small- and Medium-Scale Agricultural Households 2003/04.

- 10.1 The CFS in 2003/04 and 2007/08 included questions about the primary source of fertilizer used by smallholders. These questions were not included on the CFS in other years so it is not possible to view over the full time series information on fertilizer acquisition sources by smallholders. In 2003/04, smallholder farmers reported that the single most important source of

fertilizer was private/commercial suppliers (27,526 tons). Some 52 percent of all fertilizer they acquired came from private/commercial suppliers. Smallholders reported receiving only 10,818 tons of fertilizer through the Fertilizer Support Programme in 2003/04. This amounts to roughly 26 percent of all the fertilizer acquired by the smallholder sector.

**Observation 11:** Table 7. Number of Households Obtaining Fertilizer by Main Source of Fertilizer – Zambia Small- and Medium-Scale Agricultural Households 2003/04

- 11.1 Roughly 277,000 smallholders reported obtaining fertilizer from the different sources listed in the table. Commercial/private sources were used by the largest number of smallholders (141,601) with about 50,366 farmers reported receiving fertilizer from the Fertilizer Support Programme in 2003/04. Of these 46,727 were small-scale farmers, while 3,639 were medium-scale farmers.
- 11.2 Of all the smallholder farmers using fertilizer in 2003/04, the FSP was the primary source for 18 percent of these farmers, while private commercial traders were the main source for 52 percent. The remainder 30 percent was acquired from NGOs, PAM, and other farmers.

**Observation 12:** Table 8. Fertilizer Use by Main Source of Fertilizer, 2007/08 Season

- 12.1 In the 2007/08 season, 81,250 tons of fertilizer was reported used by farmers in the small- and medium-scale sector in 2007/08. Of this, 61,348 tons were acquired from private/commercial traders, while 14,832 tons were acquired from the FSP. Supplies being acquired from PAM reduced to 2,100 tons in 2007/08.

**Observation 13:** Table 9. Number of Households Obtaining Fertilizer by Main Source of Fertilizer, 2007/08 season.

- 13.1 253,394 small-scale households and 14,082 medium-scale households acquired fertilizer in the 2007/08 season (total of 267,476 households in the smallholder sector). Of all the smallholder farmers using fertilizer in 2007/08, the FSP was the primary source for 16 percent of these farmers (56,638), while private commercial traders were the main source for 78 percent. The remainder 7 percent was acquired from NGOs, PAM, and other farmers.

**Observation 14:** Table 10. Basal and Top Dressing Fertilizer Use by Main Source of Fertilizer, 2007/08

- 14.1 Basal and top dressing were used in virtually equal proportions: 40,476 tons of basal and 40,774 tons of top dressing in 2007/08. More than 97 percent of all this fertilizer was used on maize.

**Observation 15:** Figure 5. Concentration of Smallholder Maize Sales Among Fertilizer Users in Zambia 2000/2002 to 2007/2008

- 15.1 The concentration figures shown in Figure 5 for this variable reveal graphically that roughly 20 to 40 percent of smallholders over the years have used fertilizer, but pretty consistently the top 20 percent of smallholders using fertilizer are responsible for over 90 percent of sales of maize among all smallholders using fertilizer.

**Observation 16:** Table 11. Selected Production, Marketing, and Fertilizer Use Characteristics of Zambian Small- and Medium-Scale Agricultural Households by Quartile of Total Area Planted per Household, 2000/01 to 2007/08.

- 16.1 Most comments on this table will focus on the year 2007/08, as up to the present more analysis has been done on data for this year. However, some basic variables are included for each of the other years. A major benefit of examining the CFS data by quartile of small- and medium-scale smallholder area cultivated is to understand the considerable variability in conditions and results facing the smallholder population in Zambia.
- 16.2 The percentage of smallholder households not growing maize increases significantly as the quantity of total area cultivated per household decreases. Only 70 percent of the lowest quartile of small-scale farmers grow maize, while 95.5 percent of the top quartile of medium-scale farmers grow maize. The same pattern is shown for participation of female-headed households. The largest number of female headed small-scale households are disproportionately found in the lowest land cultivation size quartile. In 2007/08, over 30% of the households cultivating under 0.6 hectares are headed by a woman, compared to only 14.5 percent among households in the top land cultivation size quartile for small-scale households (1.72 to 4.99 hectares). Importantly there are female headed medium-scale smallholders, although the percentage reduces to about 9 for the highest land cultivating quartile. For future analysis, it is very important to understand how some female headed households are able to participate in the top group of medium-scale smallholders, but a much larger proportion are found among increasingly smaller land cultivating households.
- 16.3 Across the 8 quartiles shown for small- and medium scale smallholders, area planted per farm for maize growers ranged from .3 to 7.5 hectares. Area harvested ranged from .17 to 4 hectares. As discussed earlier, very significant portions of area planted were left unharvested and the principal reasons for these are listed, with flood/water logging being mentioned 60-70 percent of smallholders. Some 9 to 20 percent of smallholders mentioned lack of fertilizer as the major reason, although this is a bit difficult to understand. An important challenge is to understanding better what can be done to reduce the amount of unharvested area that shows up to a significant degree in each of the years shown over the 20001/02 to 2007/08 period.
- 16.4 There are likewise important differences revealed by the data in tillage methods, with conventional hand cultivation methods dominating among small-scale farmers and animal traction ploughing methods being used by 60 to 72 percent of the medium-scale farmers. Conservation farming tillage methods of various sorts are more common among small-scale than medium scale, but overall the adoption rate is still relatively low for this tillage method.
- 16.5 In 2007/08, the percentage of small-scale households using fertilizer on maize varied from 18.3 percent among farms in the bottom area cultivated size quartile (0 to 0.6 hectares) compared to 43.6 percent among small-scale holdings cultivating in the 1.7 to 4.99 hectare range. Among medium-scale farmers, 52 to 69 percent used fertilizer on maize.
- 16.6 The amount of fertilizer used on average per smallholder ranged from 190 kilos to 290 kilos per hectare. The larger amounts were used by small-scale farmers, with the largest amount being use by those planting the least area to maize. For the smallest of small-scale holdings who are able to acquire fertilizer, using higher rates per hectare may be a way for trying to compensate for the very small area planted. Given the small area planted there could also be a higher degree of measurement error on this variable.
- 16.7 As noted in discussion of the aggregate maize yield performance shown in the CFS smallholder data, there are important differences in maize yield both among the quartiles of

small-scale and between small- and medium-scale smallholders. Again, there appears to be a clear advantage to using fertilizer on maize, although the smaller yield differences among fertilizer users and non users in the medium-scale smallholder category suggest there are also other factors at play in addition to fertilizer in determining yield. This could be quality of land, location in different agro-ecological areas and management practices that are not easily measured by this data. The maize yield for the smallest quartile of small-scale farmers is relatively highest among all small-scale farms. This holds also for yield if a farmer does not use fertilizer, again suggesting that those smallholders only able to plant very small areas may be using other management practices, as well as fertilizer to try to compensate for the very small area planted. Understanding these kinds of management differences and including insights about them in agricultural extension messages is very important for future work.

- 16.8 One of the food security objectives of GOZ input support and private sector development policy is to try to make sure that smallholders who will produce for the market as well as for home consumption receive some government assistance and/or improved commercial services. The CFS data help inform this policy goal by examining the relative use of the total fertilizer volume obtained from all sources among all smallholders, as compared to their respective contribution to the total potential marketed surplus. This has been done with the CFS 2007/08 data. Recall that medium-scale farmers represent about 4 percent of the smallholder population. But in the aggregate, medium-scale smallholders in 2007/08 reported using some 20 percent of all fertilizer used by all smallholders, and these same households declared their intention in the CFS to market some 28 percent of the total potential marketed surplus coming from smallholders.

- 16.9 The small-scale farmers in the quartile with the largest area cultivated (1.76 – 4.99 ha.) reported using 42 percent of the fertilizer used by all smallholders in 2007/08. This same group of farm households planned to deliver 43 percent of the maize marketed by all smallholders. The farms with the smallest area cultivated (.03 -.60 ha.), that is those in the lowest 25 percent grouping, reported using 5 percent of the fertilizer used by all smallholders, and these farmers expected to market only 3 percent of the total grain to be marketed by all smallholders.

- 16.10 Smallholders declared in the CFS their primary source of fertilizer acquired in 2007/08 as being private/commercial traders. They were the single largest source of fertilizer acquisition identified among both small- and medium-scale farmers. CFS data also reveal that in 07/08, the distribution of fertilizer from the FSP (Fertilizer Support Programm) varied greatly among farmers according to the size of area cultivated per farm. In general, the larger the area cultivated per farm, the larger the average quantity of fertilizer that was reported as used by those in the group. The percent of FSP fertilizer reported as used by small-scale households ranked by size of area cultivated from smallest to largest was 1.6, 6.2, 23 and 54 percent, and the 4 percent of medium-scale holdings received the remaining 14 percent of FSP fertilizer reported used by all smallholders.

- 16.11 In summary, in 2007/08, over 55 percent of small-scale farmers in the highest area cultivated size quartile acquired fertilizer from FSP, compared to less than 2 percent of small-scale farmers in the bottom area cultivated size quartile. Likewise, in 2007/08, over 45 percent of small-scale farmers in the highest area cultivated size quartile acquired fertilizer from PAM/Food Security Pack, compared to 5.1 percent of small-scale farmers in the bottom area cultivated size quartile.

- 16.12 Overall, the CFS data suggest significant levels of smallholder willingness to purchase or otherwise acquire fertilizer from private/commercial sources.

**Observation 17:** Table 12. Small and Medium Holdings: Source and Volume of Fertilizer Used By Major Supplier, and Maize Sales Intentions by District; CFS 07/08

- 17.1 CFS data in Table 12 takes advantage of the larger CFS sample size since 2006/07 to allow valid statistical estimates at the District level. Data by District on program accomplishments from the FSP (Fertilizer Support Programme) are also included in this Table. Given the potential importance of fertilizer access from private and public program sources, the data in Table 12 demonstrate the degree of coverage of private and public programs in the various Districts, according to how smallholders interviewed in the CFS indicated their main source of fertilizer, if any was used. The information shows from a District perspective that the vast majority of fertilizer is used on maize, and is coming from private/commercial sources. This information has potential utility to both commercial dealers as well as to FSP program managers to help assess areas, farmers and volumes of distribution covered and areas to target where neither commercial nor public coverage is obtained.

**Observation 18: Table 12. Maize sales intentions by District**

- To facilitate discussions of marketing campaigns for both private and public programs (FRA) in the 2008 marketing season, Table 12 also shows the sales intentions of smallholder farmers by District. Notable in this marketing season is the relatively high anticipated sales intentions among smallholders in Districts of Central, Northern, Copperbelt and Northwestern Provinces. In contrast in some Districts of Eastern and especially in many Districts of Southern Province, maize sales intentions are low. These derive in large part from the relative flood damage in Southern and parts of Eastern, and from the favorable moisture pattern for many parts of Central, Northern, Northwestern and Copperbelt.
- Table 13 presents smallholder reports of maize sales, or intentions to sell by Province, along with information from FRA on actual quantities of maize acquired by FRA in the respective marketing season covered. CFS data for 2006/07 and 2007/08 are based on the larger sample size, which allows robust estimates of farmer intentions at the Province and District level. This information could potentially help prioritize both commercial and public program buying efforts.

**Table 1a. Zambian Maize Production by Smallholder (Small- & Medium-Scale Holding Combined) and Commercial Farmers 2003/04 - 2007/08**

Type of Farmer	Crop Year	Area Planted (Ha)	Area Harvested (Ha)	Production (MT)		Yield (MT/Ha)	Planned Sales (MT)	Fertilizer Use (MT)	
S/M Scale Holding	02/03	627,529	476,493	823,209		1.22	218,204	47,950	
	03/04	589,036	490,939	993,930		n/a	246,910	47,850	
	04/05	750,351	379,959	598,411		.79	114,957	55,637	
	05/06	731,900	576,097	1,106,751		1.52	358,221	63,081	
	06/07	824,247	541,362	1,103,679		n/a	398,024	79,443	
	07/08	887,300	504,568	988,169		1.13	357,112	79,150	
Commercial	02/03	90,004	88,017	412,381		4.58	381,957	42,884	
	03/04	42,043	46,683	219,670		n/a	234,273	n/a	
	04/05	93,630	85,873	267,776		4.29	234,777	n/a	
	05/06	52,624	42,858	317,688		6.07	n/a	n/a	
	06/07	48,565	45,141	262,479		n/a	224,446	25,755	
	07/08	48,534	44,948	218,728		4.51	174,164	18,530	

Source: Crop Forecast Surveys, 2002/2003-2007/2008, MACO & CSO . Numbers are a composite of MACO final crop reports and FSRP aggregations from the micro data. Slight differences between MACO and FSRP totals in this table are due to alternative data cleaning rules applied by FSRP analysts. n/a = not available at this time

**Table 1b. Zambian Small- and Medium-Scale Holdings (Agricultural Households) Sampled in CFS, and National Smallholder Population Estimates, 2000/2001-2007/2008**

Agricultural year	CFS Sample Size of Smallholders Growing Crops (Number of Households)			National Estimate of Smallholders Growing Crops (Number of Households)			National Estimate of Smallholders Growing Crops (%)		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total %
2000/2001	5,786	734	6,520	760,983	22,259	783,242	97.2	2.8	100
2001/2002	5,617	725	6,342	765,323	25,566	790,889	96.8	3.2	100
2002/2003	6,788	791	7,579	1,002,298	24,788	1,027,086	97.6	2.4	100
2003/2004	6,516	1,337	7,853	946,672	43,160	989,832	95.6	4.4	100
2004/2005	6,786	1,247	8,033	1,127,418	44,030	1,171,448	96.2	3.8	100
2005/2006	6,651	1,239	7,890	1,148,470	40,386	1,188,856	96.6	3.4	100
2006/2007	10,887	2,269	13,156	1,126,386	48,349	1,174,735	95.9	4.1	100
2007/2008	11,055	2,161	13,216	1,101,219	44,610	1,145,829	96.1	3.9	100

Source: Crop Forecast Surveys, 2000/2001-2007/2008, MACO & CSO

Note: Households responding no to "Did you grow any crops?" not included in this table. See the table below for figures on such households.

