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FOOD SECURITY RESEARCH PROJECT

Technical Compendium: Descriptive Agricultural Statistics and Analysis for Zambia in Support of the USAID Mission's Feed the Future Strategic Review

by

Nicholas J. Sitko, Antony Chapoto, Steven Kabwe, Solomon Tembo, Munguzwe Hichaambwa, Rebecca Lubinda, Harrison Chiwawa, Mebelo Mataa, Simon Heck, and Dorothy Nthani

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April 2011

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Any views expressed or remaining errors are solely the responsibility of the authors.

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EXECUTIVE SUMMARY

Background

This technical compendium was developed to serve two interrelated purposes: 1.To assist in the development of USAID Zambia's Feed the Future (FtF) strategy by providing a broad empirical analysis of the current conditions and historical trends shaping Zambia's agricultural and food sector; and 2. To serve as a technical reference for organizations tasked with designing and implementing programs associated with FtF.

Problem Statement

Population growth, rapid urbanization, and stagnant agricultural production are contributing to an emerging structural deficit of food crops in the southern Africa region. Finding ways of effectively coping with this emerging food deficit is critical for fostering economic growth, reducing poverty, and enhancing food/nutrition security for the people of southern Africa. Addressing this challenge requires placing agriculture- and the associated processes of production, trade, processing, and consumption - at the forefront of any economic development strategy for the region.

Zambia is in a unique position to not only leverage agriculture as an engine for poverty reduction and improved nutrition, but to become the *breadbasket* of southern Africa. Relative to other countries in the region Zambia has an abundance of fertile land, water, and a generally favorable climate for agricultural production. Moreover, Zambia has a large and rapidly growing urban population, which creates opportunities for rural-urban development synergies that may not exist in other countries.

Despite these unique endowments, agricultural growth in Zambia remains stagnant, poverty rates in rural Zambia remain stubbornly high, at 80% of the population, and incidences of stunting, malnutrition, and wasting continue to disproportionately affect rural Zambians. While rural Zambians are generally worse off in terms of poverty and malnutrition than their urban counterparts, addressing food and income inequalities in urban areas are of equal importance for fostering economic growth, poverty reduction, and improving the nutritional status of Zambians.

USAID Zambia's FtF strategy is guided by the assumption that fostering improvements in the production and marketing of the food crops that are of the greatest importance to small-scale farmers and the urban poor provides the best vehicle for stimulating economic growth and poverty reduction in Zambia. Yet, supporting small-scale farmers to earn more from agriculture and for urban consumers pay less for their food does not immediately translate into improvements in the nutritional status of Zambians. Rather, these changes must be seen as a precondition for effective nutrition related interventions in health-care and education.

Data

The data presented in this technical compendium is derived from a variety of sources. Data on household production comes primarily from two nationally representative surveys: 1. the Crop Forecast Survey (CFS) conducted annually by the Ministry of Agriculture and Cooperatives (MACO); and 2. the Central Statistics Office (CSO) and the Supplemental

Survey (SS) conducted periodically by the Food Security Research Project (FSRP). Household livelihood data is primarily gathered from the supplemental surveys, which is a nationally representative panel survey of households in Zambia. Nutritional and health data comes from the Living Conditions Monitoring Survey (LCMS) carried out by CSO. Other important data sources include FAOSTAT, the CSO post-harvest survey (PHS), and the FSRP Urban Consumption Survey.

Key Findings

- Rapid population growth and urbanization are contributing to increased pressure on Zambia's food, health care, sanitation, and education systems. This in turn poses a growing threat to levels of food insecurity, malnutrition, and poverty, particularly for the poorest and most vulnerable segments of the population.
- While the overall poverty rate in Zambia has declined over time, poverty rates in rural Zambia remain stubbornly high, with 80% of the rural population living in poverty.
- Despite its rich agricultural resources, Zambia has continued to experience chronic food and nutrition security problems. Stunting rates in Zambia stand at 45%, with 21% being severe. Stunting remains the most common nutritional disorder affecting under five years children in Zambia, above the Sub-Saharan Africa average of 42%; and (ZDHS 2007).
- Agriculture in Zambia supports the livelihoods of over 70% of the population. 78% of women in Zambia are engaged in agriculture, compared with 69% of men.
- Zambia's economy has grown steadily in real terms since 2001. However the percent contribution of the agricultural sector to GDP has declined from 16% in 2001 to 12.6% in 2009.
- Cropping characteristics: Small-scale farming systems in Zambia are over-whelmingly dominated by a single crop: Maize. In 2009/10, 81.72% of all smallholders grew maize. Cassava cultivation, the second most important staple food crop, is geographic confined to the north and northwestern parts of Zambia. Groundnuts, the second most widely cultivated crop in Zambia and important source of protein in Zambian diets, are frequently intercropped with maize. In Zambia, groundnuts are often considered a *women's crop* due to their importance for home consumption.
- Yields: Yields for all crops in Zambia are well below global averages. However, while national yields are low, the top 10% of smallholders achieve yields that are one to nearly four metric tons (mt) more than average depending on the crop. This suggests the potential for yield improvements in Zambia.
- Input use: While input use has trended upward since 2001, 60% of Zambia farmers still do not use fertilizer on their fields, while more than 60% do not use hybrid maize seeds.
- Land: Despite a relatively low population density, growth in the number of rural households contributes to increasing land fragmentation and shrinking land size holding in Zambia. While the mean land size holding in Zambia is 3.27 hectares, a quarter of the rural population controls on average barely one hectare of land.
- Market Position: In Zambia, 2% of small-medium scale farmers produce roughly 50% of the country's total maize supply. A further 19% produce the other 50% of surplus maize in Zambia. Despite the high prevalence of maize cultivation in rural Zambia, 36% of rural households are in fact net buyers of maize (Figure 22). These farmers tend to control smaller farm sizes and tend to be located in more marginal agro-ecological zones.

- Caloric intake among Zambians is overwhelmingly dominated by a single food crop, maize. According to FAOStat maize accounts for 57% of Zambians' daily caloric consumption.
- Government spending on agriculture is just under 10% of the total government budget, which is approaching the spending goal agreed upon under the 2003 Maputo Declaration. However, procurement and distribution of maize through FRA and input subsidies through FSP/FISP account for over 43% of the total agricultural budget.

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ACRONYMS

ARMD	Age Related Macular Disease
BMI	Body Mass Index
CAADP	Comprehensive Africa Agriculture Development Programme
CFS	Crop Forecast Survey
CSO	Central Statistics Office
DRC	Democratic Republic of Congo
EPCMU	Easter Province Cooperative Marketing Union
FAOSTAT	Food and Agricultural Organization Online Statistical Database
FINNIDA	Finnish International Development Agency
FRA	Food Reserve Agency
FSP/FISP	Fertilizer Support Program/Farmer Input Support Program
FSRP	Food Security Research Project
FtF	Feed the Future
GART	Golden Valley Research Trust
GDP	Gross Domestic Product
GIDD	Gender in Development Division
HH	House Hold
IAA	Integrated Agriculture Aquaculture
IFAD	International Fund for Agricultural Development
LCMS	Living Conditions Monitoring Survey
MACO	Ministry of Agriculture and Cooperatives
MSU	Michigan State University
MT	Metric Ton
OFSP	Orange-fleshed Sweet Potato
PABRN	Pan African Bean Research Network
PHS	Post-harvest Survey
QDS	Quality Declared Seed
RBCs	Red Blood Corpuscles
RTIP	Root and Tuber Improvement Programme
SABRN	Southern African Bean Research Network
SADC	Southern African Development Community
SME	Small-Medium Enterprise
SNDP	Sixth National Development Plan
SS	Supplemental Survey
UNICEF	The United Nations Children's Fund
UNZA	University of Zambia
USAID	United States Agency for International Development
WFP	World Food Program
WRS	Warehouse Receipt System
ZABRN	Zambia Bean Research Network
ZAMACE	Zambian Agricultural Commodity Exchange
ZARI	Zambia Agricultural Research Institute
ZDHS	Zambia District Health Surveys
ZEGA	Zambia Export Growers Association

I. STATEMENT OF THE PROBLEM

Population growth, rapid urbanization, and stagnant agricultural production are contributing to an emerging structural deficit of food crops in the Southern Africa region. Finding ways of effectively coping with this emerging food deficit is critical for fostering economic growth, reducing poverty, and enhancing food/nutrition security for the people of Southern Africa. Addressing this challenge requires placing agriculture- and the associated processes of production, trade, processing, and consumption - at the forefront of any economic development strategy for the region.

Zambia is in a unique position to not only leverage agriculture as an engine for poverty reduction and improved nutrition, but to become the *breadbasket* of southern Africa. Relative to other countries in the region Zambia has an abundance of fertile land, water, and a generally favorable climate for agricultural production. Moreover, Zambia has a large and rapidly growing urban population, which creates opportunities for rural-urban development synergies that may not exist in other countries.

Despite these unique endowments, agricultural growth in Zambia remains stagnant, poverty rates in rural Zambia remain stubbornly high, at 80% of the population, and incidences of stunting, malnutrition, and wasting continue to disproportionately affect rural Zambians. While rural Zambians are generally worse off in terms of poverty and malnutrition than their urban counterparts, addressing food and income inequalities in urban areas are of equal importance for fostering economic growth, poverty reduction, and improving the nutritional status of Zambians.

This strategic review is guided by the assumption that fostering improvements in the production and marketing of the food crops that are of the greatest importance to small-scale farmers and the urban poor provides the best vehicle for stimulating economic growth and poverty reduction in Zambia. Yet, supporting small-scale farmers to earn more from agriculture and for urban consumers pay less for their food does not immediately translate into improvements in the nutritional status of Zambians. Rather, these changes must be seen as a precondition for effective nutrition related interventions in health-care and education.

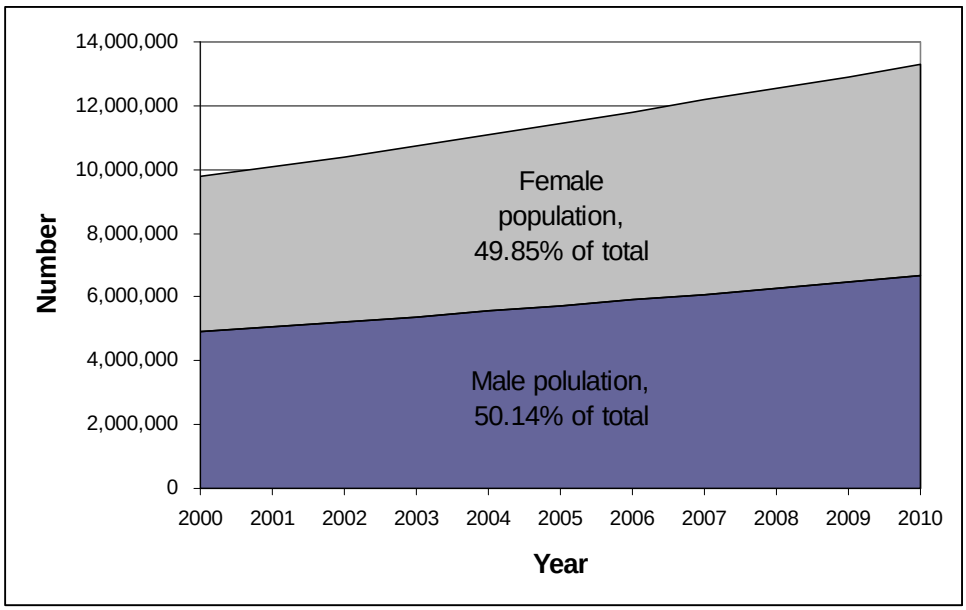
II. CONTEXT

2.1. Population

Rapid population growth and urbanization are contributing to increased pressure on Zambia's food, health care, sanitation, and education systems. This in turn poses a growing threat to levels of food insecurity, malnutrition, and poverty, particularly for the poorest and most vulnerable segments of the population.