**Table 2. Zambian Small- and Medium-Scale Households Sampled in CFS that Did Not Grow Crops, 2000/2001-2007/2008**

Agricultural year	CFS Sample Size of Smallholders Not Growing Crops (Number of Households)			National Estimate of Smallholders Not Growing Crops (Number of Households)		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total
2000/2001	391	13	404	46,693	268	46,961
2001/2002	152	5	157	16,346	76	16,422
2002/2003	50	0	50	6,020	0	6,020
2003/2004	93	8	101	11,314	103	11,417
2004/2005	58	5	63	11,123	28	11,151
2005/2006	61	12	73	11,435	199	11,634
2006/2007	282	32	314	29,902	439	30,341
2007/2008	216	23	239	18,085	288	18,373

Source: Crop Forecast Surveys, 2000/2001-2007/2008, MACO & CSO

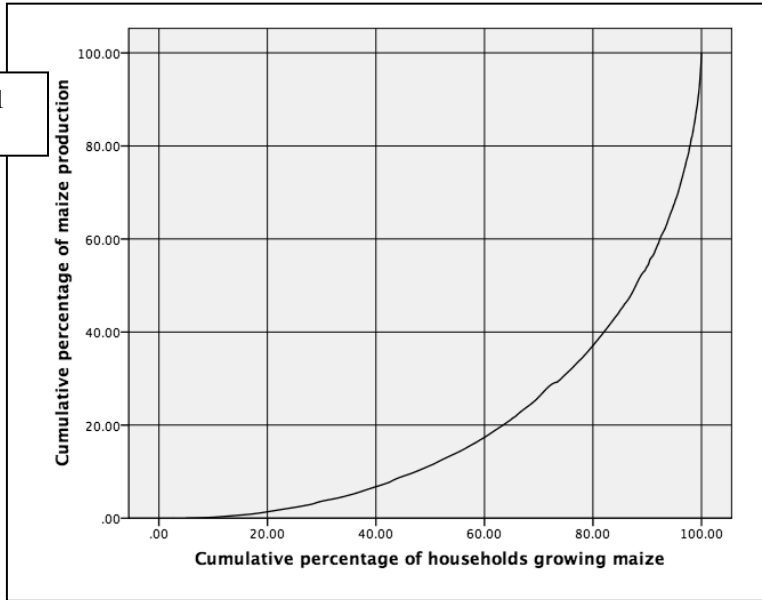
**Table 3. Production and Intended Sales of Maize Among Zambian Small- and Medium-Scale Agricultural Households, 2000/2001-2007/2008**

Agricultural year	Total Maize Production (mt)			Intended Total Maize Sales (mt)			% Maize-Growing HH's Selling Maize		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	All Small-holders
2000/2001	593,847	97,266	691,113	89,647	45,683	135,330	17.1	44.0	18.0
2001/2002	362,566	64,674	427,240	50,971	25,592	76,563	16.4	39.1	17.3
2002/2003	664,665	158,544	823,209	139,614	78,590	218,204	21.9	62.9	23.1
2003/2004	824,453	169,477	993,930	156,577	84,333	240,910	28.8	64.8	30.1
2004/2005	503,711	94,700	598,411	87,010	27,947	114,957	16.9	37.2	17.7
2005/2006	892,454	214,297	1,106,751	232,355	125,866	358,221	27.5	68.5	28.8
2006/2007	847,395	256,284	1,103,679	244,924	153,100	398,024	25.9	69.4	27.3
2007/2008	815,911	172,258	988,169	258,121	98,991	357,112	26.2	48.2	26.9

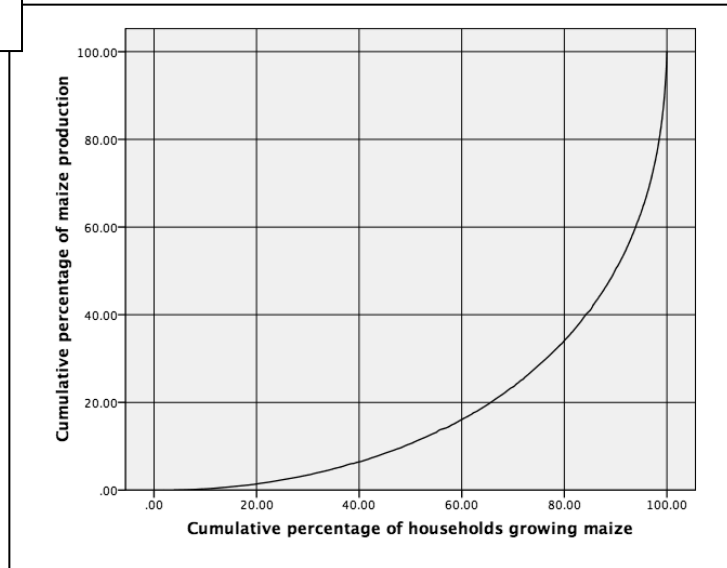
Source: Crop Forecast Surveys, 2000/2001-2007/2008, MACO & CSO

**Figure 1 A-D 2000/2001 to 2003/2004. Concentration of Maize Production by Small- & Medium-Scale Households in Zambia (CFS data)**

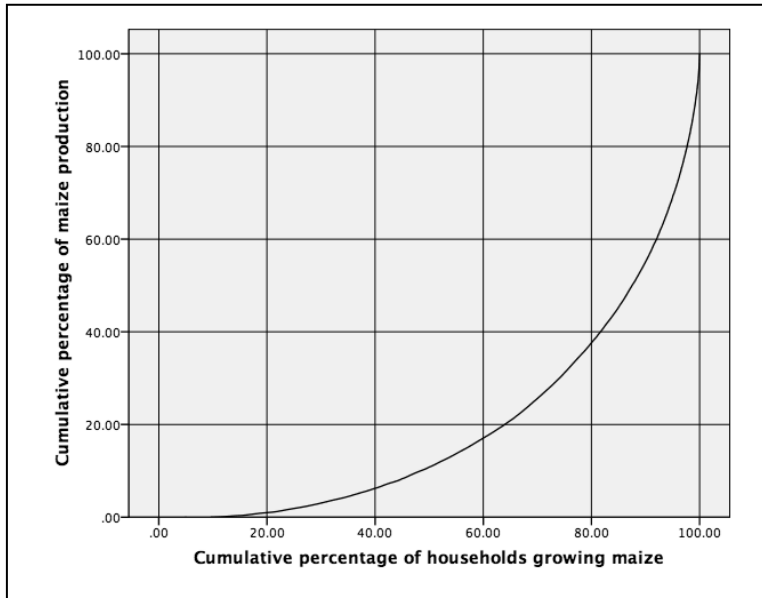
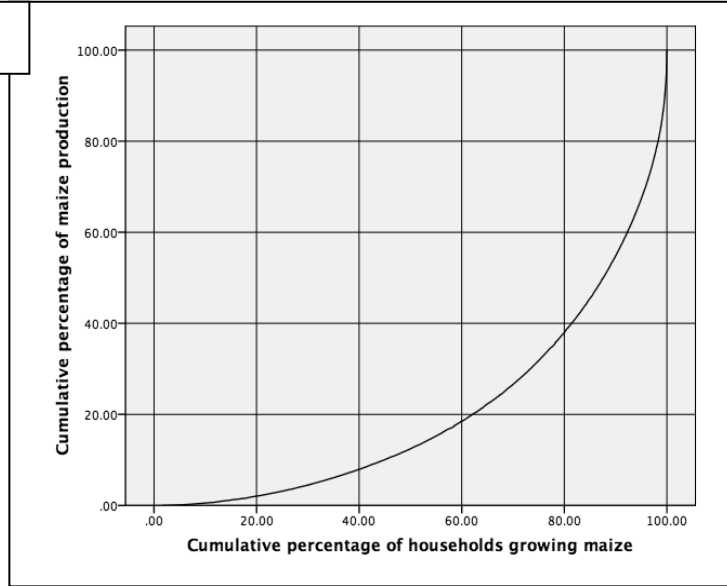
A. 2000/2001



C. 2002/2003

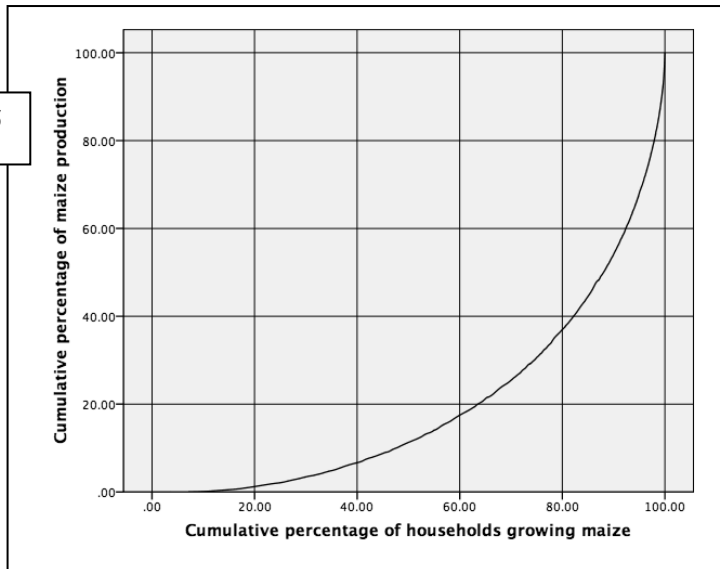


D. 2003/2004

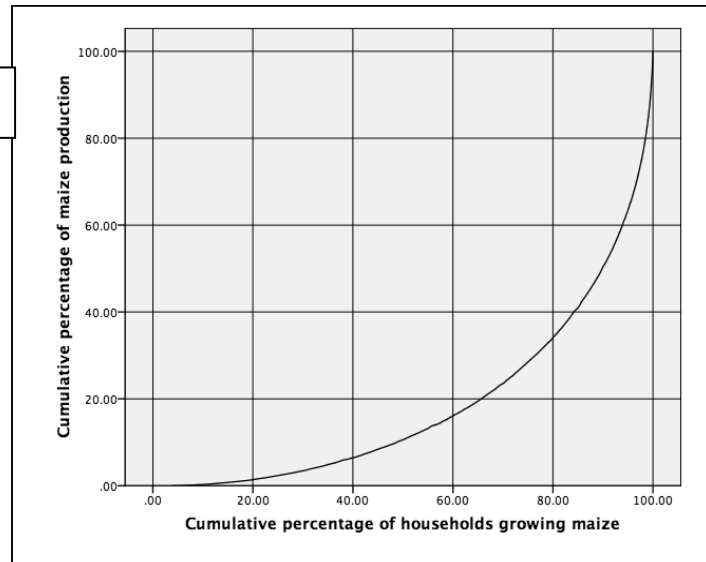


**Figure 1 E-H 2004/2005 to 2003/2004. Concentration of Maize Production by Small- & Medium-Scale Households in Zambia (CFS data)**

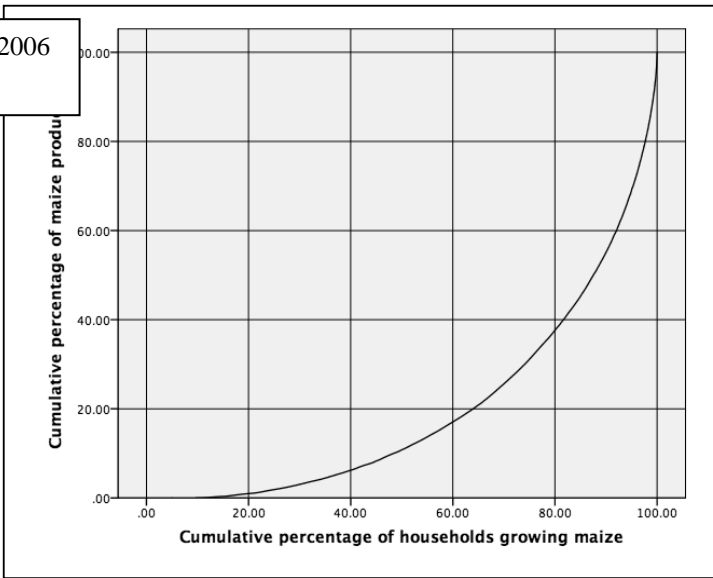
E. 2004/2005



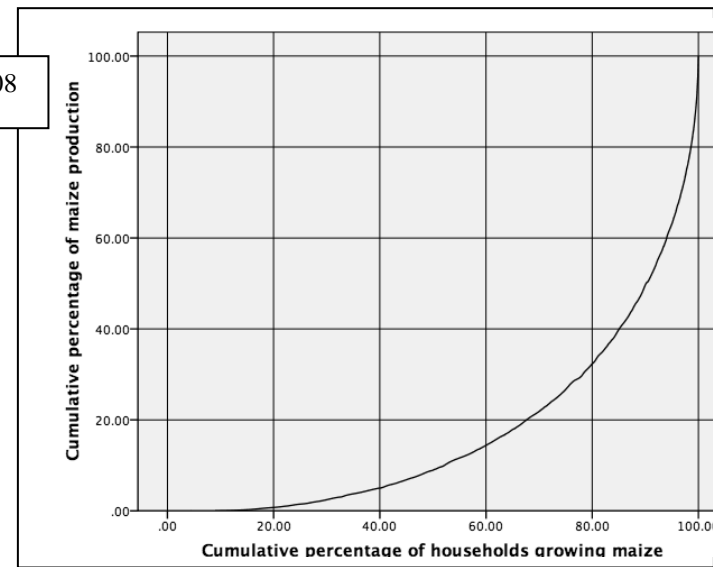
G. 2006/2007



F. 2005/2006

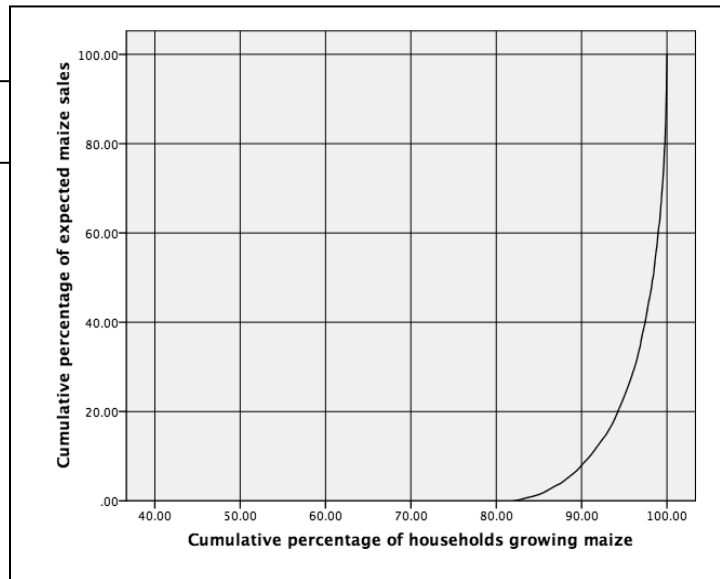


H. 2007/2008

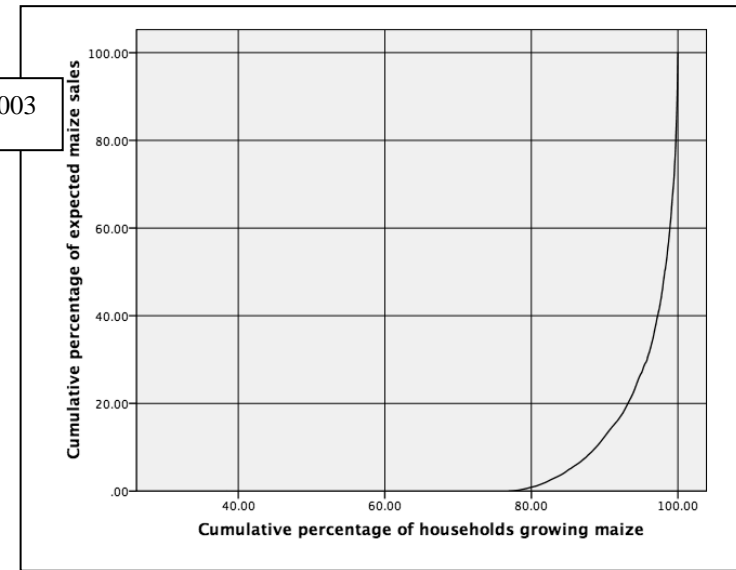


**Figure 2 A-D 2000/2001 to 2003/2004. Concentration of Maize Sales by Small- & Medium-Scale Households in Zambia (CFS data)**