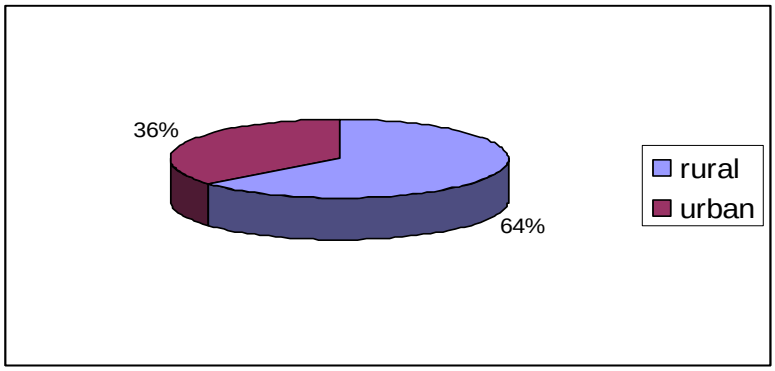
a. The last population census for which data are available was conducted in 2000. Data have been collected for the 2010 census, but are not yet available.
b. According to the 2000 census, Zambia's population was projected to grow from 9,885,591 in 2000 to 13,273, 571 in 2010 (Figure 1).
c. In Zambia, 64% of the population resides in rural areas and 36% in urban. Zambia is therefore highly urbanized by regional standards (Figure 2).
d. The 2000 census projects urban populations to nearly double between the years 2000-2025.
    - Providing this growing population with reliable access to nutritious and culturally acceptable foods at tolerable prices is critical for reducing poverty, stimulating economic growth, and improving the nutritional status of Zambians.
e. Crop forecast surveys also record increases in the number of farm households in Zambia (Figure 3).
    - This is contributing to the increasing fragmentation of landholdings and decreases in the mean farm size.
f. In Zambia, populations are concentrated along the *line of rail* and the Copperbelt provinces where most of Zambia's industrial activities take place and where the majority of urban centers are located (Map 1).

Figure 1. Population Projections, 2000-2010



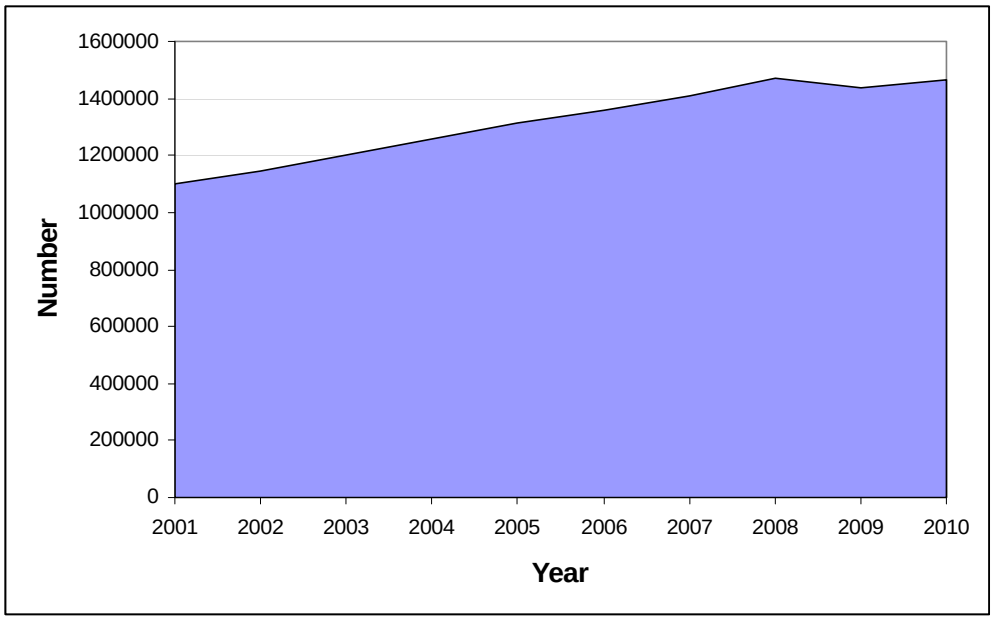
Source: CSO Population Projections Report 2003.

Figure 2. Urban and Rural Population, Zambia



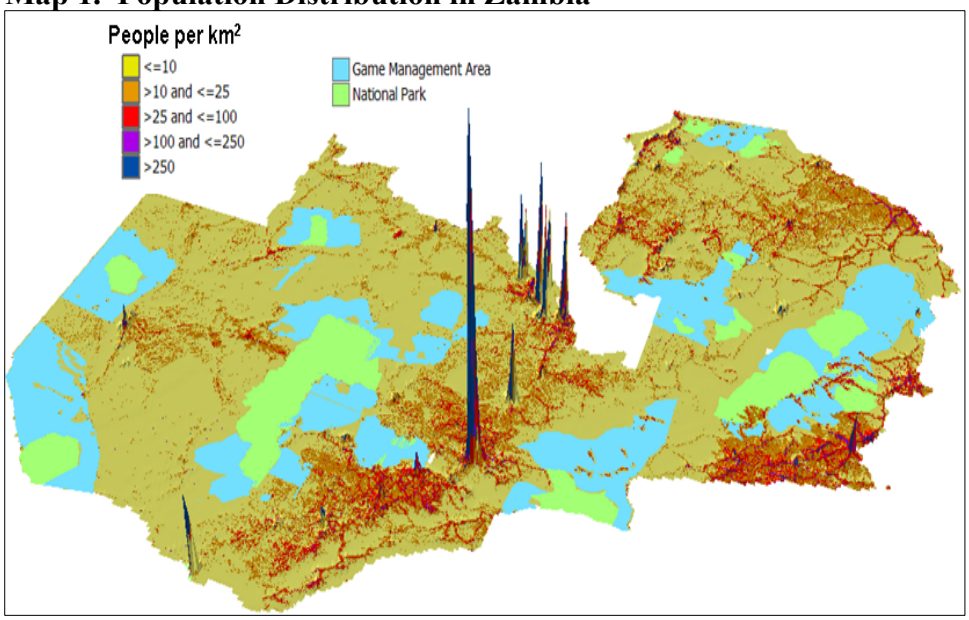
Source: CSO Population Projections Report 2003.

Figure 3. Number of Small and Medium Scale Farming Households, Zambia



Source: GRZ CSO Crop Forecast Surveys 2001 – 2010.

Map 1. Population Distribution in Zambia

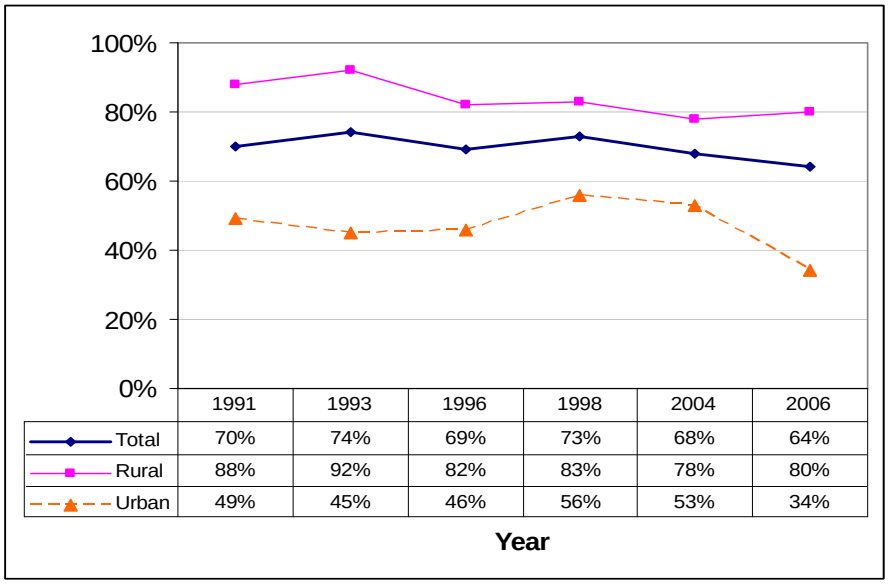


2.2. Poverty and Malnutrition

While the overall poverty rate in Zambia has declined over time, poverty rates in rural Zambia remain stubbornly high, with 80% of the rural population living in poverty. Furthermore, children living in rural areas of Zambia disproportionately exhibit signs of stunting, underweight, and wasting than their urban counterparts.

a. Incidences of people living in extreme poverty have a distinct geographic distribution, with people living in outlying regions experiencing a higher incidence of extreme poverty than those in regions more accessible to the major population centers (Map 2). Furthermore, poverty is significantly higher in rural than urban areas (Figure 4)
b. Provinces located far from the line of rail, yet with relatively more dense populations have the greatest numbers of people living in extreme poverty. These provinces are Eastern Province, with 1,049,142, and in Northern Province, with 948,741 people live in extreme poverty (Map 3).
c. Incidences of stunting, underweight, and wasted children are higher in rural Zambia than in urban: 56.6 % of children exhibiting sign of stunting in rural Zambia compared to 47.8% in urban. Yet, with a national average of 53% of under 5 children exhibiting signs of growth stunting, under-nutrition must be considered a national epidemic in Zambia.
d. In terms of absolute numbers of children who are stunted and underweight, the provinces of Eastern and Northern again are the highest, due in part to the high levels of poverty and relatively higher population densities than in other more sparsely populated and remote provinces (Maps 4 and 5). However, in terms wasting, the provinces of Southern and Northwestern have the highest number (Map 6). Wasting is normally brought on by a dramatic short-term shock, such as an acute absence of food or disease. Thus, while in Northern and Eastern Province children more often experience issues of chronic food access and nutrition problems, contributing to high levels of stunted and underweight children, more people in Southern and Northwestern Provinces experience short-term and acute food and nutrition problems, leading to higher numbers of wasting children.

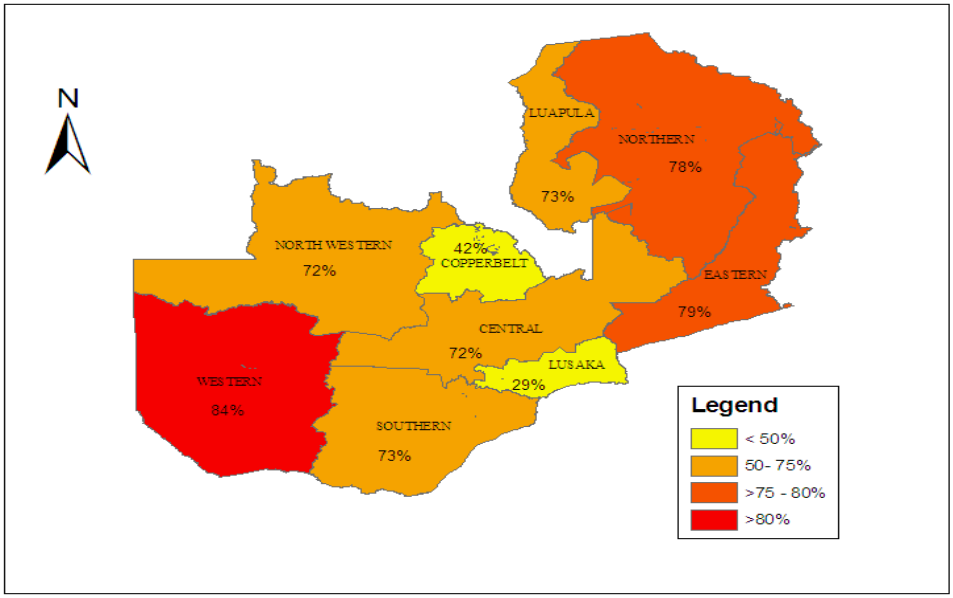
Figure 4. Poverty Levels in Zambia, 1991 to 2006



	1991	1993	1996	1998	2004	2006
Total	70%	74%	69%	73%	68%	64%
Rural	88%	92%	82%	83%	78%	80%
Urban	49%	45%	46%	56%	53%	34%

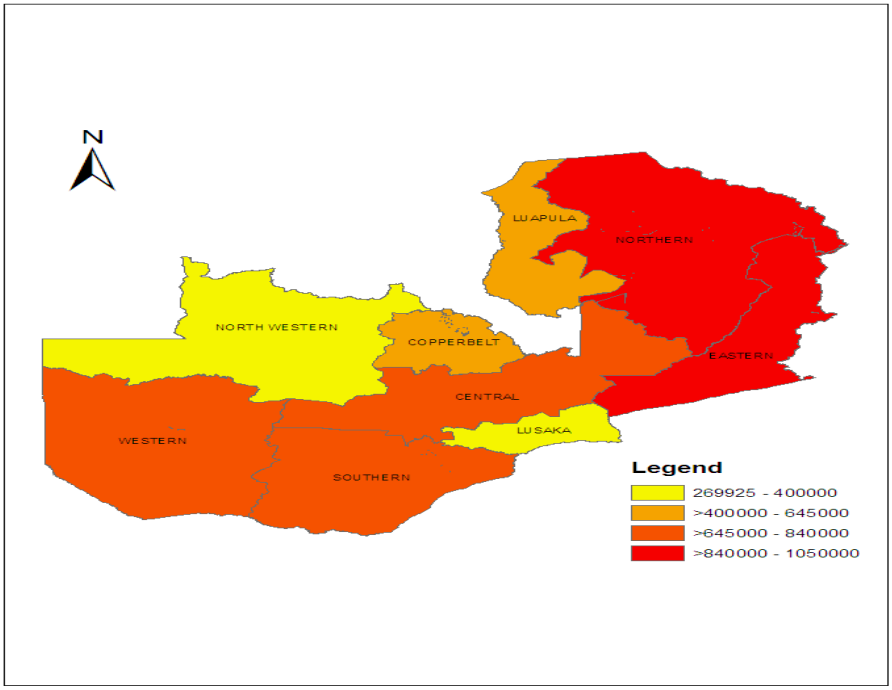
Source: PSI Surveys 1991, 1993: LCMS Surveys 1996, 1998, 2004, 2006.

Map 2. Incidence of Poverty in Zambia



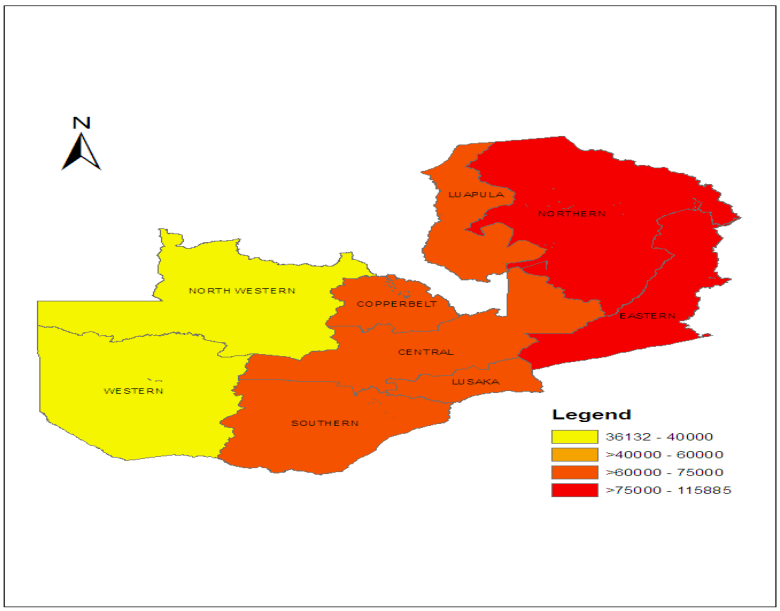
Source: Living Conditions Monitoring Survey 2006.

Map 3. Numbers of People Living in Extreme Poverty by Province



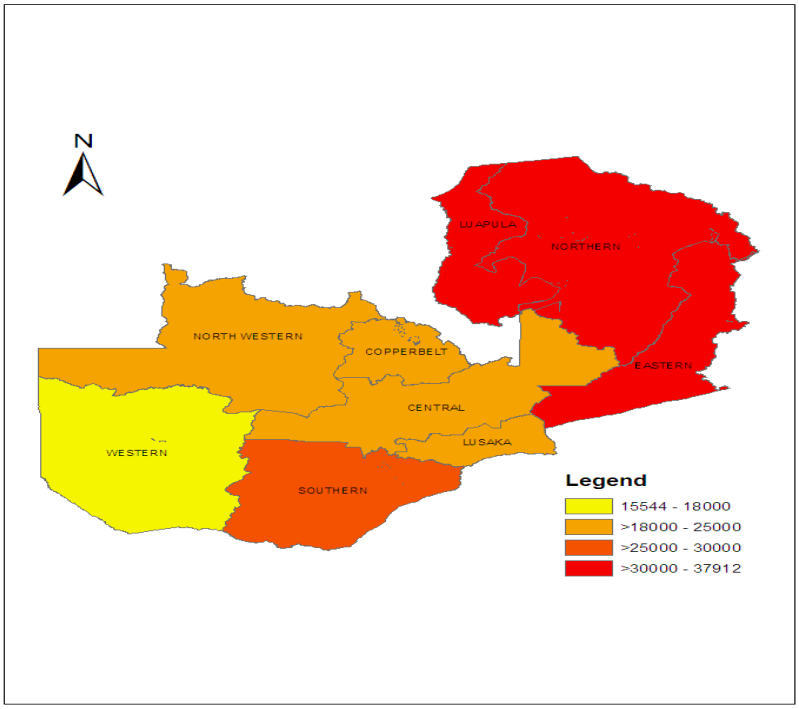
Source: Living Conditions Monitoring Survey 2006

Map 4. Number of Under 5 Children Exhibiting Signs of Growth Stunting by Province



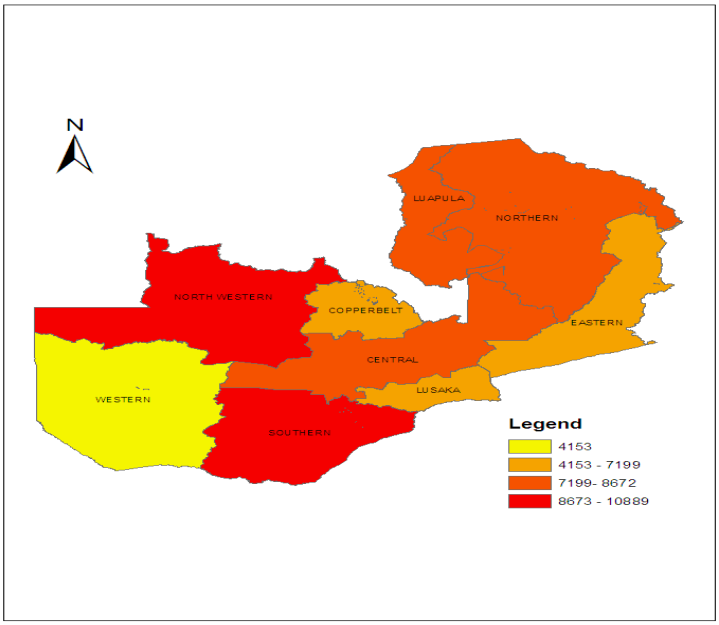
Source: Living Conditions Monitoring Survey 2006.

Map 5. Number of Underweight Children by Province



Source: Living Conditions Monitoring Survey 2006.

Map 6. Number of Wasting Children by Province



Source: Living Conditions Monitoring Survey 2006.

2.3. Nutrition Analysis for Zambia

2.3.1. Underlying Causes of Malnutrition in Zambia by Region

Despite its rich agricultural resources, Zambia has continued to experience chronic food and nutrition security problems (Table 1). Stunting at 45% and 21% being severe, remains the most common nutritional disorder affecting under five years children in Zambia, above the Sub-Saharan Africa average of 42%; and (ZDHS 2007). Stunting peaks at 18-23 months when 59% are below -2SD (moderate or severe). Stunting is a proxy indicator for national development, inversely related to household wealth, high in all wealth quintiles (48% and 33.2% in the lowest and highest quintiles respectively.) Stunting also decreases with increasing levels of mother's education. Zambia District Health Surveys (ZDHS 2007, p. 162) indicate that children born to mothers with no education are more likely to be stunted (44.6 %) than children born to mothers with a secondary education (38.6 %).

Wasting (5%), a short-term effect reflecting more recent or acute weight loss, can be a result of recent illness, sudden lack of appetite or inadequate food intake causing muscle and fat loss.

Underweight (15%) is a composite index for stunting and wasting. A child can be underweight for age because of stunting, wasted, or both. Weight for age is a good overall indicator of a population's nutritional health.

Table 1. Rates of Stunting, Underweight, and Wasting among Children under 5 Years of Age; Low Body Mass Index among Women of Reproductive Age, by Province

Province	Children <5 years (%) (stunting) Ht/age -3	Ht/age -2	Children < 5 years (%) (underweight) Wt/age -3	Wt/age -2	Children < 5 years (%) (wasting) Wt/ht -3	Wt/ht-2	Women (%) with BMI[1]< 18.5
Central	25.0	52.7	2.4	15.2	2.8	5.9	9.3
Copperbelt	20.1	43.8	1.8	14.9	0.6	2.3	7.4
Eastern	23.9	49.5	2.1	12.7	1.0	3.6	6.6
Luapula	32.0	56.3	3.1	17.7	3.1	5.4	13.4
Lusaka	14.7	37.2	2.6	9.7	1.2	4.4	7.8
Northern	21.9	49.3	4.2	17.3	2.2	6.0	13.1
North-Western	21.1	43.6	5.3	19.6	2.5	7.6	14.0
Southern	15.1	36.2	2.9	12.8	1.3	4. 8	8.2
Western	13.9	36.3	1.9	13.0	5.4	10.6	14.3

Source: ZDHS 2007.

a. Situation Analysis. The most nutritionally vulnerable population groups are pregnant and lactating women, whose bodies must cope with the additional nutritional stresses and demands of pregnancy and lactation, and infants and young children up to age two. Several factors contribute to this scenario, ranging from poor infant and young child feeding practices, inefficient policies and inadequate human resources in agriculture and food sectors, inadequate access to energy from food to meet their energy requirements.