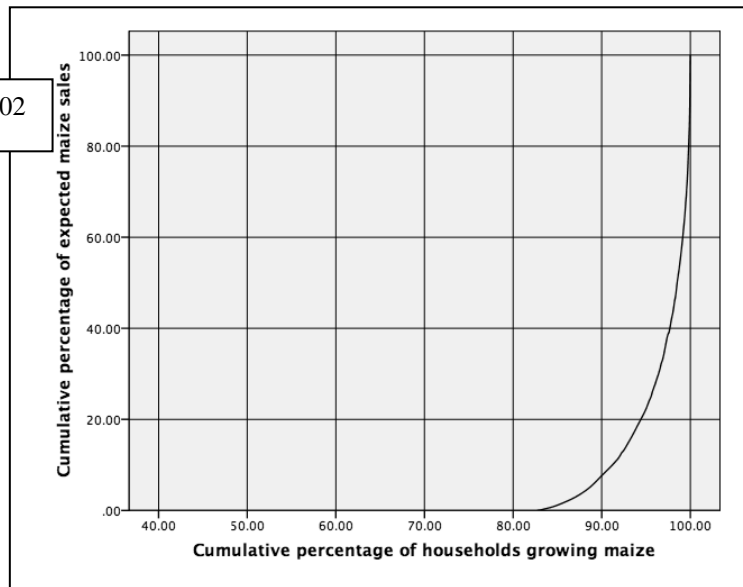
A. 2000/2001



C. 2002/2003



B. 2001/2002



D. 2003/2004

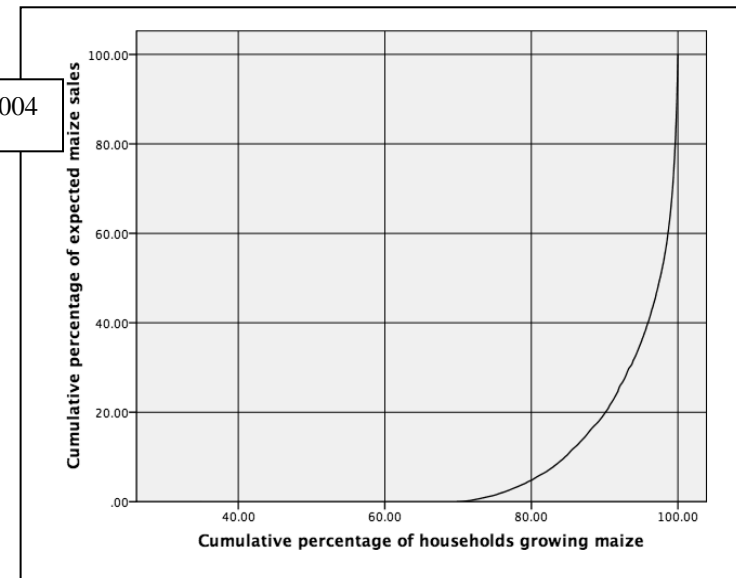
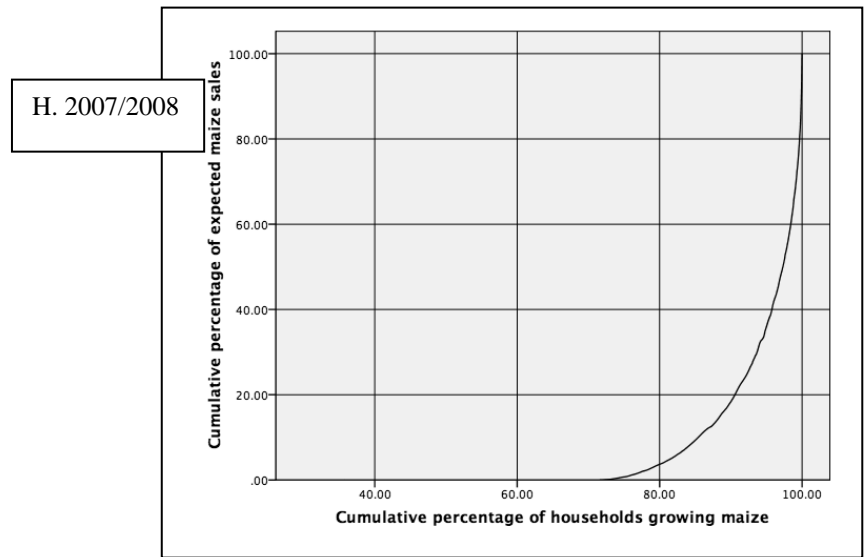
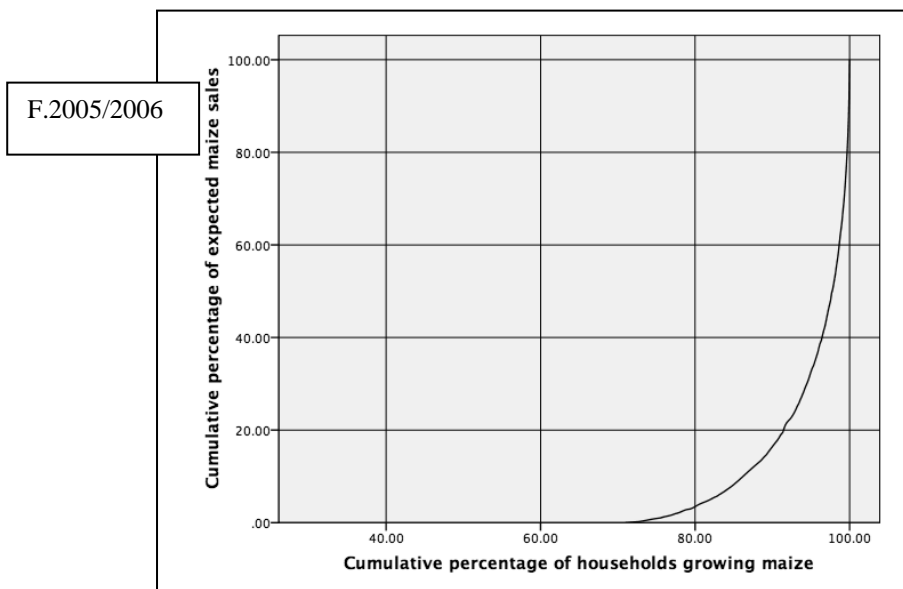
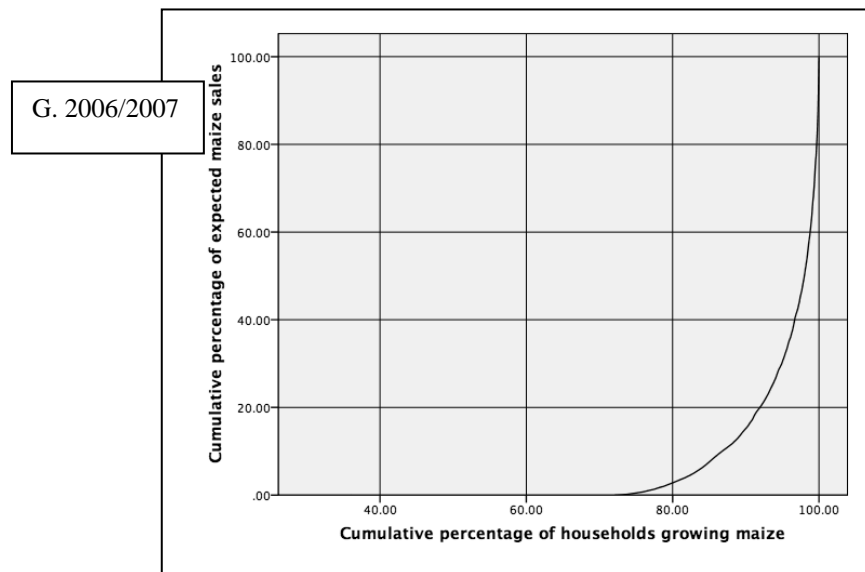
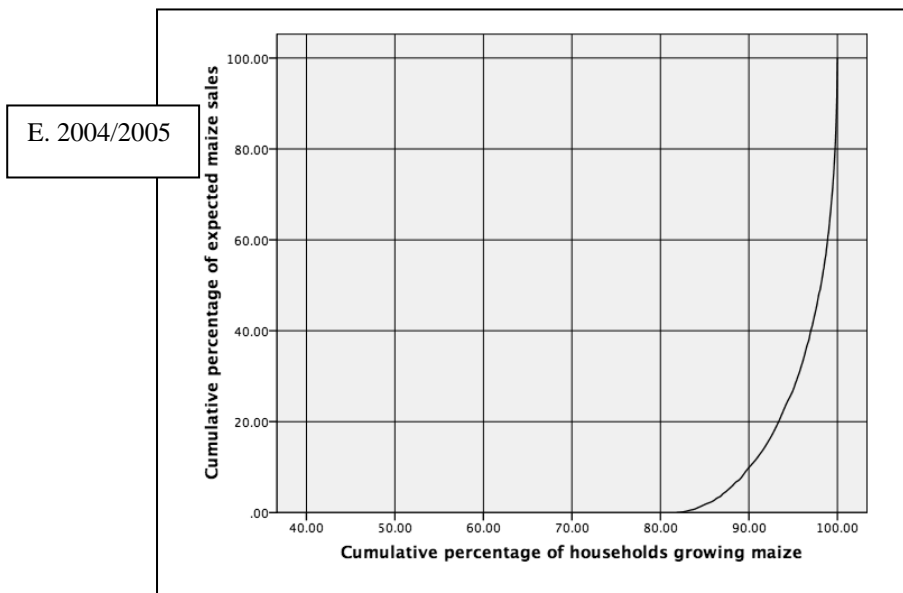


Figure 2 E-H 2004/2005 to 2007/2008. Concentration of Maize Sales by Small- & Medium-Scale Households in Zambia (CFS data)



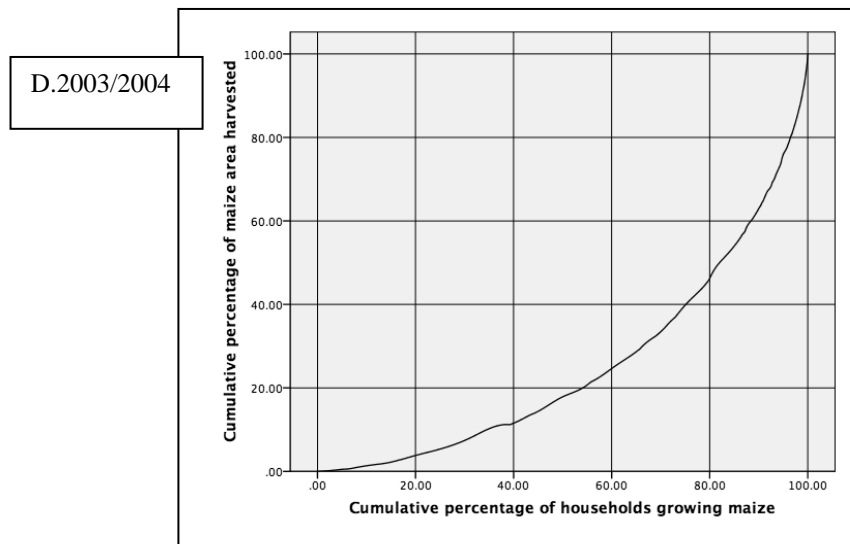
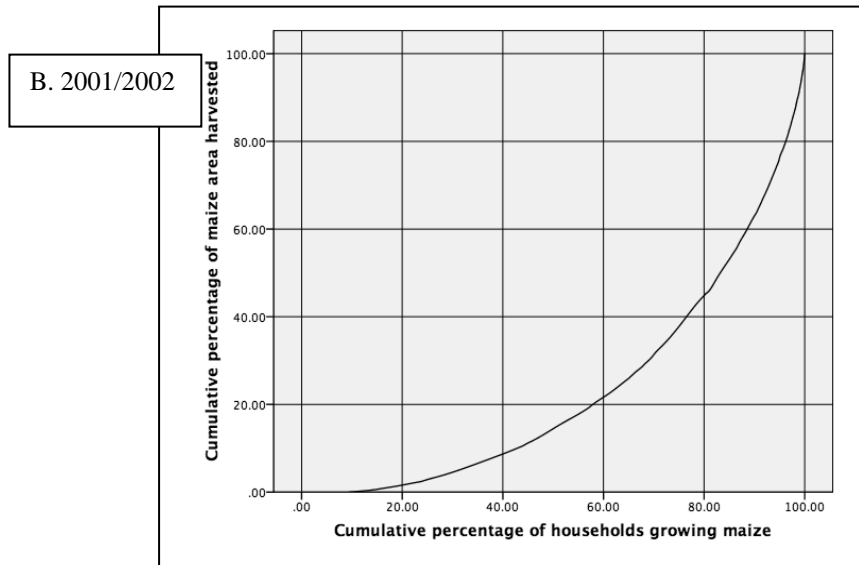
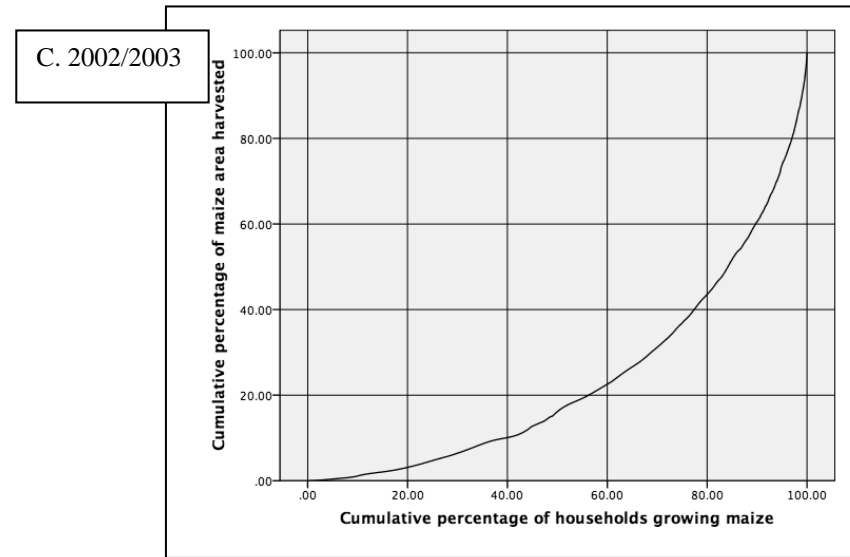
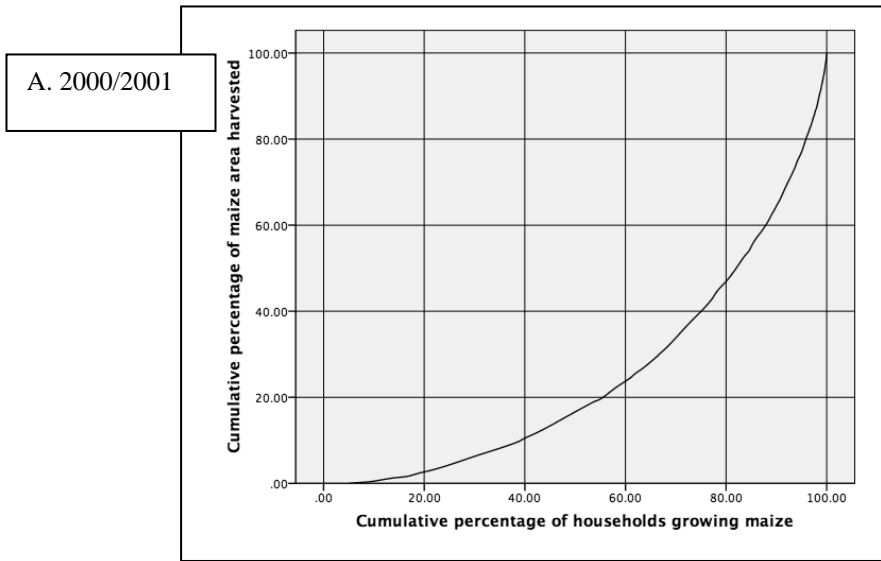
**Table 4. Area Planted and Final Area Harvested by Fertilizer Application for Maize by Zambian Small- and Medium-Scale Agricultural Households, 2000/2001-2007/2008**

Agricultural year	Maize Area Planted (ha)			Final Maize Area Harvested (ha)			% of Area Planted That Was Harvested Among Maize-Growing Households Using Fertilizer			% of Area Planted That Was Harvested Among Maize-Growing Households Not Using Fertilizer		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	All Smallholders Using Fert.	Small-scale	Medium-scale	All Smallholders Not Using Fert.
2000/2001	473,224	60,055	533,279	368,482	49,410	417,892	83.3	86.8	84.1	76.0	76.6	76.1
2001/2002	429,813	84,689	514,502	307,139	50,518	357,657	80.8	67.1	77.3	67.8	52.7	66.0
2002/2003	527,472	100,057	627,529	396,156	80,337	476,493	80.1	81.1	80.4	72.0	78.5	72.6
2003/2004	490,234	98,802	589,036	412,637	78,302	490,939	88.0	83.3	86.9	81.6	73.1	80.6
2004/2005	630,676	119,675	750,351	322,122	57,837	379,959	54.5	48.8	53.1	49.2	47.6	49.1
2005/2006	626,473	105,427	731,900	478,075	89,022	567,097	85.5	88.8	86.2	70.7	76.0	71.2
2006/2007	682,663	141,584	824,247	442,411	98,951	541,362	75.3	78.0	76.0	58.0	55.3	57.7
2007/2008	738,350	138,950	877,300	429,787	74,781	504,568	64.5	60.8	63.7	53.5	40.9	52.2