Food insecurity is the major underlying cause of malnutrition in Zambia. Only 36% of households in Zambia have *enough food to eat*, while 19% of households *seldom* or *never* have enough to eat, categorizing them as *chronically food insecure*. This is consistent with data indicating that 64% of Zambians live below the international poverty line (53% Sub-Saharan average) and that 36.5% live in *extreme poverty*.[2] Some dimensions of food security of concern in Zambia include seasonal fluctuations in access to sufficient food resulting in quantitative deficit of energy, generally matched by deficits in food quality reflected in insufficient essential micronutrients including vitamin A, iron, zinc, folate, and many others; adequate quantity to meet energy needs of growing children and adolescents as well as pregnant and lactating women and working adults; dietary diversity that provides essential micro and macro nutrients needed for good health; and distribution of food stocks within the country to enable those who must purchase food to do so.

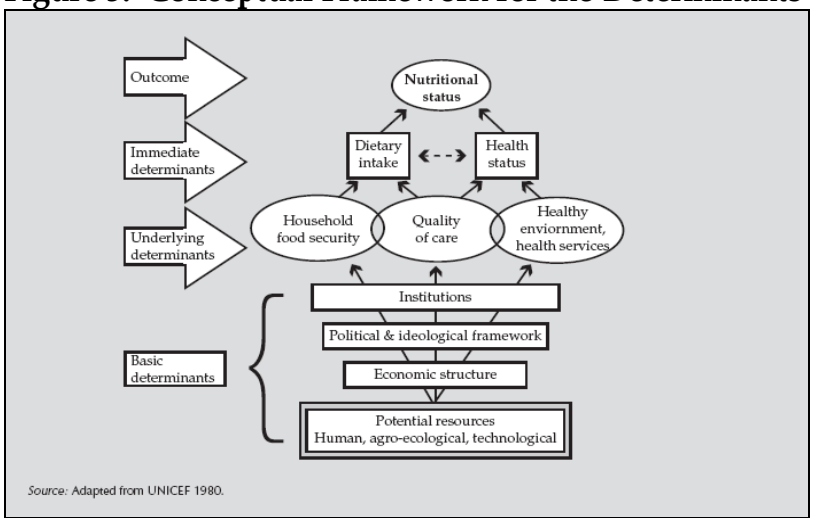
Using the UNICEF (1980) conceptual framework, (in Maxwell and Frankenberger 1992) three main underlying determinants of nutritional status are identified; thus household food security, quality of feeding and care giving practices and the healthy environment and access to health care services, providing feasible points of intervention entry. See Figure 5. This paper focuses on household food security window.

Suffice to note that while food production and household food security, income and in many cases food consumption and diet quality increase, childhood malnutrition persist. This leads to the conclusion that increasing agricultural production and income are probably necessary but not sufficient conditions to reducing malnutrition. There is need to cast the net wider beyond food security issues.

[1] Body mass index (BMI) is used to measure thinness and obesity. It is defined as weight in kilograms divided by height in metres squared (kg/m^2). A cut-off point of 18.5 is used to define thinness or acute under nutrition and a BMI of 25.0 or above usually indicates overweight or obesity. [BMI <16.0 implies severe under nutrition, BMI 16.0 – 18.4 implies moderate under nutrition, BMI 18.5 – 24.9 implies adequate weight for height, BMI 25.0 – 24.9 implies overweight and BMI > 30 indicates obesity].

[2] Rural poverty has declined from 92% in 1993 to 76.8% in 2006 but remains high relative to other Sub-Saharan African countries.

Figure 5. Conceptual Framework for the Determinants of Nutritional Status



Source: Adapted from UNICEF 1980.

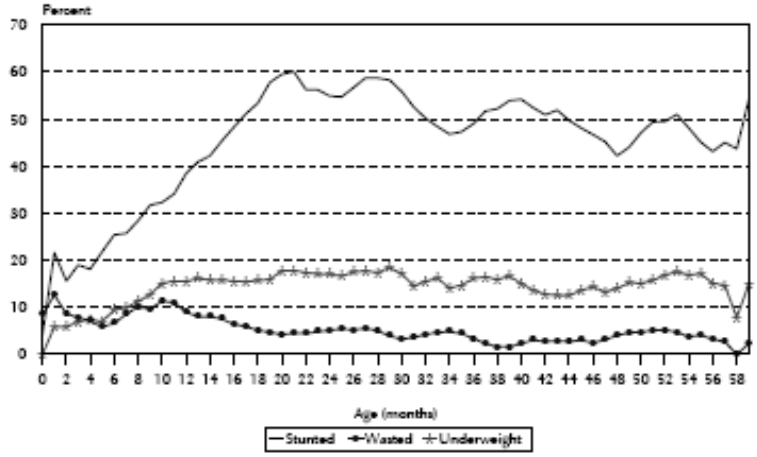
Impacts that are far more substantial ought to be achieved when agricultural interventions incorporated nonagricultural interventions that addressed other determinants of child nutrition. These other determinants include maternal health-seeking and care giving practices. Arming women with knowledge about appropriate child feeding practices, importance of child feeding practices and different micronutrients and food sources in which those nutrients are available is a particularly effective way of improving child health and nutrition outcomes.

Incorporating nonagricultural criteria like health and nutrition into the design and conduct of agricultural programs to improve nutrition suggests developing an effective interface between agricultural and other institutions. Yet systematic high-level coordination between sector ministries is challenging given the bureaucratic barriers that typically divide them. Nonetheless, these bureaucratic divides can be overcome through programs and interventions carried out at local community level. Successful projects must invest broadly in improving human capital and sustained and increased livelihood assets of the poor.

b. Child Nutritional Status. Infant and young child feeding practices and a high prevalence of illness and infection are important determinants of nutritional status. Feeding practices are far from optimal making children more vulnerable to growth faltering and malnutrition in the first two years of life than at any other time in the life cycle. Inadequacies in complementary feeding are common with foods of low nutrient density being the norm and with little consumption of foods of animal source by children in low income households. Meal frequency and consistency leaves much to be desired. Using dietary diversity as a measure, 2007 DHS survey found that only 25% of children 6-23 months receive a minimum acceptable diet (ZDHS 2007, page 172).

Most stunting occurs during the first two years of life at which time children have a particularly high demand for nutrients but face serious limitations in the quality and quantity of their diets, usually beginning at the age of 4-6 months. As shown in Figure 6 below, stunting increases with age through the first two years of life before declining steadily in the third and fourth year. The increase is especially rapid during the first two years of life as evidenced in the rise from 26% among children 6 – 8 months to 59 months among children age 18 – 23 months, providing a window of opportunity for interventions.

Figure 6. Nutritional Status of Children by Age



Source: ZDHS 2007.

c. Maternal Nutritional Status. The nutritional status of a woman before and during pregnancy is important for a healthy pregnancy outcome, an important factor for her own quality of life as well as for the health of her children. In Zambia, an estimated 10% of women of reproductive age have a low body mass index (BMI) - below 18.5 - while an estimated 11% of infants are born low birth weight.[3] A BMI under 18.5 usually implies particularly low caloric intake and/or particularly high caloric expenditure (arduous labor), but often also suggests that the woman was malnourished as a young child.

Low maternal body-mass index is associated with intrauterine growth restriction. Size at birth, in turn, is an important indicator of the nutritional status of children. Children (44%) with an average size or larger at birth (a proxy indicator for birth weight adequacy in the absence of birth weight measurement) are less likely to be stunted than children small or very small at birth (63%). Stunting also is slightly higher among children who are less than 24 months apart than among first born children or those with a larger birth interval.

d. Micronutrient Deficiencies. Deficiencies of key vitamins and minerals continue to be pervasive, overlapping considerably with problems of general under nutrition (underweight, wasting, and stunting). Data on micronutrient status in Zambia is less readily available,[4] but existing evidence indicates that micronutrient deficiencies continue to be prevalent. Dietary micronutrient deficiencies of vitamin A and iron are the most widespread, disproportionately affecting women and young children. Vitamin A deficiency has traditionally been a public health problem in Zambia due to inadequate dietary intake. A 1997 national survey showed a prevalence of vitamin A deficiency of 65.7% and 21.5% in women and children respectively. However, no surveys have been conducted since the Ministry of Health began distributing vitamin A supplements during the bi-annual child health weeks and sugar fortification introduced.

[3] Low birth weight (LBW) is defined by WHO as <2.5 kg. Yet there is strong evidence that the child's likelihood of survival and subsequent normal growth are substantially higher for infants with birth weights >3.0 kg than for infants between 2.5 and 3.0 kg. The percentage of infants born < 3.0 in Zambia as in most developing countries is likely to be more than double the official low birth weight percentage.

[4] Recognizing shortcomings indicated here, UNICEF is planning both a national food consumption survey and a micronutrient survey.

Shortage of nutrients in diets limit growth, weaken immunity, cause xerophthalmia (an irreversible eye disorder leading to blindness), and increase mortality. Iron deficiency is estimated to be the most prevalent nutritional deficiency. Anemia prevalence is 53% (2003) among children 6 – 59 months and 46.9% (1999) among pregnant women: as many as 50% of women attending antennal clinics are affected. At least 50% of anemia is caused by inadequate iron intake, the major cause being low consumption of animal source foods, particularly in low income households. In young children, iron deficiency impairs growth, cognitive development, and immune function. In school-age children, it affects school performance, and in adults, it lowers work capacity. Iron deficiency anemia is responsible for tens of thousands of maternal deaths each year.

Although no studies have been conducted on zinc deficiency in Zambia, there is evidence internationally of an association between levels of absorbable zinc in food supply (usually from animal sources) and stunting prevalence. Zinc is an essential nutrient for normal growth in children and is vital for the immune system; even mild deficiency may increase the risk of infection. Zinc deficiency may be an important contributing factor to stunting given evidence of low animal-source food consumption especially for young children, reliance on maize and other staples from which zinc is poorly absorbed, and frequent infections such as pneumonia and diarrhea which cause significant zinc losses. Other micronutrients of concern in maternal and child health include calcium, folic acid, and vitamin B12.

e. Food Consumption Patterns. Food consumption patterns in Zambia are generally poor, exhibited in monotonous low daily meal frequency and dietary diversity. The best available direct measure of food insecurity is an estimate of daily energy intake manifesting in high stunting rates for children and low BMI for adults. Nearly half of the country's rural population, 45% have daily caloric intakes below 1,750 (an average for individuals of all age groups) per day (FAO[5] food balance sheet calculation) while their families spend nearly 80% of their incomes on food. Calorie consumption ranges from 1,185 in Luapula province and 2,103 in Lusaka compared with an estimated average daily requirement of 2, 750 and 2, 600 for men and women respectively. The FAO food balance sheet calculation also indicates that, on average, only two percent of calories consumed by Zambians are from pulses, vegetables, and nuts highlighting the dire need for dietary diversity.

While extreme poverty is more common in rural areas of Zambia, evidence indicates that the poor in urban and peri-urban areas also have challenges obtaining sufficient food as shown in Table 2 below.

At Provincial Level, Lusaka Province had the highest percentage of households that could afford three meals a day at 64%. Luapula province had the lowest proportion of households that could afford three meals at 14% and the highest proportion of households

[5] FAO food balance sheet reflects calories and protein averages per capita food availability calculated by dividing total food production by population figures. Evidently, results do not reflect inequitable access to the food, storage and cooking losses or intra-household distribution.

Table 2. Average Number of Meals per Day by Sex of Head, Rural/Urban, and Province 2006

Sex of Head, Residence and Province	Average number of meals per day			
	1 Meal	2 Meals	3 Meals	More than 3 meals
Sex of head				
Male Head	5	50	43	2
Female Head	7	51	37	2
Rural/Urban				
Rural	5	61	33	1
Urban	5	32	59	4
Province				
Central	4	55	40	1
Copperbelt	7	41	48	4
Eastern	5	55	40	1
Luapula	4	81	14	1
Lusaka	4	28	64	4
Northern	5	67	26	2
North-western	6	63	29	1
Southern	3	33	63	2
Western	13	61	25	1.0

Source: Living Conditions Monitoring Survey 2006.

that could only manage two meals per day at 81%. Generally, the minimum number of meals that a person requires per day is three including snacks, assumed that would meet the dietary requirements.

However, not all households can afford to consume three meals a day in Zambia, with more than half the number of households not affording to consume three meals a day. About half the total number of households (51%) could afford two meals a day while 5% could only manage one meal a day. Most rural households (34%) could not afford three meals a day while 66% could only manage two meals or less per day. This explains why it is very difficult to accommodate the level of energy and other nutrients in such a limited number of meals, coupled with poor quality. Ideally, a diet should constitute enough food from the staple category (cereals, starchy fruits and root tubers) and at least one food item from each of the other groups (legumes and nuts, dark green leafy vegetables and/or yellow vegetables, animal source food, and fats and fat substitutes) using the food grouping system of meal planning.

In addition, many urban dwellers live in crowded conditions in which poor access to safe water and adequate sanitation (Zambia DHS 2007) significantly increases the risk of infection. In 2008, rising food and fuel prices and the subsequent global recession led to a sharp increase in child malnutrition rates especially in urban areas (National Food and Nutrition Commission 2008.)

2.3.2. Selected Food Value Chains

a. Beans. Beans are low in calories, high in dietary fiber and provide a source of dietary proteins (20%). They are a good source of B-group vitamins (thiamin B1, Riboflavin B2, Niacin and folic acid). Beans also provide the minerals iron, zinc, potassium, selenium, magnesium, and calcium. Note that beans lack sulphur containing essential amino acids. However, these amino acids are nonetheless found in cereals e.g. maize, which also lacks lysine, an amino acids found in legumes. Therefore eating beans and maize provides a complementary effect.

Further, including beans in the diet on a regular basis provide health benefits such as helping weight control. The dietary fiber in beans helps to slow the absorption of

carbohydrates, which may prevent hunger from occurring soon. The high content of dietary fiber in bean especially soluble fiber helps slow the absorption rate of carbohydrate, a factor which moderates blood sugar peaking related to food intake, a positive attribute in diabetes. Further beans are a very good source of resistant starch, which play a role in reducing the risk of colon cancer. The nutrition profile of beans contributes to heart health. It is low in total fat, saturated fat, and sodium while it is high in dietary fiber, especially soluble fiber, folate (B-group vitamin), potassium, and a host of other minerals. Finally, beans help to maintain normal ranges for several risk factors for heart diseases including blood cholesterol, blood pressure, and blood cysteine levels.

Despite the positive attributes highlighted above, beans however suffer some challenges. Anti-nutrient factors in beans reduce amounts of nutrients absorbed by the body. The proportion of iron and zinc that can be absorbed from legumes including beans is typically low due to anti-nutrients such as phytates and polyphenols, which normally bind to the iron and zinc making them unavailable for absorption and therefore body use. Flatulence factors caused by the presence of sugars and polysaccharides that are not digested by the human enzymes pass undigested and get fermented in the large intestines by microorganisms thus producing gas, a factor that may be deemed uncomfortable for some people.

Most beans varieties take a long time to cook. Nonetheless, varieties that are being developed now combine a number of agronomic and consumer acceptance characteristics including low phytate levels and short cooking time.

Opportunities available for beans include processing and cooking methods being available that reduce anti-nutrients factors, including germination, fermentation, and dehulling. Eating beans with vitamin C rich foods enables vitamin C to bind with iron thus making it unavailable for phytate binding, preventing it from being attached to the iron absorption inhibitors thereby increasing its bioavailability. This means that eating beans together with vegetables and fruits enhance iron and zinc absorption.

b. Sweet Potatoes. Sweet potato, not only is it sweet to taste buds but also good for cardiovascular health. This starchy root vegetable is a rich source of antioxidants, vitamins, minerals and dietary fiber that are essential for optimal health. Sweet potatoes are not always orange-fleshed on the inside but can also be a spectacular purple color. The orange fleshed sweet potato intervention not only improved gains in production, incomes, and household food security in Mozambique, but also showed significantly greater nutrition impacts of vitamin A intake when combined with interventions involving women's empowerment, education, and behavior change. The study that measured biochemical indicators also showed reductions in Vitamin A deficiency. Sweet potatoes are low in calories (provide just 90 cal/100 g, on comparison with starch rich cereals) and contains no saturated fats and cholesterol; but are a rich source of dietary fiber, anti-oxidants, vitamins (provides 40% of the RDA for vitamin C) and minerals like iron, calcium, magnesium, manganese and potassium which are very essential for body metabolism

- Sweet potatoes are a store-house of starch, a complex carbohydrate, which raises blood sugar levels *slowly* on comparison to simple sugars; therefore, recommended as a healthy food supplement even in diabetes. It is an excellent source of *flavonoids* like beta carotene and vitamin A *(provides 14187 IU of vitamin A and 8509 mcg of β-carotene)*. Vitamin A is also required by the body to maintain integrity of healthy

mucus membranes and skin. It is also vital nutrient for vision. Consumption of natural vegetables and fruits rich in flavonoids helps to protect from lung and oral cavity cancers. Sweet potato is packed with many essential vitamins such as pantothenic acid (vitamin B5), pyridoxine (vitamin B-6) and thiamin (vitamin B-1), niacin and riboflavin. These vitamins are essential in the sense that the body requires them from external sources to replenish. These vitamins function as co-factors for various enzymes during metabolism. There are surprisingly a number of nutrient categories responsible for the health benefits of this underappreciated tuber, among which categories are antioxidants, anti-inflammatory nutrients, and blood sugar-regulating nutrients. Each category brings with it valuable health benefits.

- Antioxidants**:** Sweet potatoes contain a wealth of orange-hued carotenoid pigments. They have a highly effective way of providing school age children with sizable amounts of their daily vitamin A. In some studies, sweet potatoes have been shown to be a better source of bioavailable beta-carotene than green leafy vegetables. Because sweet potatoes are available in on a virtual year-round basis, their ability to provide beta-carotene antioxidant makes them a standout antioxidant food. Particularly in purple-fleshed sweet potato, antioxidant anthocyanin pigments are abundant. Recent research has shown that particularly when passing through our digestive tract, sweet potato cyanidins and peonidins and other color-related phytonutrients may be able to lower the potential health risk posed by heavy metals and oxygen radicals. Storage proteins (sporamins) in sweet potato also have important antioxidant properties. Orange-fleshed sweet potatoes may be one of nature's unsurpassed sources of beta-carotene. Several studies have shown the superior ability of sweet potatoes to raise the blood levels of vitamin A. In several studies from Africa, sweet potatoes were found to contain between 100-1,600 micrograms to meet 35% of all vitamin A needs, and in many cases enough to meet over 90% of vitamin A needs (from this single food alone).

  Biofortified orange-fleshed sweet potato (OFSP) has heightened potential. Unlike most staple crops, even unimproved OFSP is rich in vitamin A and is promising for a number of reasons. It contains very high levels of carotenoids; it is well accepted by young children proving a good source of energy. It is easy to cultivate, is vegetatively propagated, and fairly drought-resistant once established, qualities making it an excellent food security crop. It is also less labor-intensive than most other staple crops, and this is particularly helpful to labor-constrained households, such as those affected by HIV/AIDS. It can be planted over a broad range of time without considerable yield loss and can fill some seasonal gaps in energy and vitamin A intakes. Finally, prices are generally low enough that families will choose to keep some OFSP for home consumption, rather than selling all they produce.

- Anti-Inflammatory Nutrients**:** Anthocyanin and other color-related pigments in sweet potato are equally valuable for their anti-inflammatory health benefits. Their phytonutrients have a profound impact effect on fibrinogen, a key glycoproteins in the body that is required for successful blood clotting. With the help of a coagulation factor called thrombin, fibronogen gets converted into fibrin during the blood clotting process. Balanced amounts of fibrinogen, thrombin, and fibrin are a key part of the body's health.

- Blood Sugar Benefits: Many people think that this starchy root crop could not possibly be helpful for controlling their blood sugar, realizing that food starches

can be converted by the digestive tract into simple sugars. If foods are especially concentrated in starch, there can often be a risk of too much simple sugar release in the digestive tract and too much pressure upon the bloodstream to uptake more sugar, a situation resulting in an overly quick elevation of the blood sugar level. However, what is fascinating about sweet potatoes is their ability to actually *improve* blood sugar regulation-even in persons with type 2 diabetes. While sweet potatoes contain a valuable amount of dietary fiber, (just over 3 grams per medium sweet potato) if boiled or steamed can carry a very reasonable glycemic index (GI) rating of approximately 50.

Recent research has shown that extracts from sweet potatoes can significantly increase blood levels of adiponectin in persons with type 2 diabetes. Adiponectin is a protein hormone produced by fat cells, and serves as an important modifier of insulin metabolism. Persons with poorly-regulated insulin metabolism and insulin insensitivity tend to have lower levels of adiponectin; those with healthier insulin metabolism tend to have higher levels. While more research on much larger groups of individuals to further evaluate and confirm these blood sugar regulating benefits, this area of health research is an especially exciting one for anyone who loves sweet potatoes.

- Other Health Benefits: One of the more intriguing nutrient groups provided by sweet potatoes are resin glycosides. These nutrients are sugar-related and starch-related molecules that are unusual in their arrangement of carbohydrate-related components, and in their inclusion of some non-carbohydrate molecules. Sweet potatoes contain one group of resin glycosides called batatins (including batatin I and batatin II). Recently researchers discovered a related group of glycosides in sweet potato called batatosides (including batatodide III, batatoside IV, and batatoside V). In laboratory studies, most of these sweet potato glycosides have been shown to have antibacterial and antifungal properties. To what extent these carbohydrate-related molecules in sweet potatoes can provide us with health benefits in these same antibacterial and antifungal areas is not yet clear.

c. Horticulture. Agricultural interventions promoting increased production of fruit and vegetable carry considerable potential to effectively address micronutrient deficiencies. A significant body of evidence documenting the success of homestead gardens in raising production, income, household consumption and the intake of targeted fruit and vegetable by vulnerable population groups exist. Several programs also show significant impacts on dietary and biochemical indicators of micronutrient deficiencies, and especially so when they include components designed to change behavior through education and to empower women.