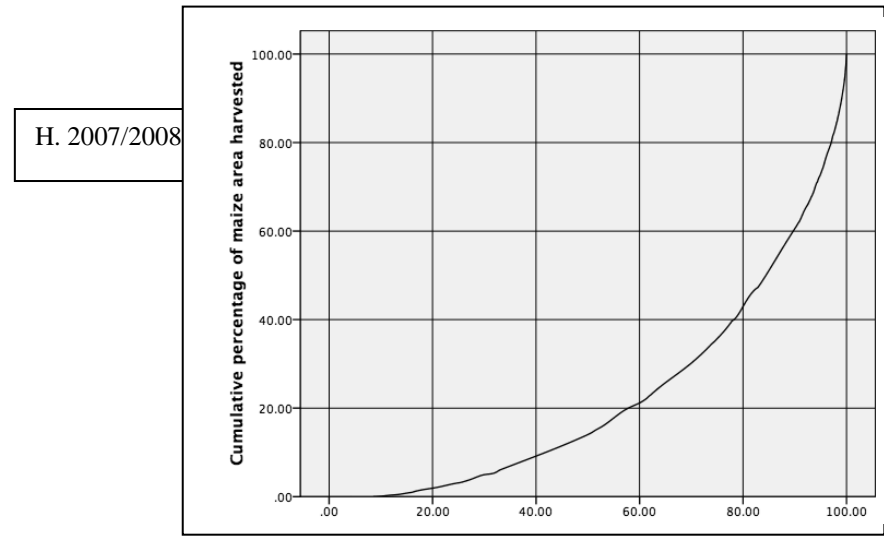
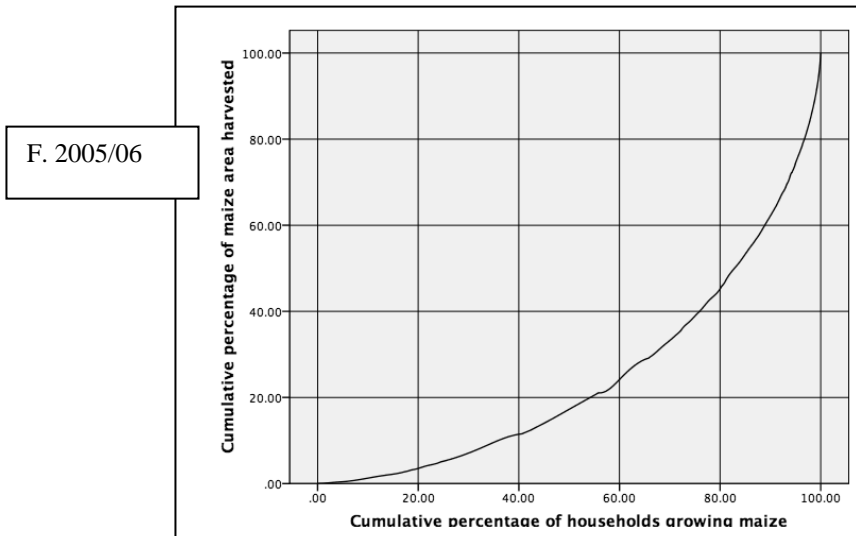
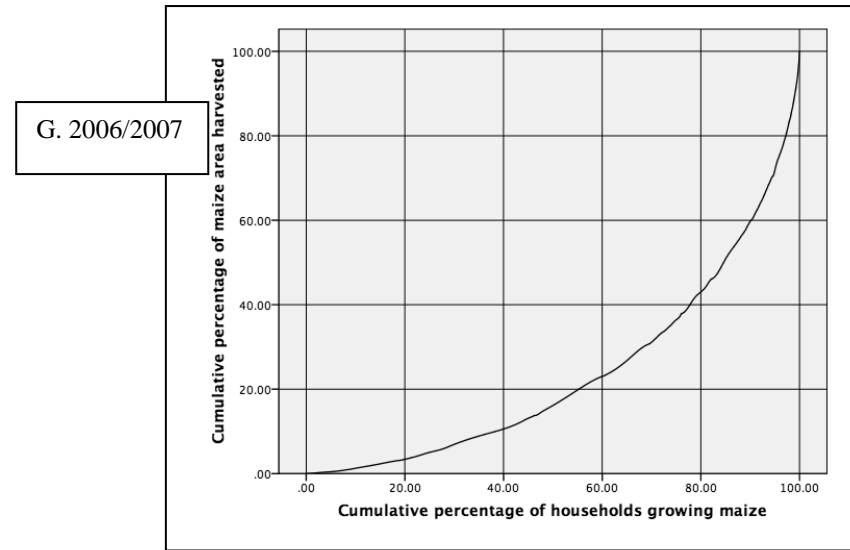
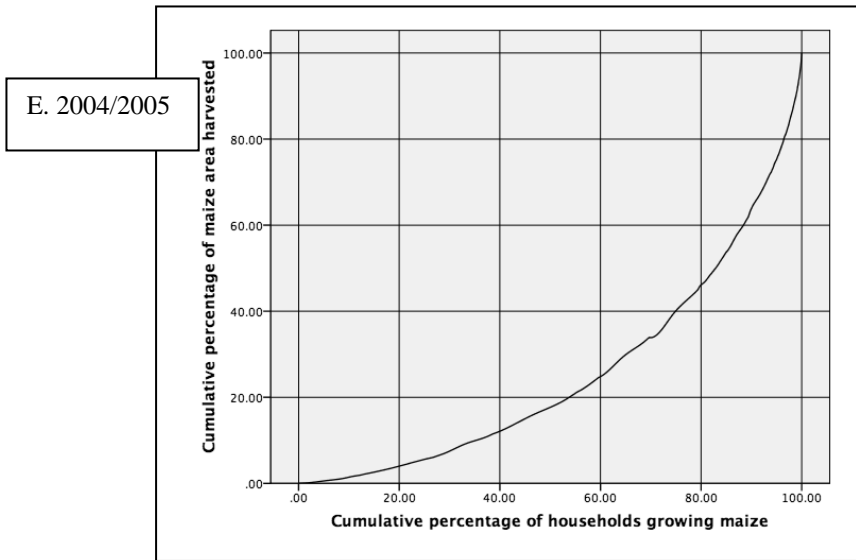
Source: Crop Forecast Surveys, 2000/2001-2007/2008, MACO & CSO

Agricultural year	% of Area Planted That Was Harvested Among All Maize-Growing Households		
	Small-scale	Medium-scale	Total
2000/2001	77.9	82.3	78.4
2001/2002	71.5	59.7	69.5
2002/2003	75.1	80.3	75.9
2003/2004	84.2	79.3	83.3
2004/2005	51.1	48.3	50.6
2005/2006	76.3	84.4	77.5
2006/2007	64.8	69.9	65.7
2007/2008	58.2	53.8	57.5

Figure 3 A-D 2000/2001 to 2003/2004. Concentration of Maize Area Harvested by Small- & Medium-Scale Households in Zambia (CFS data)



**Figure 3 E-H 2004/2005 to 2007/2008. Concentration of Maize Area Harvested by Small- & Medium-Scale Households in Zambia (CFS data)**



**Table 5. Aggregate Fertilizer Use by Zambian Small- and Medium-Scale Agricultural Households, 2000/2001-2007/2008**

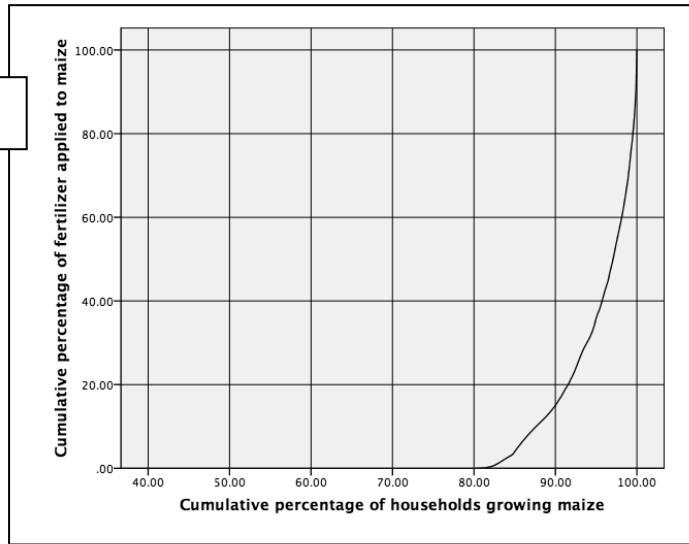
Agricultural year	Total Fertilizer Use On 13 Crops* (mt)			Total Fertilizer Use On Maize (mt)			% Maize-Growing HH's Using Fertilizer on Maize			Maize Yield – Smallholder Using Fertilizer (mt per ha of harvested area)		Maize Yield - Smallholders Not Using Fertilizer (mt per ha ha. of harvested areas)	
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	All Smallholders	Small-scale	Medium Scale	Small-scale	Medium Scale
2000/2001	22,893.1	6,478.4	29,371.5	21,538.1	6,303.0	27,841.1	18.9	43.7	19.7	1.22	1.25	0.74	0.52
2001/2002	24,042.5	6,614.9	30,657.4	22,464.2	6,390.1	28,854.3	22.1	42.8	22.9	1.46	1.56	1.05	0.94
2002/2003	39,888.4	10,417.5	50,305.9	37,904.9	10,045.4	47,950.3	31.0	65.8	32.0	2.19	2.21	1.33	1.42
2003/2004	41,038.9	11,458.2	52,497.1	37,263.7	10,586.6	47,850.3	32.6	51.3	33.3	2.26	2.45	1.81	1.67
2004/2005	47,435.9	14,106.4	61,542.3	42,503.4	13,134.1	55,637.5	30.1	52.1	30.9	1.95	1.98	1.33	1.12
2005/2006	52,034.2	14,956.2	66,990.4	49,069.3	14,012.5	63,081.8	30.5	57.6	31.3	2.38	2.69	1.49	1.76
2006/2007	62,949.3	18,363.1	81,312.4	61,576.7	17,866.6	79,443.3	34.0	58.8	34.8	2.53	2.96	1.39	1.66
2007/2008	64,628.0	16,622.7	81,250.7	62,904.8	16,245.4	79,150.2	35.2	59.1	36.0	2.49	2.73	1.37	1.13

Source: Crop Forecast Surveys, 2000/2001-2007/2008, MACO & CSO

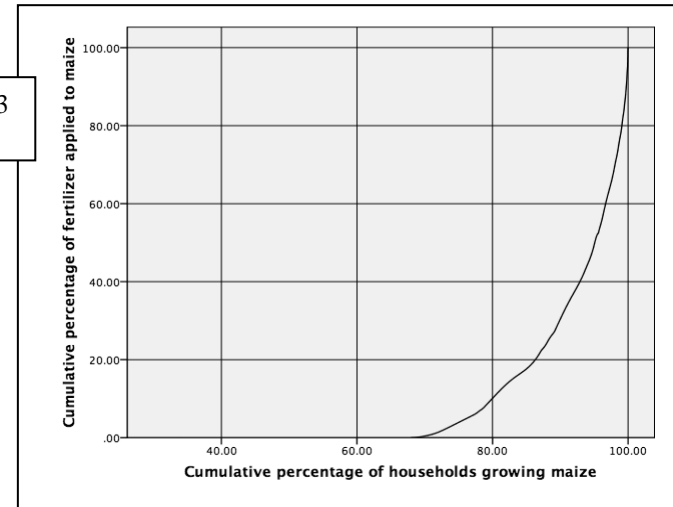
\*Note: Crops included are maize, sorghum, rice, millet, sunflower, groundnuts, soybeans, seed cotton, Virginia tobacco, burley tobacco, mixed beans, cowpeas, and sweet potatoes.

**Figure 4 A-D 2000/2001 – 2003/2004. Concentration of Smallholder Fertilizer Application to Maize in Zambia, (CFS data)**

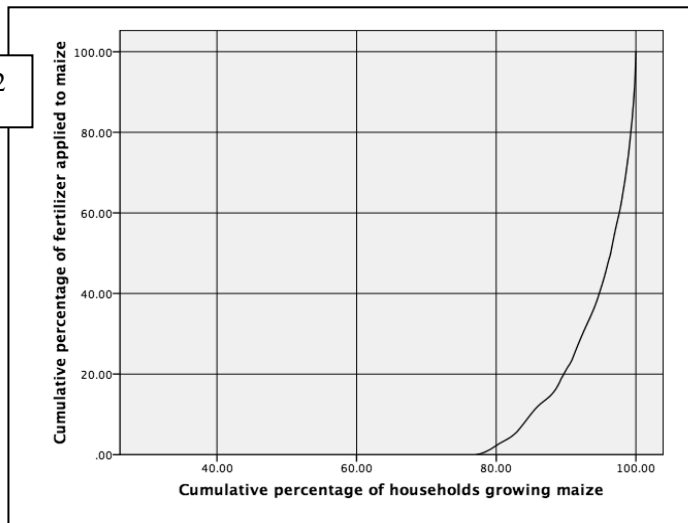
A. 2000/2001



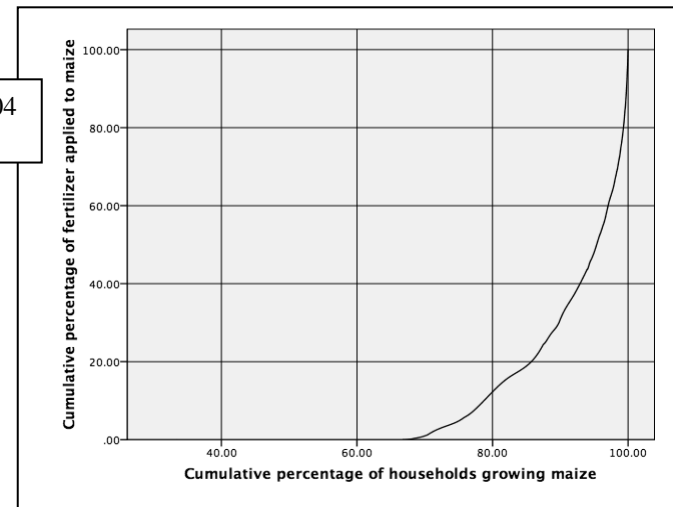
C. 2002/2003



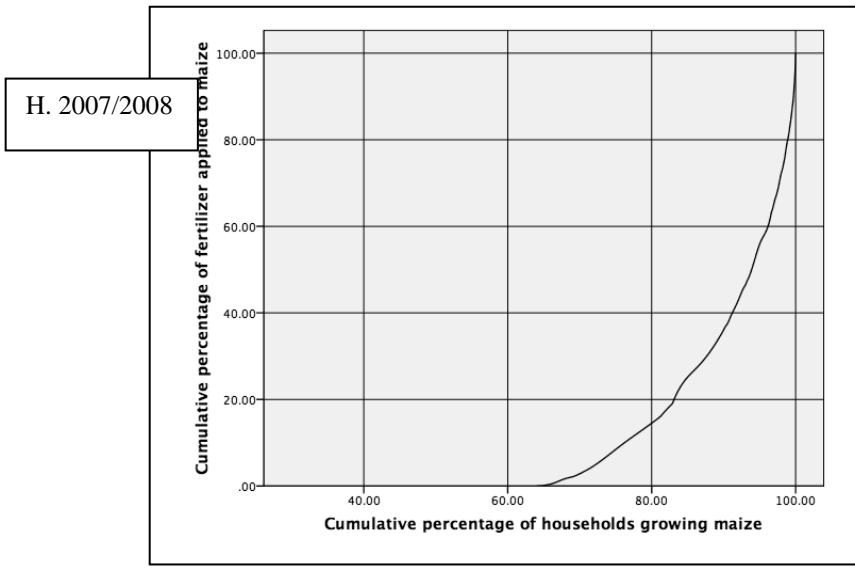
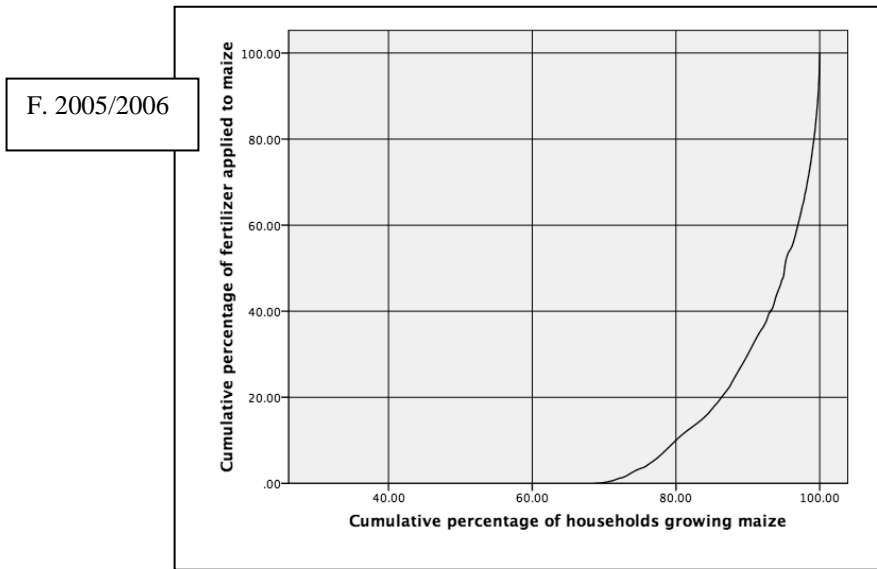
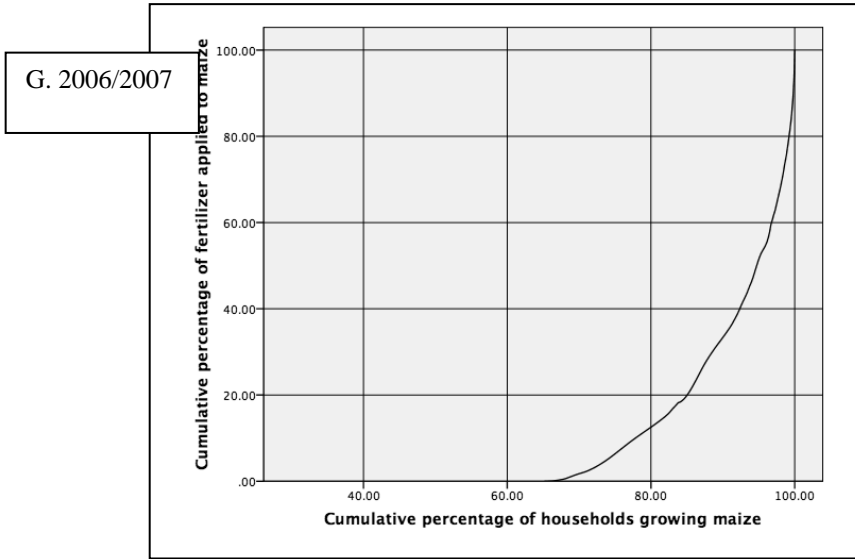
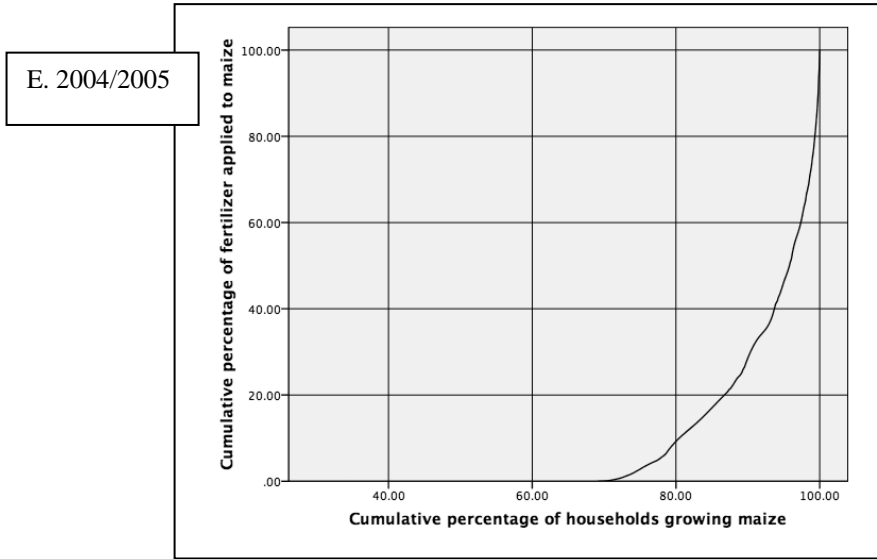
B. 2001/2002