It is hoped that households will earn incomes by selling the fruits and vegetables. The main use of this income should be for food and also to invest in seeds, seedlings, saplings or other income-generating activities as well as save income. Households with improved homestead gardens should consume micronutrient-rich, non-cereal foods more frequently. In turn, foods, such as beans and animal products, may not actually be produced in the garden, but purchased using income generated from the selling of garden produce. Chicken liver is a particularly rich source of vitamin A and other essential micronutrients. Egg consumption should be encouraged to increase disproportionately among women and children. Nutrition education should emphasize both intra-household distribution issues and micronutrient consumption and focus on the special needs of women and young

children. Horticultural crops under consideration include tomato, rape, onion and indigenous vegetables (sweet potato leaves, pumpkin leaves, cassava leaves), mangoes, bananas and oranges. These will be considered in turn below:

- Tomato: Tomato can be considered either a fruit or vegetable. Though technically a fruit, tomato is used as a vegetable for cooking purposes. Tomatoes have a number of important nutrients and are believed to accord a number of nutritional benefits to their users. Tomato is a good source of calcium and iron. It also contains some phosphorus, sulphur, potassium and some vitamin A. It is rich in vitamin C which increases as the vegetable ripens. 100 g of tomato contains only 20 calories, which are easy to absorb by the body. The low calorie content of tomato makes it a favourite for obese people as it fills the stomach and does not add calories.

  The presence of antioxidants in tomatoes helps in cleansing toxic compounds from the body. Lycopene, present in tomatoes, neutralize free radicals in the body, reducing the risk of prostate cancer and heart attack. Eating raw tomatoes reduces the risk of developing rectal, colon or stomach cancer. Tomatoes block the effects of nitrosamines and thus, reduce the risk of lung cancer. Vitamin K present in tomatoes helps in keeping the bones strong and healthy. It also helps prevent hemorrhages. Consuming raw tomato on a regular basis helps improve the skin texture, making it glow. Tomatoes are known to have blood purifying properties protecting the liver from cirrhosis and dissolves gallstones as well. Being a natural antiseptic, tomatoes help to protect the body against various common infections. Nicotinic acid in tomatoes is credited with reducing blood cholesterol, which in turn helps keep heart diseases at bay. Studies have shown that consumption of tomatoes and tomato based products prevents serum lipid oxidation and reduces the risk of macular degenerative disease. When applied topically, tomato pulp helps heal wounds and sores.

- Onion: Onion is a vegetable cultivated in almost all countries of the world and consumed across the globe used for cooking purposes. Not only does the vegetable lend an excellent taste to dishes, but is also associated with imparting a number of health benefits to its users. Onions have therapeutic, antibacterial, antifungal and load of other beneficial properties. Fresh as well as cooked onions have anti-platelet adhesiveness, which helps in preventing thrombosis. Onion is very good for those suffering from high blood pressure, helps reduce inflammation and is therefore, beneficial for those suffering from Neuritis, Vertigo, and Bronchitis. Onion, being a diuretic, increases the secretion of urine. It is rich in flavonoids and thus, provides protection against cardiovascular disease.

  Onions contain a number of sulfides that help in lowering blood lipids; have anti-allergy properties, apart from being slightly laxative. They help drain out mucus from the cavities and loosen phlegm, in turn alleviating symptoms of sinus. They also help the body in destroying worms and other parasites. They have a property of helping lower blood sugar, hence are good for people suffering from diabetes. Extracts of onion, being rich in a variety of sulfides, provide some protection against tumor growth. In addition, onions have been found to be helpful in the alleviation of the following ailments: asthma, bacterial infections, cough, colds,

influenza, insomnia, obesity, pneumonia, tuberculosis, neuritis, vertigo, and bronchitis.

- Rape**:** Rape, classified as group A vegetable are rich in vitamins B1, B2, C, carotene, and a variety of inorganic salts and large amounts of water, usually 70% to 90%. Being a dark green vegetable, rape is a rich content of nutrition, right from protein, vitamins, potassium, phosphorus, magnesium, calcium to selenium, iron, manganese, copper, and zinc. A high vegetable diet assures a relief from all the major and minor problems of the body. People consuming greater amounts of vegetables in their diet are high on energy and feel less lethargic or stressed out. The nutrition provided, helps body perform all the activities, by providing the body cells and organisms, all the necessary requisites for supporting life.

- Sweet Potato Leaves**:** Sweet potatoes leaves are not only delicious, nutritious and exceptionally easy to prepare – they are also versatile, having great nutritional profile. Sweet potato leaves are edible; containing more nutrients and dietary fiber than some green leafy vegetables like spinach (e.g. 100 g sweet potato leaves provide 1028 IU of vitamin A). They can also be dried and preserved for use to add culinary taste and in the lean periods. High consumption of vegetables and fruits has been linked epidemiologically to decreased risk of cancer and cardiovascular disease, beneficial effects attributed partly to the presence of numerous polyphenolic compounds, which display antioxidant and free radical scavenging properties. Polyphenols are the major phytochemicals in fruits and vegetables. A variety of *in vitro* studies have shown that polyphenols such as flavonoids are antioxidants, immunomodulators, and exhibit antigenotoxic effects. Sweet potato leaves are easily grown and have the highest polyphenolic content, in particular, flavonoids, of all the commonly grown vegetables, therefore supplementation of diets with sweet potato leaves would be prudent. As with many vegetables and fruits, sweet potato leaves are rich in carotenoids, whose immunomodulatory activity in animals and human beings is well known.

- Pumpkin Leaves**:** Pumpkin leaves and flowers can be cooked as vegetables, an incredibly rich source of vital anti-oxidants and vitamins. This humble vegetable is very low in calories yet good source of vitamin A, flavonoid poly-phenolic antioxidants like leutin, xanthins, and carotenes. It is one of the vegetables which is very low in calories; providing 26cal per 100g and contains no saturated fats or cholesterol; but is a rich source of dietary fiber, anti-oxidants, minerals, vitamins such as A, C and E, recommended in cholesterol controlling and weight reduction programs. With 7384 mg per 100 g, it is one of the vegetable in the cucurbitaceae family with highest levels of vitamin-A, providing about 246% of RDA. Vitamin A is a powerful natural anti-oxidant and is required by body for maintaining the integrity of skin and mucus membranes. It is also an essential vitamin for vision. Pumpkin leaves are also an excellent source of many natural poly-phenolic flavonoid compounds like alpha and beta carotenes, cryptoxanthin, leutin and zeaxanthin. Zea-xanthin is a natural anti-oxidant, which has UV (ultra-violet) rays filtering actions in the macula lutea in the retina of the eyes; thus, helping protect from *age related macular disease* (ARMD) in the elderly. Pumpkin leaves are also rich in B-complex group of vitamins like folates, niacin, vitamin B-6 (pyridoxine), thiamin, and pantothenic acid and a rich source of minerals like copper, calcium, potassium, and phosphorus.
- Cassava Leaves**:** Young cassava leaves are a popular vegetable due to the high content of protein, minerals, and vitamins. According to studies, consumption of

400g cassava leaves is equivalent to protein intake of 45 to 50 grams. It contains vitamin A, vitamin B1 vitamin C, calcium, calories, phosphorus, protein, fat, carbohydrate, and iron. Cassava leaves contain 15 to 20 times cyanide compared to roots. But this is easily degraded during cooking.

d. Chickens. Program and interventions involving animal source foods have even greater potential to tackle micronutrient deficiencies, especially vitamin A, Iron and Zinc deficiencies. These micronutrients are more readily bio-available in animal source foods than plan foods. Chicken makes a delicious, flavorful, and nutritious meal. It is no wonder chicken is the world's primary source of animal protein and a healthy alternative to red meat. It is available to enjoy throughout the year.

Chicken is rated as a very good source of protein, providing 67.6% of the daily value for protein in 4 ounces. Chicken provides an alternative source of meat for people who wish to reduce the amount of fat in their meals. The leanest part of the chicken is the chicken breast, which has less than half the fat of a trimmed Choice grade T-bone steak. The fat in chicken is also less saturated than beef fat. However, eating the chicken with the skin doubles the amount of fat and saturated fat in the food.

Chicken is a very good source of the cancer-protective B vitamin, niacin. Components of DNA require niacin, and a deficiency of niacin (as well as other B-complex vitamins) has been directly linked to genetic (DNA) damage. A four-ounce serving of chicken provides 72.0% of the daily value for niacin.

Chicken is also a good source of the trace mineral, selenium, of fundamental importance to human health. It is an essential component of several major metabolic pathways, including thyroid hormone metabolism, antioxidant defense systems, and immune function.

Chicken is not only a very good source of niacin, but is also a good source of vitamin B6. This particular mix of B-complex vitamins makes chicken a helpful food in supporting energy metabolism throughout the body, because these B vitamins are involved as cofactors that help enzymes throughout the body guide metabolic reactions.

Both of these B vitamins are important for energy production. In addition to its DNA actions, niacin is essential for the conversion of the body's proteins, fats, and carbohydrates into usable energy. Niacin helps optimize blood sugar regulation via its actions as a component of a molecule called glucose tolerance factor, which optimizes insulin activity. Vitamin B6 is essential for the body's processing of carbohydrate (sugar and starch), especially the breakdown of glycogen, the form in which sugar is stored in muscle cells and to a lesser extent in our liver.

In addition to its role in energy metabolism, vitamin B6 plays a pivotal role as a methyl donor in the basic cellular process of *methylation*, through which methyl groups are transferred from one molecule to another, resulting in the formation of a wide variety of very important active molecules. When levels of B6 are inadequate, the availability of methyl groups is also lessened. One result of the lack of methyl groups is that molecules that would normally be quickly changed into other types of molecules not only do not change, but accumulate. One such molecule, *homocysteine*, is so damaging to blood vessel walls that high levels are considered a significant risk factor for cardiovascular disease.

e. Free Range Eggs. Free range eggs means the chicken was allowed to roam, picking what it wanted to eat. Research has shown that cage-free hens have produce eggs higher in various vitamins. Chickens packaged tightly in cages undergo stress, lowering their immune systems and raising their likelihood of infection. Many times, chickens are given regular antibiotics to help keep down infection rates. These antibiotics may lead to stronger, more resistant bacteria in the feces of the chicken and even in that of the farmer who raises them. This presents two big potential problems for the consumer: 1) antibiotics like sulfa in the chicken that could aggravate drug allergies, and 2) super resistant bugs. Free-range eggs actually show greater resistance to bugs like salmonella. On this account free range eggs offer the best alternative.

Eggs are probably one of the most nutritious foods that easily find space on every supermarket shelf round the world. Apart from being inexpensive, they are delicious and packed with a wealth of essential components required by the body. Eggs are a rich source of high-quality protein and amino acids that are indispensable for a healthy body. Eggs are a great source of protein and numerous vitamins, including vitamin A, potassium, and many B vitamins like folic acid, choline, and biotin, are also packed into this oval-shaped staple. In fact, very few foods share the same diverse nutrient makeup available in a single egg. Many of these are specifically needed for the health of the nerves and the brain. Due to the presence of carotenoids like lutein and zeaxanthin, eggs check macular degeneration caused by ageing. Eggs also defend and improve eyesight by preventing diseases like cataract. Due to high vitamin D content, consuming eggs gives rise to strong and healthy bones. Eggs are also rich sources of vitamin E that is important for combating free radicals and ensuring cell protection. Eggs also contain phosphorus that helps in the development of healthy teeth and bones. Iron present in eggs helps in the formation of red blood corpuscles (RBC's) in the body. Zinc present in eggs aids in normal functioning of the immune system. Consuming eggs prevents different types of cancers, including breast cancer. Due to high sulphur content and presence of many vitamins and minerals, eating eggs helps in the promotion of healthy hair and nails. Chlorine that forms an essential component of eggs, boosts memory power and brain functioning. An important antioxidant called selenium is also found in eggs that curbs damages caused by unrestrained oxidation in the body, and thus prevents blood clots, strokes, and heart attacks.

f. Maize. Maize is the most important grain crop in Zambia, being both the major feed grain and the staple food for the majority of the population. Maize has a wide variety of uses that ranges from both human to industrial. Maize meal is a staple food and high volumes are traded monthly. Maize is a rich source of carbohydrates, Vitamin B1, Vitamin B5, and Vitamin C, dietary fibers, proteins, and minerals. Presence of thiamin in maize helps in keeping memory power intact; thereby prevent the dreaded Alzheimer's disease. Folate, a good source of niacin, helps in preventing birth defects and helps in lowering the level of Homocysteine that has the potential of damaging the blood vessels. Humans eat maize or corn in the form of popcorn, porridge, beverage, etc. In terms of industrial usage, the grains of the maize are used in the transformation of plastics and fabrics. Ethanol, produced from maize, is being used as an additive in gas to prevent pollution levels and reduce the use of petroleum. Consumption of corn also prevents the occurrence of lung cancer, as it is rich in beta-cryptoxanthin, an orange-red carotenoid found in corn in large proportion.

g. *Groundnuts.* Groundnuts are an important source of cheap protein, more than meat and two and half times more protein than that obtainable from eggs. They suffer the

misconception of being a fatty food because of the oil content. However, research has shown that its oil is actually nutritious, packed with mono-unsaturated fats. They are also not lacking in antioxidants that help reduce the risk of cancer and heart disease as well as have anti-aging properties contributing to a younger look.

Groundnuts provide five main nutrients required by the body in good quantity to maintain and repair the tissues namely food energy, protein, phosphorous, thiamin, and niacin. Groundnuts are also rich vitamins and contain at least 13 different types of vitamins that include Vitamin A, B, C and E. along with this, groundnuts are also rich in 26 essential minerals like calcium, iron, zinc, boron, etc. these help in brain function and development and also help to maintain strong bones. Groundnuts possess healing properties, are easily digested, and serve as a mild laxative. They are also known to boost the immune system. Groundnuts build resistance against such diseases as hepatitis and tuberculosis.

In addition, groundnuts and their products are very beneficial in the treatment of hemophilia and other such inherited blood disorders. People suffering from nose bleeding also benefit from eating groundnuts and they are also helpful in reducing excessive menstrual bleeding in women. They have also proven effective in the treatment of obesity. Roasted groundnuts could be taken before lunch. They do a good job in lowering appetite, which could contribute to weight loss. Diabetics should consider groundnuts as a boon because it addresses niacin deficiency. It also minimizes the risk of vascular complications.

In the absence of dairy milk or avoiding it for health reasons, groundnut milk can serve as an alternative that is as nutritious as dairy milk. As beneficial as groundnuts are, moderation should be exercised in consumption because in excess could give rise to acidity in the stomach. Excessive should be avoided by asthmatics, much in the same way as in those with gastritis and jaundice as it could lead to indigestion and heartburn. It is recommended that growing children, expecting women and nursing mothers consume roasted groundnuts with. It is said to provide resistance and immunity against dangerous infections like hepatitis and tuberculosis. Groundnuts are rich in anti-oxidants and a chemical called resveratrol. These help in reducing the risk of contracting cardiovascular diseases, cancer risk and help in anti-ageing, thus keeping the body young and fit.

h. *Cassava Value Chain*. In Luapula and Northern provinces, cassava is the staple food. The major advantage of cassava is that both tubers and leaves are consumed. In addition many products can be made from chips, flour and starch commercial purposes. With the increase in food prices and population trends towards urbanization, many products can be made from cassava, offer interesting nutritious and palatable options for consumers. Low levels of cassava utilization in Zambia clearly show that many households are not aware of the wide range of possible products available for domestic consumption and input into the food industry. Under-utilization of cassava is therefore a limiting factor to increased and sustained production.

Cassava is mainly composed of starch (carbohydrates) as the source of energy, fiber, minerals, and vitamins. The tubers have very low protein levels (though of high quality) in comparison with cereals and this forms the common criticism of cassava crop. However, the leaves are richer in protein. Some varieties that have yellow fleshed roots contain β-carotene. In cassava-based farming systems where cassava is the staple food, if the diet is not balanced people, especially children under five years of age are at greater risk of malnutrition. Use of protein rich foods such as groundnuts, soya beans, beans,

cowpea, cassava leaves, and kapenta etc. in combination with cassava products overcomes the protein inadequacy.

The major challenge for cassava is that of high cyanide content in bitter varieties. The danger of having high levels of cyanide in consumed cassava is that most animal protein is diverted to detoxify cyanide resulting in growth retardation. It is for this reason that cassava should be properly processed to remove the toxins.

Despite the low utilization levels, cassava root is utilized in many food preparations in Zambia. The most commonly consumed cassava products include nshima, boiled roots, roasted chips, and leaves. In addition, many other products can be made for household consumption and for sale to increase household income. Eating places such as restaurants and hotels should be encouraged to promote cassava products.

Constraints for cassava are manifold, including inadequate accessibility to drying equipment and tools increases post harvest losses, especially during the rainy season and the inability to benefit from higher prices during this period. Low adaptability of improved processing technology due to high capital investments result in low quality cassava chips and loss of value addition. Further, inadequate access to (reliable) water may constrain small scale farmers to explore high value adding processing like starch production and hence limit their income generating opportunities. Inadequate access to capital limits farmers to invest in appropriate processing technology, as a result they are only able to produce low to medium quality chips for local markets. Lastly, cassava is generally perceived a *poor man* food and hence not sought for by the middle and high income earners (with exception of those who were born in cassava growing areas).

Regardless of the constraints, opportunities do abound. These include the promotion of innovative saving and credit systems facilitating access to loans making it possible for farmers to store their cassava instead of being forced to sell immediate after harvesting at low prices. Additionally, the possibility of harvesting the whole year around enables farmers to benefit from seasonal price increases, especially when maize is scarce, resulting in higher returns. Lastly, the deficits in neighbouring countries like the Congo DRC provide ample opportunities for cross border trade and outlets for the farmers' surpluses.

2.3.3. The Role of Women in the Value Chains and Household and Child Nutrition

Women play multiple roles in both agricultural production and nutrition, and interventions that consider trade-offs between their respective roles and their time and labor constraints are more likely to lead to positive outcomes. Successful interventions are more likely to take into account the range of factors that differentially enable or constrain men and women in terms of access to resources like land and services like credit. These influence and often determine their roles as decision makers in the household or community. The significance of gender equity is particularly critical because women's status and decision-making power directly affect the nutritional status of their children.

2.3.4. Major Policy Environments, Current Initiatives, and Enabling Environments

To achieve the policy objective of reducing poverty and improving income distribution, Zambia has employed a number of policy measures embraced in several documents. In the

2030 Vision, Zambia adopted a major development objective, which seeks to accelerate pro-poor economic growth through securing macroeconomic stability, structural reform, and investment in human development. Specific targets are (a) to reduce the poverty head count from 68% to less than 20% of the population living below the poverty datum line (Bank-defined poverty line of U$1 per day) (LCMS 2007), and (b) to improve income distribution to a Gini coefficient of less than 40 from the current 53. The Sixth National Development Plan (2010) also includes the objective intended to achieve a "well nourished and healthy population by 2030", specifying five nutrition and food security targets.

Further the national agriculture policy vision is to develop an efficient, competitive and sustainable agriculture sector which assures food security and increased income. The specific objective for this vision is to ensure national and household food security. Note however, that both the vision and specific objective are broad statements not specific to nutrition security, thus evasive. The targeted crops in the long term vision which seeks to achieve food security for the majority of the population through increased yields and improved post management and utilisation include maize, cassava, sorghum, millet, sweet potatoes beans and groundnuts. It is delightful to note that the proposed value chain crops fall within the confines therefore stand to enjoy government support. The aspect of horticulture however, was not specific thus left to interpretation by implementers. Lastly the food and nutrition policy provision is inadequate in as far as the definition for food security is concerned, confined to food security which suffers deficit by most implementers and Politian's to imply maize security.

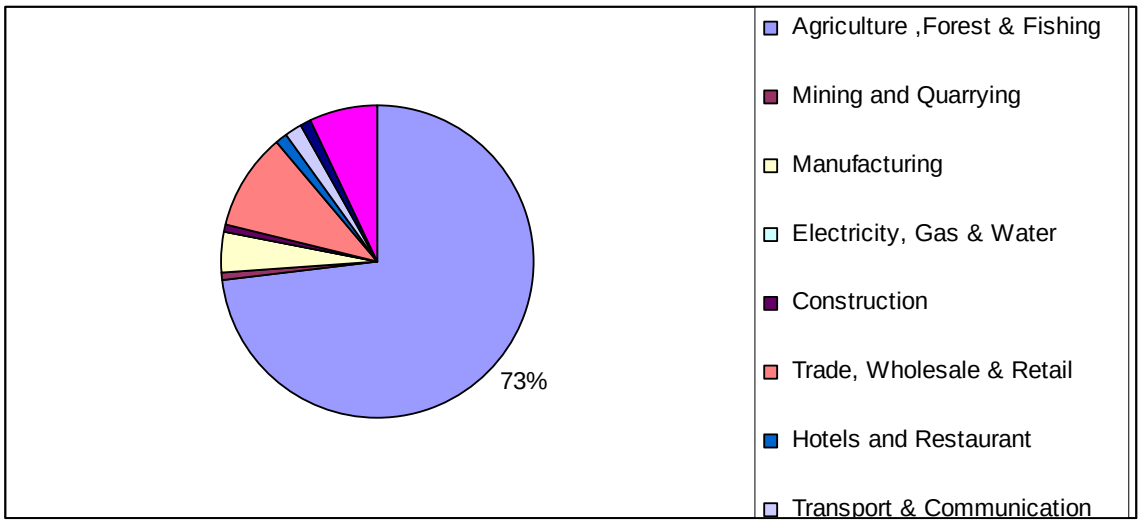
Factors that contribute to malnutrition and poor nutrition outcomes are complex and vary across production and consumption settings. Sector specific strategies tend to approach nutrition issues along narrowly disciplinary lines and generally disregard contributing factors that fall outside the purview of that particular field. Agriculture's roles as the source of food production make its significant contribution to nutrition unquestionable. Yet the persistence of malnutrition as a public health concern despite increasing agricultural production belies any notion that the malnutrition and under nutrition problem can be solved entirely from the supply side by increasing production. Nutrition is intrinsically multi-sectoral, and strategies to improve nutrition outcomes should seek to purposefully integrate the contribution of relevant disciplines. Multi-sectoral efforts intended to simultaneously address agriculture and nutrition have often been hindered by institutional barriers and insufficient resources.