D. 2003/2004



**Figure 4 E-H 2004/2005 – 2007/2008. Concentration of Smallholder Fertilizer Application to Maize in Zambia, (CFS data)**



**Table 6. Fertilizer Use on All Crops and on Maize by Main Source of Fertilizer – Zambian Small- and Medium-Scale Agricultural Households, 2003/2004\***

Main source of fertilizer**	Total Fertilizer Use on 13 crops (mt)***			Total Fertilizer Use on Maize (mt)		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total
Private/commercial suppliers	20,597.1	6,929.2	27,526.3	18,652.0	6,285.8	24,937.80
NGO	4,137.9	306.8	4,444.7	3,259.4	186.2	3,445.60
Food Security Pack	3,023.0	156.3	3,179.3	2,885.2	156.3	3,041.50
Fertilizer Support Programme	10,818.7	3,125.5	13,944.2	10,378.6	3,083.1	13,461.70
Friends/Relatives	1,211.8	77.5	1,289.3	1,113.7	41.4	1,155.10
Own harvest****	565.2	831.0	1,396.2	397.0	806.6	1,203.60
No source listed	685.2	31.90	717.1	577.80	27.20	605.00
<b>TOTAL</b>	<b>41,038.9</b>	<b>11,458.2</b>	<b>52,497.1</b>	<b>37,263.70</b>	<b>10,586.60</b>	<b>47,850.30</b>

Source: Crop Forecast Surveys, 2003/2004, MACO & CSO

Notes: \*Only the CFS for agricultural year 2003/2004 and 2007/2008 included information on the source of fertilizer.

\*\*The relevant question on the CFS was “What was the source of most of the fertilizer?”

\*\*\*Crops included are maize, sorghum, rice, millet, sunflower, groundnuts, soybeans, seed cotton, Virginia tobacco, burley tobacco, mixed beans, cowpeas, and sweet potatoes.

\*\*\*\*“Own harvest” was listed as a code for the source of fertilizer. It is not clear what this means, since the question refers to basal fertilizer and top dressing. (These responses may be miscoded or, e.g., the respondent may have misinterpreted the question as including manure.)

**Table 7. Number of Households Obtaining Fertilizer by Main Source of Fertilizer – Zambian Small- and Medium-Scale Agricultural Households, 2003/2004**

Main source of fertilizer	Number of households obtaining most fertilizer through this channel (all 13 crops)			Number of households obtaining most fertilizer used on maize through this channel		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total
Private/commercial suppliers	132,417	9,184	141,601	122,834	8,764	131,598
NGO	34,703	1,353	36,056	31,629	1,063	32,692
Food Security Pack/PAM	25,276	522	25,798	25,256	522	25,778
Fertilizer Support Programme	46,727	3,639	50,366	46,185	3,639	49,824
Friends/Relatives	14,988	312	15,300	14,346	243	14,589
Own harvest	2,969	545	3,514	2,900	545	3,445
No source listed	9,094	297	9,391	6,397	180	6,577
<b>TOTAL†</b>	<b>258,201</b>	<b>14,920</b>	<b>273,121</b>	<b>247,331</b>	<b>14,511</b>	<b>261,842</b>

Source: Crop Forecast Survey, 2007/2008, MACO & CSO

† Totals are less than column sums because fertilizer source questions were asked for each of the households' fields and some households reported different fertilizer sources for different fields.

**Table 8. Fertilizer Use by Main Source of Fertilizer – Zambian Small- and Medium-Scale Agricultural Households, 2007/2008\***

Main source of fertilizer**	Total Fertilizer use (mt)			Total Fertilizer Use on Maize (mt)		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total
Private/commercial suppliers (a)	46,436	13,496	59,933	46,012	13,353	59,365
Outgrower scheme (b)	1,242	172	1,415	185	8	194
<i>Commercial purchases (a+b)</i>	<i>47,680</i>	<i>13,669</i>	<i>61,348</i>	<i>46,199</i>	<i>13,361</i>	<i>59,559</i>
NGO	882	205	1,087	819	160	979
Food Security Pack/PAM	1,697	413	2,110	1,697	413	2,110
Fertilizer Support Programme	12,800	2,033	14,832	12,689	2,016	14,706
Friends/Relatives/Other farmer	1,312	238	1,550	1,250	231	1,480
No source listed	257	66	323	252	66	317
<b>TOTAL</b>	<b>64,628</b>	<b>16,623</b>	<b>81,250</b>	<b>62,905</b>	<b>16,246</b>	<b>79,151</b>

Source: Crop Forecast Surveys, 2007/2008, MACO & CSO

Notes: \*Only the CFS for agricultural year 2003/2004 and 2007/2008 included information on the source of fertilizer.

\*\*The relevant question on the CFS was “What was the source of most of the fertilizer?”

**Table 9. Number of Households Obtaining Fertilizer by Main Source of Fertilizer – Zambian Small- and Medium-Scale Agricultural Households, 2007/2008**

Main source of fertilizer	Number of households obtaining most fertilizer through this channel (all 13 crops)			Number of households obtaining most fertilizer used on maize through this channel		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total
Private/commercial suppliers	248,247	13,694	261,941	246,057	13,660	259,717
Outgrower scheme	5,147	388	5,535	890	28	918
NGO	4,143	240	4,383	3,773	220	3,993
Food Security Pack/PAM	9,136	542	9,678	9,099	542	9,641
Fertilizer Support Programme	53,263	3,375	56,638	52,942	3,328	56,271
Friends/Relatives/Other farmer	10,743	568	11,311	10,238	515	10,754
No source listed	1,804	115	1,919	1,006	115	1,121
<b>TOTAL†</b>	<b>326,992</b>	<b>17,929</b>	<b>344,921</b>	<b>321,798</b>	<b>17,794</b>	<b>339,592</b>

† Totals are less than column sums because fertilizer source questions were asked for each of a given household’s fields and some households reported different fertilizer sources for different fields.

**Table 10. Basal & Top Dressing Fertilizer Use by Main Source of Fertilizer – Zambian Small- and Medium-Scale Agricultural Households, 2007/2008\***

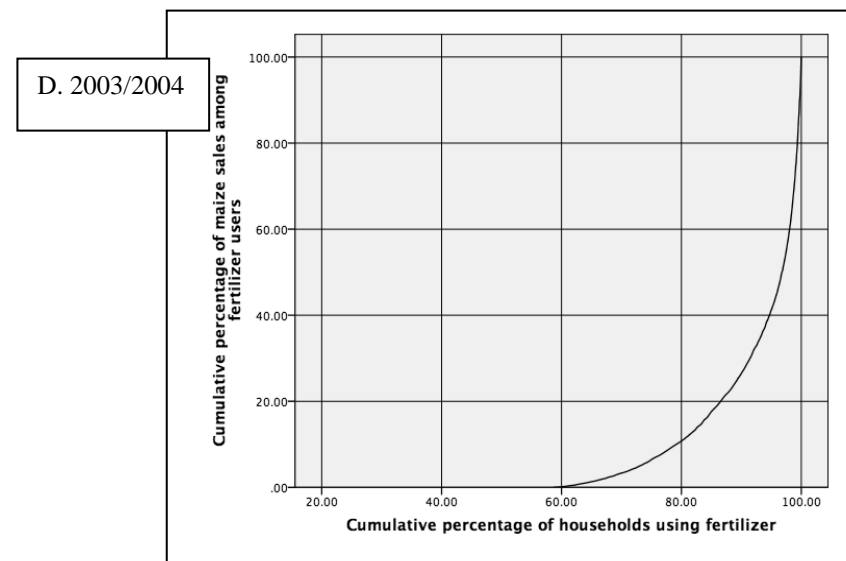
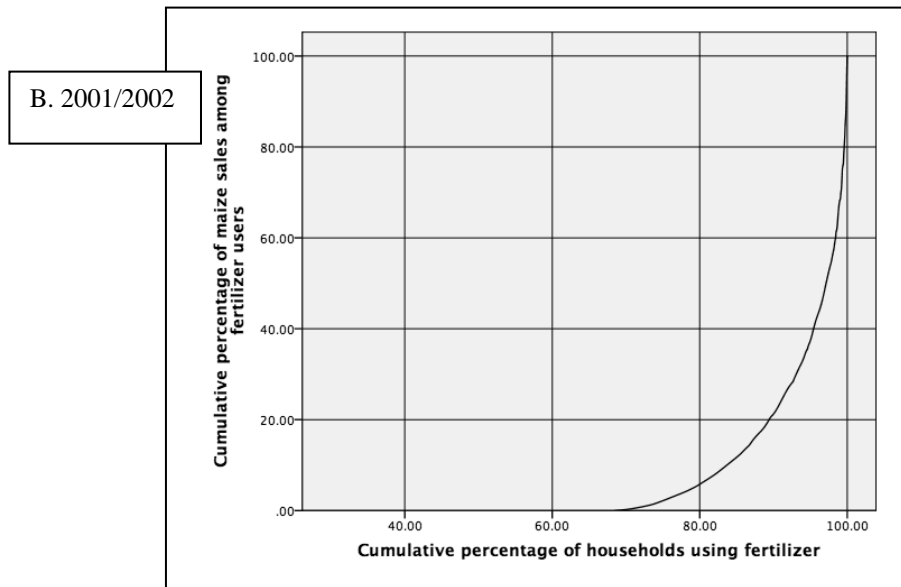
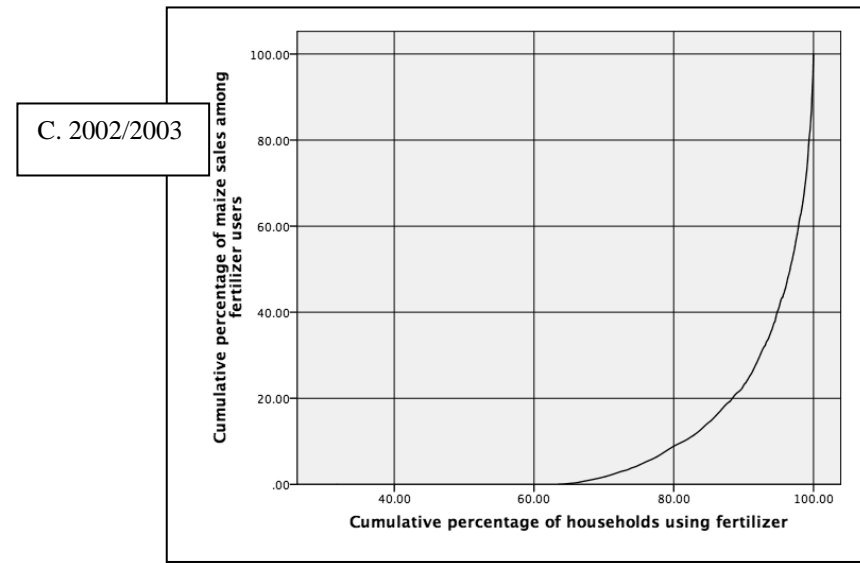
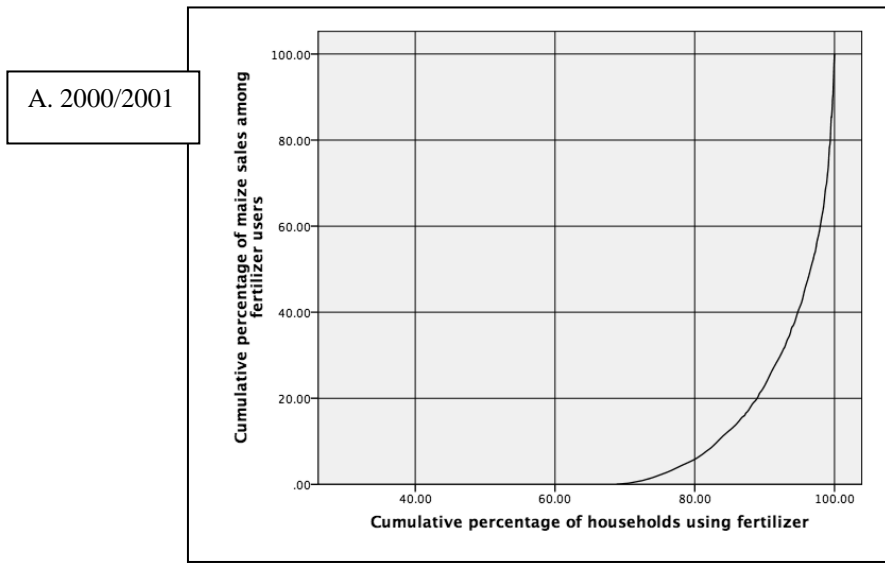
Main source of fertilizer**	Total basal fertilizer use (mt)			Total top dressing fertilizer use (mt)			Total basal fertilizer use on maize (mt)			Total top dressing fertilizer use on maize (mt)		
	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total	Small-scale	Medium-scale	Total
Private/commercial suppliers (a)	23,272	6,684	29,957	23,164	6,812	29,976	23,040	6,604	29,644	22,972	6,749	29,721
Outgrower scheme (b)	686	105	791	556	67	624	95	7	102	90	1	92
<i>Commercial purchases (a+b)</i>	<i>23,959</i>	<i>6,789</i>	<i>30,748</i>	<i>23,721</i>	<i>6,880</i>	<i>30,600</i>	<i>23,136</i>	<i>6,611</i>	<i>29,746</i>	<i>23,063</i>	<i>6,750</i>	<i>29,813</i>
NGO	450	105	555	432	100	532	423	77	500	396	83	479
Food Security Pack/PAM	823	207	1,030	874	206	1,080	823	207	1,030	874	206	1,080
Fertilizer Support Programme	6,343	1,036	7,379	6,457	997	7,453	6,293	1,025	7,319	6,396	991	7,387
Friends/Relatives/Other farmer	574	114	688	738	124	862	539	114	652	711	117	828
No source listed	59	17	76	198	49	247	57	17	74	195	49	243
<b>TOTAL</b>	<b>32,208</b>	<b>8,268</b>	<b>40,476</b>	<b>32,420</b>	<b>8,355</b>	<b>40,774</b>	<b>31,271</b>	<b>8,050</b>	<b>39,321</b>	<b>31,634</b>	<b>8,196</b>	<b>39,830</b>

Source: Crop Forecast Surveys, 2007/2008, MACO & CSO

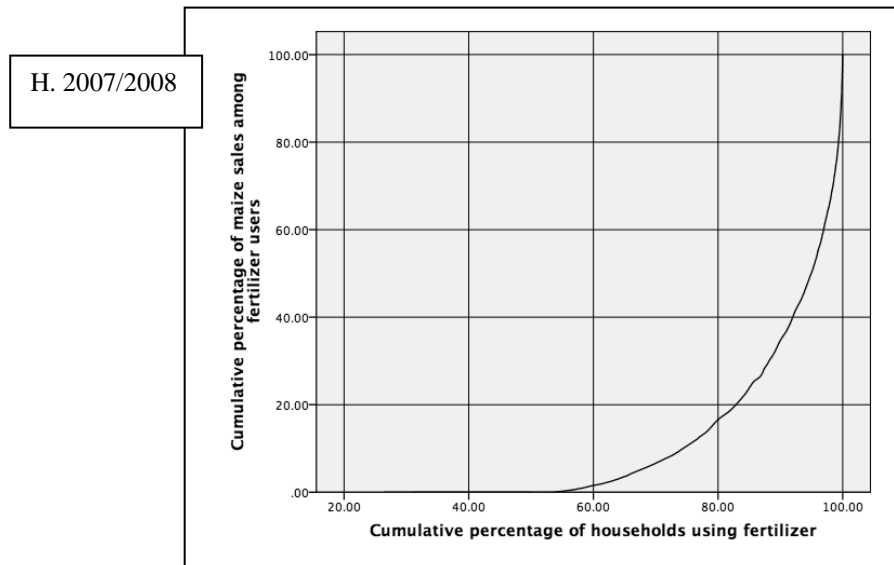
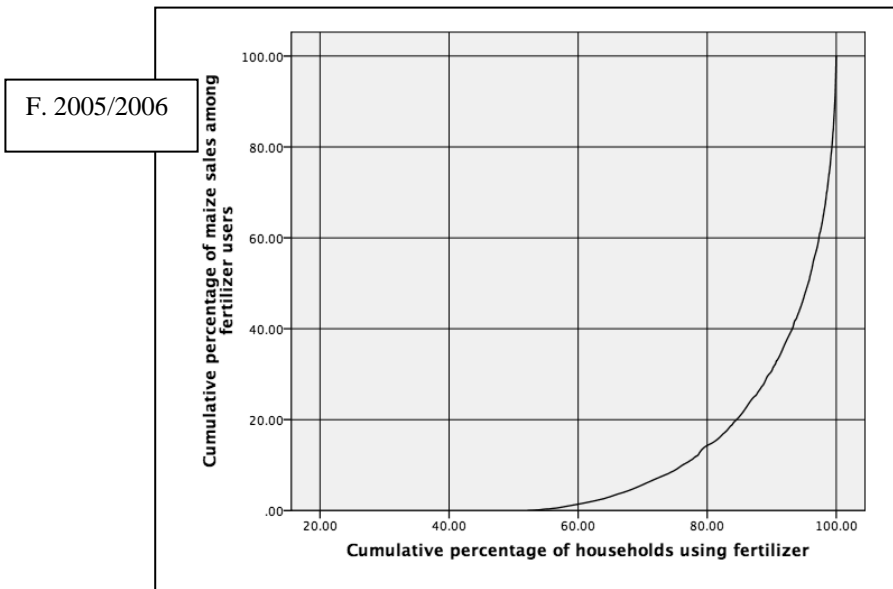
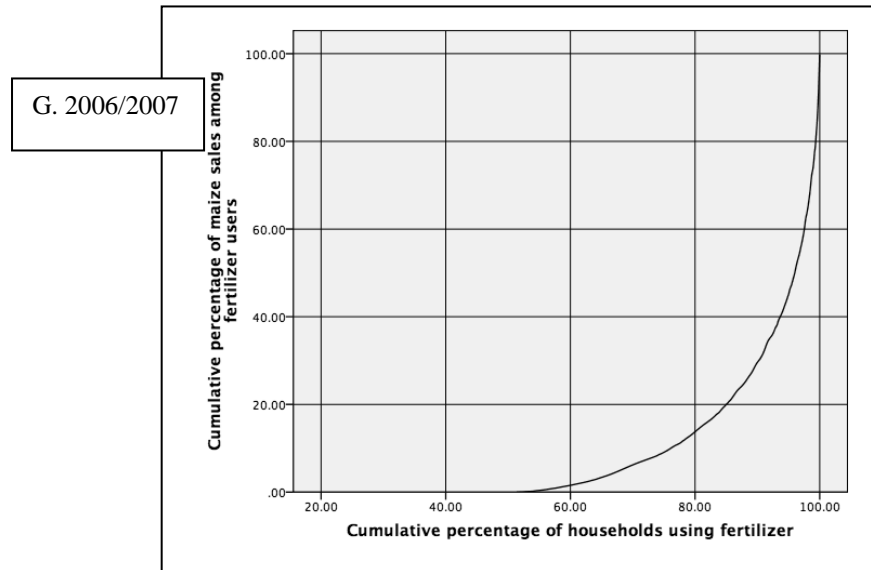
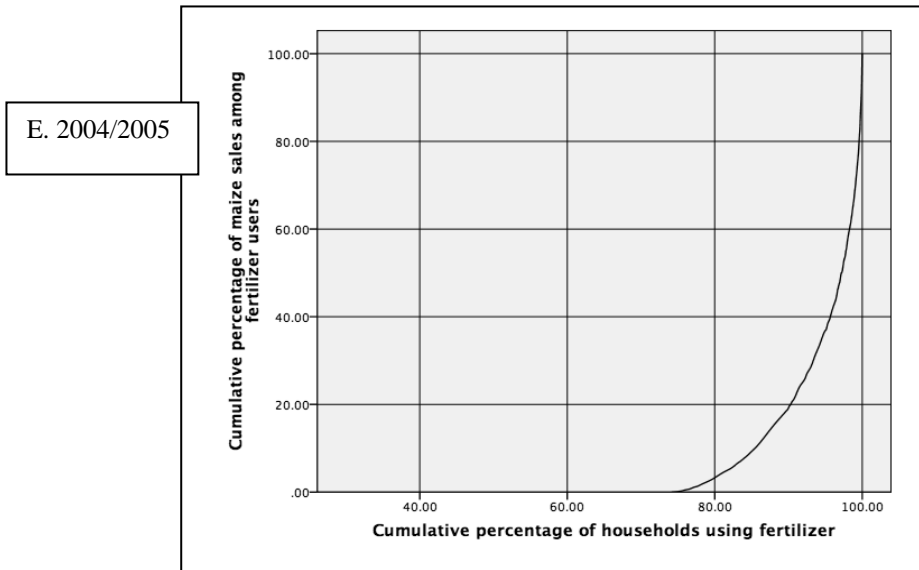
Notes: \*Only the CFS for agricultural year 2003/2004 and 2007/2008 included information on the source of fertilizer.

\*\*The relevant question on the CFS was “What was the source of most of the fertilizer?”

**Figure 5 A-D 2000/2001 – 2003/2004. Concentration of Smallholder Maize Sales Among Fertilizer Users in Zambia, (CFS data)**



**Figure 5 E-H 2004/2005 – 2007/2008. Concentration of Smallholder Maize Sales Among Fertilizer Users in Zambia, (CFS data)**



**Table 11. Selected Production, Marketing and Fertilizer Use Characteristics of Zambian Small- and Medium-Scale Agricultural Households by Quartile of Total Area Planted per Household, 2000/2001-2007/2008 (Using CSO/MACO Crop Forecast Data)**

Agricultural year	Quartiles of Total Area Planted by Small-Scale Farmers (14 crops *)				Quartiles of Total Area Planted by Medium-Scale Farmers (14 crops *)			
	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest
2000/2001	(0.3-0.81 ha/hh)	(0.82-1.27 ha/hh)	(1.28-2.06 ha/hh)	(2.07-4.99 ha/hh)	(5.00-5.44 ha/hh)	(5.46-6.15 ha/hh)	(6.16-7.46 ha/hh)	(7.49-19.24 ha/hh)
% hhs not growing maize	21.1%	16.9%	17.1%	12.9%	11.0%	25.0%	5.9%	4.4%
area planted maize for growers –ha/hh	0.33	0.58	0.79	1.31	2.24	2.47	2.35	3.90
area harvested maize for growers –ha/hh	0.25	0.46	0.61	1.02	1.99	1.90	1.78	3.33
% hh using fertilizer on maize	14.1%	17.1%	17.9%	25.7%	53.0%	39.8%	36.4%	45.5%
fertilizer used on maize among users - mt/ha	0.26	0.22	0.21	0.19	0.28	0.13	0.10	0.20
maize yield among fertilizer users – mt/hh	2.35	2.10	2.14	2.16	2.12	2.45	1.66	2.30
maize yield among non-fert. users – mt/hh	1.56	1.51	1.59	1.45	1.35	1.42	1.45	1.38
average maize production - mt/hh	0.41	0.72	0.99	1.66	4.03	3.35	3.20	7.07
% of hhs selling maize	7.7%	14.5%	19.0%	26.2%	42.5%	40.8%	33.5%	58.6%
amount maize sold for sellers - mt/hh	0.40	0.51	0.78	1.19	4.81	2.72	4.05	6.30
2001/2002	(0.06-0.80 ha/hh)	(0.81-1.25 ha/hh)	(1.26-2.00 ha/hh)	(2.01-4.99 ha/hh)	(5.00-5.50 ha/hh)	(5.51-6.11 ha/hh)	(6.12-7.69 ha/hh)	(7.80-18.81 ha/hh)
% hhs not growing maize	17.5%	18.6%	19.7%	12.8%	5.4%	8.1%	10.4%	6.7%
area planted maize for growers –ha/hh	0.34	0.59	0.74	1.30	2.33	2.66	3.33	5.57
area harvested maize for growers –ha/hh	0.24	0.44	0.53	0.92	1.60	1.81	2.08	2.79
% hh using fertilizer on maize	16.7%	21.1%	20.5%	29.8%	47.8%	28.2%	41.3%	53.4%
fertilizer used on maize among users - mt/ha	0.31	0.22	0.23	0.20	0.20	0.18	0.19	0.16
maize yield among fertilizer users – mt/hh	1.62	1.50	1.54	1.63	1.84	1.46	1.63	1.62
maize yield among non-fert. users – mt/hh	1.17	1.12	1.15	1.22	1.13	1.08	1.11	0.72
average maize production - mt/hh	0.29	0.49	0.59	1.14	2.30	2.16	2.57	3.56
% of hhs selling maize	6.5%	16.3%	18.8%	24.1%	42.5%	49.6%	35.6%	28.9%
amount maize sold for sellers - mt/hh	0.20	0.36	0.40	0.85	2.51	1.08	2.55	5.76
2002/2003	(0.02-0.62 ha/hh)	(0.63-1.03 ha/hh)	(1.05-1.75 ha/hh)	(1.76-4.99 ha/hh)	(5.00-5.44 ha/hh)	(5.45-6.22 ha/hh)	(6.25-7.74 ha/hh)	(7.75-19.50 ha/hh)
% hhs not growing maize	15.8%	16.1%	15.4%	11.0%	2.8%	0.9%	1.7%	2.2%
area planted maize for growers –ha/hh	0.29	0.46	0.66	1.19	2.93	3.29	3.53	6.42
area harvested maize for growers –ha/hh	0.22	0.34	0.50	0.95	2.36	2.40	2.94	5.33
% hh using fertilizer on maize	25.9%	24.1%	30.5%	42.7%	63.9%	60.4%	64.0%	74.8%
fertilizer used on maize among users - mt/ha	0.26	0.24	0.24	0.22	0.15	0.13	0.18	0.15
maize yield among fertilizer users – mt/hh	2.27	2.13	2.18	2.28	1.91	2.78	2.50	2.32
maize yield among non-fert. users – mt/hh	1.57	1.44	1.49	1.46	1.27	1.36	1.45	1.39
average maize production - mt/hh	0.35	0.50	0.77	1.64	4.00	4.27	6.20	11.12

**Table 11. Selected Production, Marketing and Fertilizer Use Characteristics of Zambian Small- and Medium-Scale Agricultural Households by Quartile of Total Area Planted per Household, 2000/2001-2007/2008 (Using CSO/MACO Crop Forecast Data)**

Agricultural year	Quartiles of Total Area Planted by Small-Scale Farmers (14 crops *)				Quartiles of Total Area Planted by Medium-Scale Farmers (14 crops *)			
	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest
% of hhs selling maize	7.2%	15.7%	24.6%	38.9%	54.0%	55.5%	67.4%	74.3%
amount maize sold for sellers - mt/hh	0.35	0.41	0.53	1.18	2.64	2.62	5.25	8.41
2003/2004	(0.06-0.62 ha/hh)	(0.63-1.02 ha/hh)	(1.03-1.72 ha/hh)	(1.73-4.99 ha/hh)	(5.00-5.40 ha/hh)	(5.41-6.45 ha/hh)	(6.48-8.20 ha/hh)	(8.22-19.25 ha/hh)
% hhs not growing maize	17.5%	14.1%	12.9%	9.4%	13.0%	10.5%	7.5%	8.2%
area planted maize for growers –ha/hh	0.29	0.46	0.65	1.14	2.48	2.95	3.50	4.97
area harvested maize for growers –ha/hh	0.25	0.39	0.55	0.98	1.92	2.46	2.54	4.15
% hh using fertilizer on maize	26.1%	30.5%	33.1%	39.9%	41.9%	52.3%	55.6%	55.0%
fertilizer used on maize among users - mt/ha	0.29	0.25	0.23	0.20	0.17	0.18	0.18	0.22
where most of fertilizer used on maize obtained among user hhs - % reporting alternative channels below (channels sum to 100 %)								
% of hhs with commercial purchases	54.0%	48.6%	47.7%	48.1%	51.6%	59.8%	54.4%	70.6%
% of hhs getting via NGOs	10.3%	14.4%	12.9%	12.6%	11.3%	8.8%	5.2%	1.9%
% of hhs getting via food security pack/PAM	5.4%	12.0%	12.0%	9.8%	9.40%	1.30%	1.20%	3.50%
% hhs getting via fertilizer support program- FSP	12.4%	17.0%	19.3%	22.7%	19.80%	26.90%	36.60%	14.70%
% hhs getting from other (friend/own harv/unaware)	17.9%	8.0%	8.1%	6.8%	7.90%	3.20%	2.60%	9.30%
maize yield among fertilizer users – mt/hh	2.36	2.32	3.24	2.27	2.23	2.32	2.55	2.59
maize yield among non-fert. users – mt/hh	1.97	1.84	1.96	1.87	1.72	1.36	2.10	1.90
average maize production - mt/hh	0.47	0.74	1.22	1.84	3.74	4.65	5.66	9.76
% of hhs selling maize	12.7%	26.0%	30.7%	44.4%	64.0%	59.8%	67.4%	68.8%
amount maize sold for sellers - mt/hh	0.24	0.41	0.53	1.13	2.09	3.54	3.79	8.50
2004/2005	(0.02-0.62 ha/hh)	(0.63-1.12 ha/hh)	(1.14-1.82 ha/hh)	(1.83-4.99 ha/hh)	(5.00-5.47 ha/hh)	(5.50-6.40 ha/hh)	(6.43-8.00 ha/hh)	(8.06-19.75 ha/hh)
% hhs not growing maize	30.5%	22.6%	18.3%	12.1%	5.5%	3.8%	7.7%	4.5%
area planted maize for growers –ha/hh	0.29	0.51	0.68	1.21	2.32	2.75	3.51	5.30
area harvested maize for growers –ha/hh	0.18	0.28	0.38	0.63	1.23	1.39	1.67	2.62
% hh using fertilizer on maize	23.6%	26.8%	31.6%	36.6%	42.4%	52.2%	53.2%	60.8%
fertilizer used on maize among users - mt/ha	0.25	0.24	0.24	0.20	0.20	0.20	0.21	0.17
maize yield among fertilizer users – mt/hh	2.16	2.24	1.98	2.20	2.08	2.23	1.95	2.33
maize yield among non-fert. users – mt/hh	1.48	1.51	1.50	1.45	1.36	1.24	1.59	1.34
average maize production - mt/hh	0.24	0.41	0.53	0.98	1.80	2.37	2.38	4.46
% of hhs selling maize	9.3%	15.1%	17.2%	25.6%	38.5%	31.0%	32.5%	49.0%
amount maize sold for sellers - mt/hh	0.27	0.37	0.46	0.83	1.42	2.31	1.66	3.01

**Table 11. Selected Production, Marketing and Fertilizer Use Characteristics of Zambian Small- and Medium-Scale Agricultural Households by Quartile of Total Area Planted per Household, 2000/2001-2007/2008 (Using CSO/MACO Crop Forecast Data)**

Agricultural year	Quartiles of Total Area Planted by Small-Scale Farmers (14 crops *)				Quartiles of Total Area Planted by Medium-Scale Farmers (14 crops *)			
	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest
<b>2005/2006</b>	(0.02-0.60 ha/hh)	(0.61-1.00 ha/hh)	(1.01-1.72 ha/hh)	(1.73-4.99 ha/hh)	(5.00-5.50 ha/hh)	(5.51-6.39 ha/hh)	(6.40-7.94 ha/hh)	(8.00-19.70 ha/hh)
% hhs not growing maize	33.0%	24.3%	18.2%	11.2%	8.2%	4.5%	13.3%	4.3%
area planted maize for growers –ha/hh	0.28	0.50	0.66	1.19	2.71	2.69	3.39	6.10
area harvested maize for growers –ha/hh	0.21	0.36	0.51	0.95	2.23	2.15	2.86	5.36
% hh using fertilizer on maize	21.8%	25.3%	31.8%	40.4%	49.4%	49.5%	61.3%	70.1%
fertilizer used on maize among users - mt/ha	0.29	0.27	0.23	0.22	0.20	0.24	0.15	0.23
maize yield among fertilizer users – mt/hh	2.40	2.47	2.47	2.49	2.60	2.51	2.37	2.84
maize yield among non-fert. users – mt/hh	1.85	1.49	1.61	1.61	1.68	1.82	2.10	1.98
average maize production - mt/hh	0.38	0.60	0.94	1.82	5.00	4.47	6.14	14.51
% of hhs selling maize	11.4%	20.7%	30.2%	43.9%	56.5%	70.1%	67.8%	79.2%
amount maize sold for sellers - mt/hh	0.30	0.48	0.67	1.40	4.44	3.07	4.72	12.35
<b>2006/2007</b>	(0.02-0.50 ha/hh)	(0.51-1.00 ha/hh)	(1.01-1.62 ha/hh)	(1.63-4.99 ha/hh)	(5.00-5.40 ha/hh)	(5.44-6.25 ha/hh)	(6.26-8.00 ha/hh)	(8.02-19.75 ha/hh)
% hhs not growing maize	28.2%	21.9%	14.2%	10.0%	2.8%	4.3%	2.7%	2.1%
area planted maize for growers –ha/hh	0.29	0.46	0.72	1.32	3.31	3.21	4.16	7.12
area harvested maize for growers –ha/hh	0.21	0.33	0.49	0.89	2.09	2.21	2.93	5.35
% hh using fertilizer on maize	27.6%	30.2%	33.5%	42.8%	52.2%	52.2%	57.7%	73.7%
fertilizer used on maize among users - mt/ha	0.34	0.30	0.27	0.25	0.20	0.26	0.21	0.19
maize yield among fertilizer users – mt/hh	2.74	2.72	2.57	2.57	2.98	2.87	3.00	3.07
maize yield among non-fert. users – mt/hh	1.57	1.52	1.47	1.53	1.62	1.69	1.74	1.77
average maize production - mt/hh	0.35	0.57	0.87	1.70	4.72	5.12	7.72	14.77
% of hhs selling maize	11.8%	20.6%	26.5%	42.4%	57.3%	67.5%	70.6%	83.8%
amount maize sold for sellers - mt/hh	0.35	0.53	0.80	1.50	3.95	4.04	6.09	12.12
<b>2007/2008</b>	(0.03-0.60 ha/hh)	(0.61-1.01 ha/hh)	(1.02-1.75 ha/hh)	(1.76-4.99 ha/hh)	(5.00-5.27 ha/hh)	(5.28-6.12 ha/hh)	(6.17-8.00 ha/hh)	(8.01-19.94 ha/hh)
% hhs not growing maize	30.2%	21.1%	12.5%	7.4%	5.8%	3.9%	1.7%	0.5%
% of female-headed hh's	31.0%	28.5%	23.1%	14.5%	14.5%	11.1%	8.1%	8.6%
area planted maize for growers –ha/hh	0.30	0.55	0.75	1.46	3.24	3.36	4.22	7.55
area harvested maize for growers –ha/hh	0.17	0.31	0.46	0.83	1.75	1.73	2.36	4.05
% of hhs not harvesting maize area - flooding/water logging	67.8%	68.9%	65.6%	70.3%	77.0%	71.9%	77.0%	78.0%
% hhs not harvesting maize area due to drought	4.0%	4.0%	6.8%	6.3%	6.7%	5.8%	5.4%	8.3%
% hh not harvesting maize area - lack of fertilizer	21.3%	19.6%	20.5%	17.8%	13.3%	16.0%	13.0%	8.6%

**Table 11. Selected Production, Marketing and Fertilizer Use Characteristics of Zambian Small- and Medium-Scale Agricultural Households by Quartile of Total Area Planted per Household, 2000/2001-2007/2008 (Using CSO/MACO Crop Forecast Data)**

Agricultural year	Quartiles of Total Area Planted by Small-Scale Farmers (14 crops *)				Quartiles of Total Area Planted by Medium-Scale Farmers (14 crops *)			
	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest
% hh not harvesting maize area - animal destruction, pest, and diseases	1.7%	2.1%	2.2%	1.4%	0.9%	0.8%	1.7%	1.2%
% hhs not harvesting maize area due to theft	0.3%	0.5%	0.3%	0.3%	0.6%	0.0%	0.0%	0.0%
% of hhs not harvesting maize area -other reasons	5.0%	5.2%	5.8%	4.9%	3.5%	7.2%	6.7%	6.6%
% of hhs using conventional tillage methods for maize	43.0%	32.7%	24.4%	18.9%	10.8%	10.8%	13.0%	9.4%
% of hhs using ploughing tillage methods for maize	25.2%	34.4%	32.3%	42.6%	65.5%	59.3%	63.8%	72.2%
% hhs using conservation farming methods for maize – Basins, zero tillage, ripping	4.9%	4.1%	7.1%	4.6%	1.5%	3.4%	3.1%	3.3%
% of hhs using other tillage methods for maize	27.2%	29.5%	37.1%	35.5%	22.9%	26.7%	23.3%	16.6%
% hh using fertilizer on maize	18.3%	23.5%	30.4%	43.6%	51.6%	52.6%	56.4%	68.8%
fertilizer used on maize among users - mt/ha	0.29	0.25	0.24	0.21	0.20	0.18	0.19	0.19
% of total smallholder fertilizer use on maize (all channels)	5.4%	11.7%	20.0%	42.5%	3.0%	3.2%	4.6%	9.6%
% of total smallholder commercial fertilizer use on maize	6.3%	12.8%	18.9%	39.5%	3.2%	2.9%	5.1%	11.2%
% of total smallholder FSP fertilizer use on maize	1.6%	6.2%	23.0%	55.4%	2.4%	3.8%	3.1%	4.3%
% of total sm use Food Security Pack/PAM fertilizer maize	5.1%	7.5%	21.9%	45.9%	2.5%	3.9%	1.3%	11.9%
where most of fertilizer used on maize obtained among user hhs - % reporting alternative channels below (channels sum to 100 %)								
% of hhs with commercial purchases	88.4%	82.4%	72.7%	69.1%	74.5%	63.1%	74.0%	79.7%
% of hhs getting via outgrower scheme	0.0%	0.0%	0.6%	0.3%	0.0%	0.0%	0.3%	0.2%
% of hhs getting via NGOs	1.2%	1.7%	1.4%	0.7%	1.2%	3.2%	0.6%	0.3%
% of hhs getting via food security pack/PAM	3.1%	1.8%	3.4%	2.9%	2.9%	3.7%	2.1%	3.4%
% hhs getting via fertilizer support program- FSP	4.0%	9.7%	18.1%	24.2%	19.1%	27.3%	16.1%	14.0%
% hhs getting from other (friend/other farmer/unaware)	3.3%	4.4%	3.8%	2.8%	2.3%	2.7%	6.9%	2.4%
maize yield among fertilizer users – mt/hh	3.18	2.66	2.63	2.61	2.70	2.73	2.46	2.66
maize yield among non-fert. users – mt/hh	1.86	1.52	1.62	1.49	1.58	2.25	1.53	2.65
average maize production - mt/hh	0.34	0.57	0.87	1.60	3.93	4.05	4.92	9.87
% of total smallholder maize production	6.4%	12.7%	22.2%	41.3%	2.9%	3.1%	3.8%	7.6%
% of hhs selling maize	14.5%	22.9%	30.0%	38.8%	50.2%	49.0%	51.3%	51.9%
amount maize sold for sellers - mt/hh	0.42	0.62	0.90	1.62	4.10	4.37	5.33	13.11
% of total smallholder maize sales	2.9%	8.2%	18.1%	43.1%	4.0%	4.3%	5.5%	13.8%

**Table 12. Small- & Medium-Holdings: Source and Volume of Fertilizer Used By Major Supplier, and Maize Sales Intentions by District; CFS and Fertilizer Support Program, 20007/2008**

Province	District	CFS 07/08: number of smallholders identifying FSP as main source of fertilizer	CFS 07/08: Fertilizer tonnage used among those listing- FSP as main source of fertilizer	Fertilizer Support Program Data on Program Accomplishments 2007/2008		CFS 07/08: Number of smallholders identifying commercial purchases as main source of fertilizer	CFS 07/08: Fertilizer tonnage purchased among those saying commercial purchases are the main source of supply	CFS 07/08: Number of smallholders indicating intentions to sell maize from 07/08 crop	Volume to be sold from 07/08 maize Crop
		(Maize only)	(Maize only)	Number of Smallholders Reached	Volume of Fertilizer Distributed Under FSP	(Maize only)	(Maize Only).	(Maize Only)	(Maize Only)
		Number of Smallholders	Metric tons Fertilizer	Number of Smallholders	Metric Tons Fertilizer	Numbers of Smallholders	Metric Tons Fertilizer	Number of Smallholders	Metric Tons to be Sold
<b>Central</b>	Chibombo	101	66	4,160	1,664	17,981	6,219	3,052	8,069
	Kabwe	314	167	2,500	1,000	2,133	815	1,219	3,814
	Kapiri Mposhi	800	240	4,000	1,600	17,658	5,968	12,357	50,130
	Mkushi	309	149	3,750	1,500	7,034	2,145	8,643	17,833
	Mumbwa	303	131	3,275	1,310	8,502	2,339	9,366	19,360
	Serenje	2,067	495	3,000	1,200	6,145	1,233	8,848	9,852
	<b>Sub-total</b>	<b>3,894</b>	<b>1,248</b>	<b>20,685</b>	<b>8,274</b>	<b>59,452</b>	<b>18,720</b>	<b>43,485</b>	<b>109,058</b>
<b>Copperbelt</b>	Chililabombwe	9	2	1,155	462	2,143	610	1,522	3,060
	Chingola	51	18	1,155	462	2,017	379	1,934	2,486
	Kalulushi	131	57	1,155	462	596	179	676	1,953
	Kitwe	88	7	1,155	462	1,442	227	769	797
	Luanshya	399	40	1,155	462		430	2,416	2,523
	Lufwanyama	33	21	1,540	616	1,273	170	4,990	5,455
	Masaiti	838	307	2,310	924	10,482	2,158	11,111	18,816
	Mpongwe	563	249	3,465	1,386	1,211	337	2,375	5,845
	Mufulira	485	112	1,155	462	2,275	378	1,645	1,379
	Ndola	196	110	1,155	462	2,786	462	1,726	3,474
	<b>Sub-total</b>	<b>2,792</b>	<b>923</b>	<b>15,400</b>	<b>6,160</b>	<b>27,731</b>	<b>5,330</b>	<b>29,164</b>	<b>45,788</b>
<b>Eastern</b>	Chadiza	1,966	635	2,225	890	7,204	1,136	3,007	4,702
	Chama	24	5	460	184	1,013	154	63	42
	Chipata N.	3,376	1,098	2,860	1,144	23,210	3,829	7,527	14,645
	Chipata S.			4,250	1,700				
	Katete	1,660	526	3,845	1,538	5,243	961	2,762	4,787
	Lundazi	2,620	712	3,685	1,474	9,703	2,653	6,376	11,679

Province	District	CFS 07/08: number of smallholders identifying FSP as main source of fertilizer  (Maize only)	CFS 07/08: Fertilizer tonnage used among those listing- FSP as main source of fertilizer  (Maize only)	Fertilizer Support Program Data on Program Accomplishments 2007/2008		CFS 07/08: Number of smallholders identifying commercial purchases as main source of fertilizer  (Maize only)	CFS 07/08: Fertilizer tonnage purchased among those saying commercial purchases are the main source of supply (Maize Only).	CFS 07/08: Number of smallholders indicating intentions to sell maize from 07/08 crop  (Maize Only)	Volume to be sold from 07/08 maize Crop  (Maize Only)
		Number of Smallholders	Metric tons Fertilizer	Number of Smallholders Reached	Volume of Fertilizer Distributed Under FSP	Numbers of Smallholders	Metric Tons Fertilizer	Number of Smallholders	Metric Tons to be Sold
	Mambwe	323	58	560	224	952	111	653	1,022
	Nyimba	665	235	925	370	725	234	1,045	818
	Petauke	1,848	583	4,290	1,716	4,347	1,673	7,930	14,548
	<b>Sub-total</b>	<b>12,482</b>	<b>3,851</b>	<b>23,100</b>	<b>9,240</b>	<b>52,397</b>	<b>10,750</b>	<b>29,363</b>	<b>52,244</b>
<b>Luapula</b>	Chiengwe	39	8	385	154	119	35	2,881	1,256
	Kawambwa	1,066	291	2,000	800	4,672	657	8,073	7,069
	Mansa	1,827	347	1,875	750	3,421	453	5,776	4,429
	Milenge	424	69	385	154	359	57	1,184	693
	Mwense	803	128	385	154	376	57	3,092	1,374
	Nchelenge	335	39	195	78	397	56	4,169	1,833
	Samfya	375	37	750	300	1,626	341	2,533	1,310
	<b>Sub-total</b>	<b>4,869</b>	<b>920</b>	<b>5,975</b>	<b>2,390</b>	<b>10,970</b>	<b>1,656</b>	<b>27,707</b>	<b>17,965</b>
<b>Lusaka</b>	Chongwe	1,019	455	3,500	1,400	6,698	1,385	2,308	2,470
	Kafue	348	78	2,025	810	4,996	1,454	717	2,497
	Luangwa	11	4	40	16	89	4	44	20
	Lusaka			2,185	874	430	97	30	54
<b>Backstopping</b>	<b>Lusaka</b>			<b>3,750</b>	<b>1,500</b>				
	<b>Sub-total</b>	<b>1,378</b>	<b>537</b>	<b>11,500</b>	<b>4,600</b>	<b>12,213</b>	<b>2,939</b>	<b>3,099</b>	<b>5,042</b>
<b>Northern</b>	Chilubi			170	68	61	10	51	30
	Chinsali	1,263	274	1,400	560	2,853	476	3,385	3,077
	Isoka	2,821	473	2,200	880	3,533	778	5,918	6,533
	Kaputa			175	70	274	22	6,233	2,957
	Kasama	872	191	2,500	1,000	7,717	1,732	5,282	9,257
	Luwingu	1,251	283	825	330	3,980	794	6,503	6,976
	Mbala	1,176	427	3,250	1,300	6,340	1,394	13,103	20,420
	Mpika	2,161	732	2,370	948	3,861	765	8,477	11,484
	Mporokoso	7,198	1,100	850	340	2,795	331	14,219	10,578
	Mpulungu	434	57	500	200	2,531	497	4,306	4,859

Province	District	CFS 07/08: number of smallholders identifying FSP as main source of fertilizer  (Maize only)	CFS 07/08: Fertilizer tonnage used among those listing- FSP as main source of fertilizer  (Maize only)	Fertilizer Support Program Data on Program Accomplishments 2007/2008		CFS 07/08: Number of smallholders identifying commercial purchases as main source of fertilizer  (Maize only)	CFS 07/08: Fertilizer tonnage purchased among those saying commercial purchases are the main source of supply (Maize Only).	CFS 07/08: Number of smallholders indicating intentions to sell maize from 07/08 crop  (Maize Only)	Volume to be sold from 07/08 maize Crop  (Maize Only)
		Number of Smallholders	Metric tons Fertilizer	Number of Smallholders Reached	Volume of Fertilizer Distributed Under FSP	Numbers of Smallholders	Metric Tons Fertilizer	Number of Smallholders	Metric Tons to be Sold
	Mungwi	59	18	1,350	540	898	145	3,977	1,927
	Nakonde	1,087	259	1,500	600	3,335	671	5,354	10,380
	<b>Sub-total</b>	<b>18,322</b>	<b>3,814</b>	<b>17,090</b>	<b>6,836</b>	<b>38,178</b>	<b>7,613</b>	<b>76,808</b>	<b>88,479</b>
<b>N/Western</b>	Chavuma	264	63	375	150	133	41	1,761	547
	Kabompo	195	76	750	300	783	153	5,288	2,551
	Kasempa	2,389	513	1,500	600	768	135	3,707	4,804
	Mufumbwe	547	114	500	200	379	52	2,491	2,449
	Mwinilunga	958	132	1,100	440	1,178	110	4,183	2,651
	Solwezi	1,167	396	1,500	600	3,379	603	11,930	15,565
	Zambezi	206	73	500	200	751	60	2,046	639
	<b>Sub-total</b>	<b>5,726</b>	<b>1,367</b>	<b>6,225</b>	<b>2,490</b>	<b>7,372</b>	<b>1,153</b>	<b>31,406</b>	<b>29,207</b>
<b>Southern</b>	Choma	1,335	314	5,400	2,160	11,807	2,194	395	207
	Gwembe	9	1	150	60	1,090	141	97	37
	Ithezi Ithezi	361	38	225	90	744	163	1,265	941
	Kalomo	1,071	346	6,155	2,462	6,878	1,730	1,363	1,086
	Kazungula	139	14	1,000	400	2,128	449	154	274
	L/stone			75	30	171	24		0
	Mazabuka	767	399	4,375	1,750	17,237	3,775	960	2,727
	Monze	1,650	553	4,275	1,710	7,308	2,043	224	359
	Namwala	64	24	230	92	960	277	609	703
	Siavonga	10	2	125	50	233	58	122	94
	Sinazongwe			125	50	474	50		0
	<b>Sub-total</b>	<b>5,407</b>	<b>1,690</b>	<b>22,135</b>	<b>8,854</b>	<b>49,030</b>	<b>10,904</b>	<b>5,190</b>	<b>6,427</b>
<b>Western</b>	Kalabo			20	8	27	1	843	338
	Kaoma	1,268	348	1,925	770	1,000	227	1,838	1,357
	Lukulu	105	7	190	76	594	44	659	144
	Mongu			230	92	470	10	1,447	186

Province	District	CFS 07/08: number of smallholders identifying FSP as main source of fertilizer  (Maize only)	CFS 07/08: Fertilizer tonnage used among those listing- FSP as main source of fertilizer  (Maize only)	Fertilizer Support Program Data on Program Accomplishments 2007/2008		CFS 07/08: Number of smallholders identifying commercial purchases as main source of fertilizer  (Maize only)	CFS 07/08: Fertilizer tonnage purchased among those saying commercial purchases are the main source of supply (Maize Only).	CFS 07/08: Number of smallholders indicating intentions to sell maize from 07/08 crop  (Maize Only)	Volume to be sold from 07/08 maize Crop  (Maize Only)
		Number of Smallholders	Metric tons Fertilizer	Number of Smallholders Reached	Volume of Fertilizer Distributed Under FSP	Numbers of Smallholders	Metric Tons Fertilizer	Number of Smallholders	Metric Tons to be Sold
	Senanga	27	1	125	50	250	17	1,112	171
	Sesheke			250	100	34	2	778	526
	Shang'ombo			150	60			718	182
	<b>Sub-total</b>	<b>1,400</b>	<b>356</b>	<b>2,890</b>	<b>1,156</b>	<b>2,375</b>	<b>301</b>	<b>7,394</b>	<b>2,904</b>
	<b>Total</b>	<b>56,271 farmers</b>	<b>14,706 MT</b>	<b>125,000 farmers</b>	<b>50,000 MT</b>	<b>259,717 farmers</b>	<b>59,366 mt</b>	<b>253,616 farmers</b>	<b>357,112 MT</b>

**Table 13. Farmer Reports of Maize Sales in Either SS or CFS, and FRA Reports of Maize Purchases/Intentions for 2006, 2007 and 2008 FRA Buying Campaigns**

Province	CSO/MACO/FSRP Supplemental Survey (SalesData)		05/06 Production and Marketing Seasons		06/07 Production and Marketing Seasons		07/08 Production and Marketing Seasons	
	Mkt Sales 1999/2000 MT SS Data	Mkt Sales 2002/2003 MT SS Data	Planned Sales MT CFS Data	2006 FRA Purchases mt FRA Data	Planned Sales 06/07 CFS Data	2007 FRA Purchases mt FRA Data	Planned Sales 07/08 CFS Data	2008 FRA Planned Purchases MT
Central	81,878	82,283	93,900	72,005	135,880	57,790	109,058	
Southern	64,216	79,775	44,959	77,075	34,526	90,625	6,434	
Eastern	35,626	63,568	38,011	103,033	48,370	115,466	52,890	
Northern	19,422	46,397	63,288	72,709	70,014	55,804	88,866	
Lusaka	12,482	16,066	10,475	16,927	19,024	16,394	5,042	
Luapula	5,841	11,336	19,037	12,751	13,420	12,958	17,965	
Copperbelt	30,232	39,523	44,090	15,867	36,077	17,745	47,648	
Northwestern	14,008	23,380	39,701	14,690	32,804	13,167	29,207	
Western	9,245	8,004	4,759	4,453	6,546	6,501	3,020	
Gd. Total	272,950	370,332	358,221	389,510	398,024	396,450	360,130	

Note: Planned Sales by Province derived by FSRP from disaggregated CFS data and due to minor data cleaning do not match exactly numbers reported by DMU/MACO. Differences are minor.

## Annex One

**Table 1. Annex. Zambian Smallholder Household Income, Wealth and Demographic Attributes by Land Access and Education, 1999/2000**

	Landholding Size Tercile	Tercile 1 ( 0 - 1.4 hectares )			Tercile 2 ( 1.4 - 2.4 hectares )			Tercile 3 ( > 2.4 hectares )		
		Education tercile			Education tercile			Education tercile		
		1	2	3	1	2	3	1	2	3
	Years Ed.	0-6 yrs	7-8 yrs	9-19 yrs	0-6 yrs	7-8 yrs	9-19 yrs	0-6 yrs	7-8 yrs	9-19 yrs
	Totals	----- median value -----								
No. of observations (unweighted)	6826	966	721	619	752	765	725	602	830	846
<i>Land Access</i>										
Landholding size with rented land (ha)	3.10	0.70	0.80	0.80	2.00	2.00	2.00	6.90	6.90	8.10
Landholding size per capita (ha)	0.60	0.20	0.20	0.20	0.60	0.40	0.40	1.70	1.20	1.30
<i>Demographic Attributes</i>										
Household members (number)	5.8	4.2	5.3	6.0	4.8	6.1	7.1	5.3	6.6	7.9
Female headed households (%)	24	41	29	20	27	21	17	24	14	13
Age of household head (years)	44.2	44.9	41.00	40.2	45.2	43.2	42.9	49.6	44.4	46.6
Level of education hh head (years)	5.2	2.0	5.4	8.8	2.6	5.4	8.2	2.7	5.4	7.9
<i>Assets</i>										
Draft equipment (US\$ per capita)	36.04	28.40	22.80	29.50	34.10	36.80	34.80	55.30	39.80	46.00
<i>Income</i>										
Gross value of crop sales (US\$ per hh)	183.10	101.10	100.50	144.90	164.10	184.90	200.80	227.60	273.00	299.30
HH per capita household income (US\$)	78.70	57.00	58.10	105.50	65.90	69.60	98.50	80.40	86.40	108.40
Crop income share (%)	72.30	74.70	66.30	53.30	81.20	75.40	63.80	84.70	78.80	68.30
Off-farm income share (%)	24.60	22.90	31.00	44.20	16.00	21.40	31.80	12.60	17.80	27.50
of which: remittances (%)	3.90	5.90	4.10	3.80	3.30	2.90	3.40	2.50	3.30	4.60
own business home (%)	11.90	10.80	15.90	16.00	8.60	12.60	11.70	7.30	10.90	13.70
non-ag. salary + wage labor	6.40	2.40	5.40	21.80	2.30	3.70	14.70	1.60	2.60	7.80
ag.wage labor (%)	2.40	3.80	5.40	2.60	1.70	2.10	1.90	1.20	0.90	1.40
Livestock product income share (%)	3.10	2.50	2.70	2.50	2.80	3.20	4.40	2.60	3.40	4.20

Source: Post Harvest Survey (PHS) and Supplemental Survey to the PHS, 1999/00, CSO/FSRP. US\$ are computed at 2000 exchange rate.

## Annex One

**Table 2. Annex. Smallholder (Small- and Medium-Scale Combined) Landholding Size Per Household in Zambia by Province and Alternative Farm Size Definitions, 1999/2000**

Province and Farm Size Definition	Quartiles of Landholding Size Per Household				
	1 <sup>st</sup> Quartile bottom 25%	2 <sup>nd</sup> Quartile	3 <sup>rd</sup> Quartile	4 <sup>th</sup> Quartile top 25%	Mean
-----Hectares per household where applicable -----					
<b>Central</b> -cultivated + fallow - ha	.67	1.53	2.79	7.97	3.25
-hh with fallow fields - %	17 %	35 %	54 %	77 %	45 %
-hh with virgin land - %	6 %	8 %	8 %	9 %	8 %
<b>-All land - ha</b>	<b>.72</b>	<b>1.70</b>	<b>2.93</b>	<b>8.99</b>	<b>3.60</b>
<b>Copperbelt</b> -cultivated + fallow - ha	.54	1.12	1.99	5.33	2.27
-hh with fallow fields - %	11 %	31 %	68 %	79 %	46 %
-hh with virgin land - %	3 %	8 %	19 %	40 %	17 %
<b>-All land - ha</b>	<b>.58</b>	<b>1.42</b>	<b>2.41</b>	<b>8.83</b>	<b>3.35</b>
<b>Eastern</b> -cultivated + fallow - ha	.74	1.29	1.97	4.11	2.05
-hh with fallow fields - %	10 %	19 %	33 %	48 %	27 %
-hh with virgin land - %	15 %	16 %	26 %	28 %	21 %
<b>-All land - ha</b>	<b>.89</b>	<b>1.50</b>	<b>2.35</b>	<b>4.65</b>	<b>2.37</b>
<b>Luapula</b> -cultivated + fallow - ha	.54	1.25	1.98	3.80	1.90
-hh with fallow fields - %	42 %	78 %	92 %	97 %	75 %
-hh with virgin land - %	28 %	35 %	35 %	40 %	34 %
<b>-All land - ha</b>	<b>.92</b>	<b>1.84</b>	<b>2.90</b>	<b>5.48</b>	<b>2.80</b>
<b>Lusaka</b> -cultivated + fallow - ha	.43	.94	1.81	5.63	2.20
-hh with fallow fields - %	2 %	10 %	40 %	65 %	29 %
-hh with virgin land - %	0 %	3 %	4 %	8 %	4 %
<b>-All land - ha</b>	<b>.43</b>	<b>.94</b>	<b>1.84</b>	<b>5.76</b>	<b>2.25</b>
<b>Northern</b> -cultivated + fallow - ha	.76	1.51	2.45	5.56	2.55
-hh with fallow fields - %	45 %	65 %	78 %	85 %	67 %
-hh with virgin land - %	63 %	75 %	73 %	78 %	71 %
<b>-All land - ha</b>	<b>2.59</b>	<b>4.51</b>	<b>5.60</b>	<b>12.50</b>	<b>6.26</b>
<b>Northwestern</b> -cultivated + fallow ha	.55	1.06	1.59	3.53	1.67
-hh with fallow fields - %	12.31	29.22	49.97	61.36	36.54
-hh with virgin land - %	4.28	5.78	8.54	11.58	7.28
<b>-All land - ha</b>	<b>.67</b>	<b>1.21</b>	<b>1.79</b>	<b>3.89</b>	<b>1.88</b>
<b>Southern</b> -cultivated + fallow - ha	.60	1.38	2.43	6.24	2.67
-hh with fallow fields - %	6 %	32 %	41 %	72 %	36 %
-hh with virgin land - %	1 %	1 %	.02 %	6 %	2 %
<b>-All land - ha</b>	<b>.65</b>	<b>1.43</b>	<b>2.43</b>	<b>6.96</b>	<b>2.88</b>
<b>Western</b> -cultivated + fallow - ha	.37	.85	1.45	3.56	1.56
-hh with fallow fields - %	10 %	31 %	50 %	63 %	37 %
-hh with virgin land - %	5 %	14 %	20 %	24 %	15 %
<b>-All land - ha</b>	<b>.45</b>	<b>1.14</b>	<b>1.75</b>	<b>4.30</b>	<b>1.91</b>
<b>National</b> -cultivated + fallow - ha	.62	1.28	2.11	4.98	2.25
-hh with fallow fields - %	21 %	40 %	56 %	71 %	46 %
-hh with virgin land - %	20 %	25 %	28 %	32 %	26 %
<b>-All land - ha</b>	<b>1.06</b>	<b>2.03</b>	<b>2.95</b>	<b>7.01</b>	<b>3.27</b>

Source: Supplementary Survey to the 1999/2000 Post Harvest Survey, Central Statistical Office and FSRP.

Notes. All numbers are weighted

## Annex One

**Table 3. Annex. Farm Production Patterns of Small- and Medium-Scale Agricultural Households in Zambia, 2000/01 and 2003/04.**

Farm Enterprise	Marketing Year	% farmers producing	Total production (Tons)	Gross Value of Production (000 US\$)	% farmers selling	Total sales (Tons)	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 (Tons)
(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
Beans and legumes	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, reported in Zulu, Beaver, and Jayne, 2006.  
Notes: 2000/2001 marketing year refers to 1<sup>st</sup> May 2000 to 30<sup>th</sup> April 2001; 2003/2004 marketing year refers to 1st May 2003 to 30<sup>th</sup> April 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)\*100.

## Annex One

**Table 4. Annex. Characteristics of Rural Households According to Their Position in the MAIZE AND MAIZE MEAL Markets, 2003/2004 marketing year, Zambia.**

Type of maize seller	% of sample	Income Tercile 1=lowest 3=highest (number of hh)		Value in US dollars						Cropped land size (ha)	Family size (adult equivalents)	Highest level of education for a member (years)	Distance to nearest tarred/main road (km) from center of SEA	Distance to nearest district town (km) from center of SEA
				Net maize + maize meal sales	Value of maize production	Agricultural production (crop & animal gross revenue)	Off-farm income	Total household income	Value of productive assets					
1. Seller of maize, does not buy maize or maize meal (n=257,160)	20.3	1	32,187	18	59	110	7	116	86	1.1	4.1	5.9	21	44
		2	91,664	37	107	251	29	280	196	1.8	4.9	7.2	28	40
		3	133,309	213	423	878	693	1,571	687	3.2	6.1	9.1	25	34
2. Buyer of maize or maize meal, does not sell, but produces maize (n=315,524)	24.9	1	132,150	-26	42	74	12	86	102	.9	4.8	6.0	24	33
		2	97,915	-31	77	199	65	264	238	1.4	5.4	7.2	24	30
		3	85,460	-52	123	413	994	1,407	738	1.7	6.5	9.2	26	29
3. Buyer of maize or maize meal, does not sell or produce maize (n=121,585)	9.6	1	59,477	-23	0	55	20	75	44	.6	4.2	5.7	20	31
		2	39,336	-28	0	162	111	273	53	1.0	4.9	6.9	17	29
		3	22,772	-51	0	264	870	1,134	336	1.0	5.4	8.8	18	31
4. Not in market (either grain or maize meal) (n=470,145)	37.1	1	206,356	0	30	78	8	86	57	.9	4.0	5.3	29	39
		2	165,879	0	68	234	39	272	197	1.6	5.1	6.6	29	37
		3	97,910	0	157	708	469	1,176	539	2.2	5.8	8.4	26	35
5. Buys and sells, net sales greater than 0 (n=60,601)	4.8	1	7,243	11	58	94	15	109	69	.9	3.6	6.4	13	27
		2	23,314	35	132	239	44	283	97	1.6	5.0	6.9	23	37
		3	30,044	122	290	590	542	1,132	497	2.4	5.9	8.9	19	32
6. Buys and sells, net sales less than 0 (n=41,613)	3.3	1	9,524	-14	56	100	13	112	98	1.2	4.9	6.7	29	45
		2	17,479	-28	92	201	69	270	179	1.4	5.1	6.7	17	32
		3	14,611	-33	111	373	589	963	362	1.8	5.7	8.7	24	26
7. Buys and sells, net sales equal 0 (n=516)	.0	1	326	0	31	70	0	70	9	1.9	2.7	.0	83	74
		2	190	0	142	237	63	300	9	1.4	5.8	10.0	0	27
Total Sample (n=1,267,145)	100.0	1	447,263	-9	33	77	11	88	72	.9	4.3	5.7	26	37
		2	435,777	-1	77	222	51	273	187	1.5	5.1	6.9	26	35
		3	384,105	67	241	653	697	1,350	613	2.4	6.1	8.9	24	32

Source: Supplemental Survey to the 1999/2000 Post Harvest Survey, Central Statistical Office, 2000/2001 & 2003/2004 Marketing Season. (From a forthcoming FSRP Working Paper: Assessment of Alternative Maize Trade and Market Policy Interventions in Zambia by Jones Govereh, T.S. Jayne and A. Chapoto.)