2.4. GDP and the Role of Agriculture in Zambia's Economy

Zambia has experienced positive GDP growth over the last decade. At the same time, stagnant to moderate growth in the agricultural sector has led to a declining share of agriculture to Zambia's GDP.

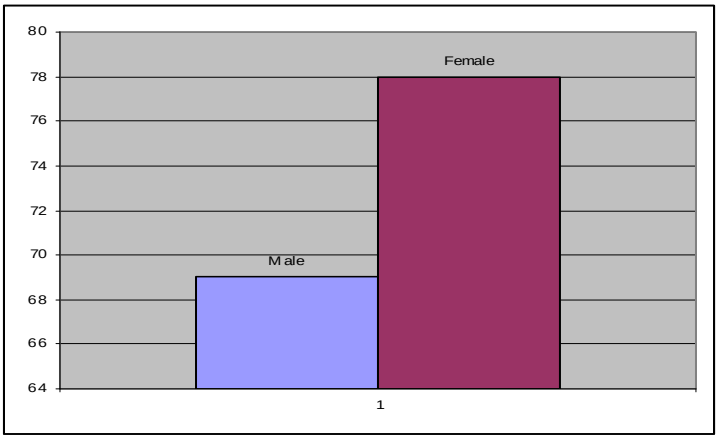
a. Agriculture in Zambia supports the livelihoods of over 70% of the population (Figure 7). 78% of women in Zambia are engaged in agriculture, compared with 69% of men (Figure 8).
b. Zambia's economy has grown steadily in real terms since 2001 (Figure 9). However, the percent contribution of the agricultural sector to GDP has declined from 16% in 2001 to 12.6% in 2009 (Figure 10 and 11).

Figure 7. Percentage Distribution of Currently Employed Persons Aged 15 years and Above by Industry



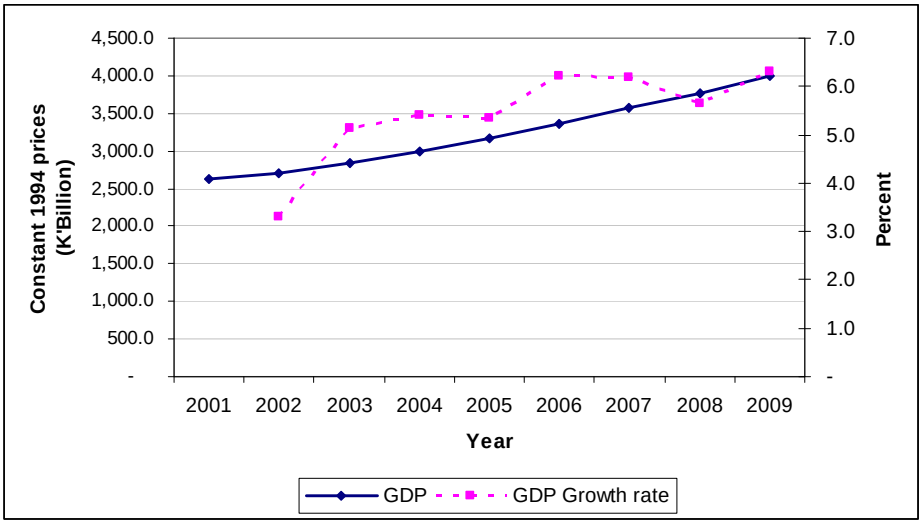
Source: GRZ CSO Labor Source Survey 2005.

Figure 8. Percent of Men and Women in Zambia Employed in Agriculture



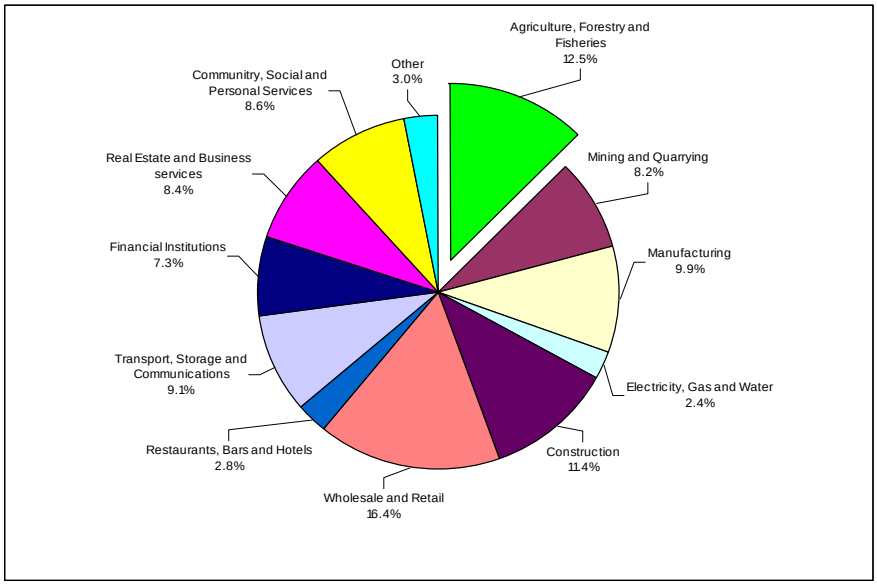
Source: GRZ CSO Labor Source Survey 2005.

Figure 9. Zambia GDP at Constant 1994 prices (K' Billion)



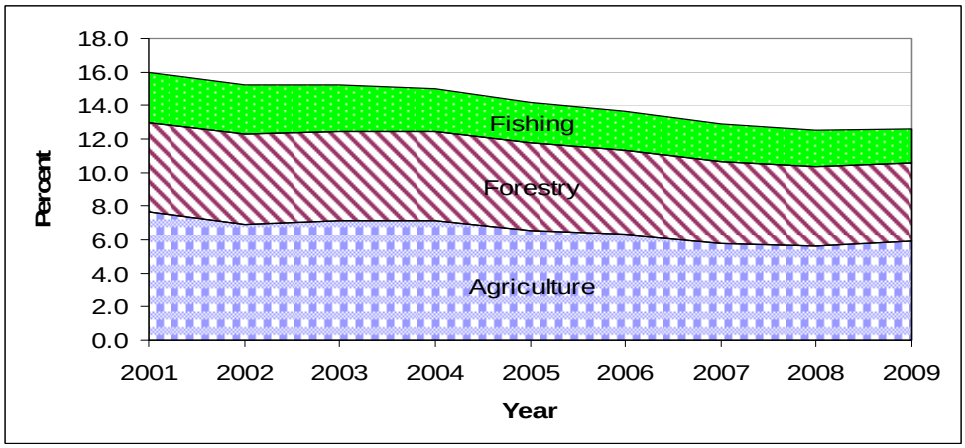
Source: Ministry of Finance and National Planning, 2010.

Figure 10. Contribution of Selected Sectors to GDP (%), 2008



Source: Ministry of Finance and National Planning, 2010.

Figure 11. Contribution of the Agricultural Sector to GDP



Source: Ministry of Finance and National Planning, 2010.

2.5. Challenge of Integrating Women into Commercial Agriculture

Empirical evidence from Zambia suggests that gender inequalities can slow down economic growth and poverty reduction **(**GTZ 2008).

a. According to the World Bank Strategic Country Gender Assessment for Zambia, women provide 70% of the country's agricultural labor (World Bank 2004).
b. Women are often disproportionately excluded from resource access, decision-making processes, and are less privileged beneficiaries of public service, such as extension services.
c. Women farmers more often than men produce agricultural products to meet household consumption needs, which limits their ability to generate an income from agricultural production and marketing.
d. According to the World Bank: *if women enjoyed the same overall degree of capital investment in agricultural inputs*, including land, output in Zambia could increase up to 15%
e. Zambia has generated a National Gender Policy, created a Gender in Development Division (GIDD), and assigned a Gender Focal Point within the Ministry of Agriculture and Cooperatives. However, these policies and positions have very little visibility, financing, or training to make meaningful changes on the ground.

III. AGRICULTURAL SECTOR IN ZAMBIA: WHY IS AGRICULTURE A CRITICAL PART OF THE SOLUTION TO FOOD INSECURITY, MALNUTRITION, AND POVERTY IN ZAMBIA?

"No country has ever achieved mass poverty reduction without a prior substantial boost in agricultural productivity" (Timmer 2005)

3.1. Agro-Ecological Zones

a. Zambia is made up of four distinct agro-ecological zones, which are based on relative rainfall and soil characteristics (Map 7)

b. Due to the relatively higher and consistent rainfall pattern, regions IIa and III are the most productive agricultural zones in the country. Conversely, Region I, located in the southern portion of the country is the most vulnerable to drought induced crop failures. Due to its sandy soils and isolation from major urban centers, Region IIb is the least productive region, in terms of staple maize production, with 61% of smallholder in the region being net maize buyers (see Table 3).

Map 7. Zambia's Agro-ecological Zones

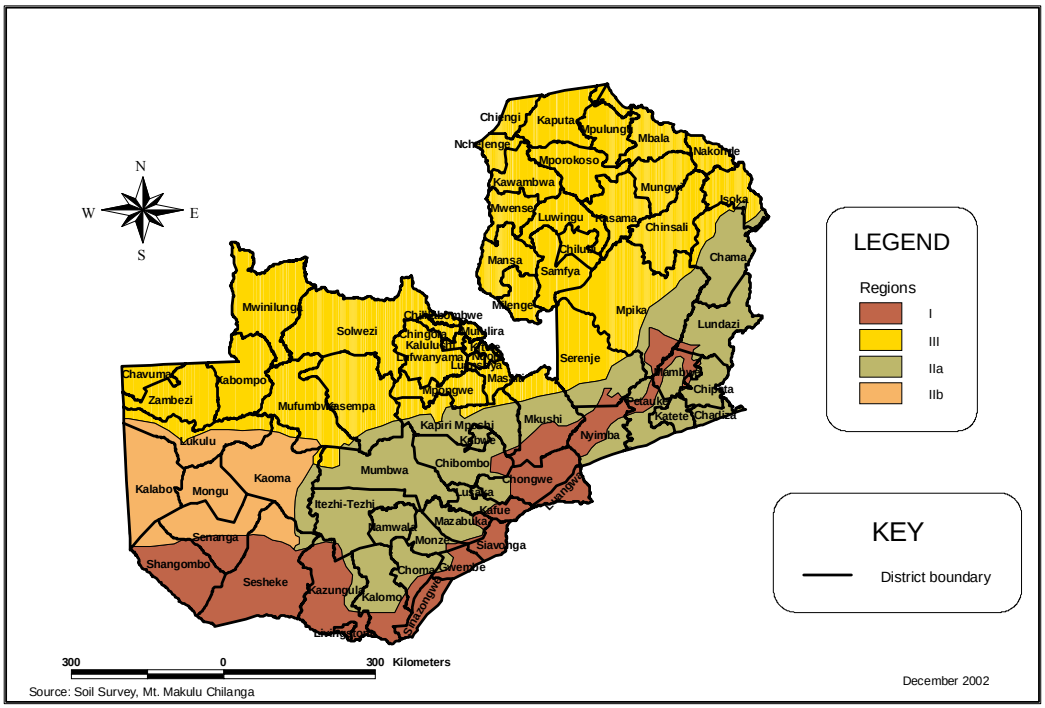


Table 3. Zambia - Household Maize Market Participation Status by Agro-Ecological Zone, 2008

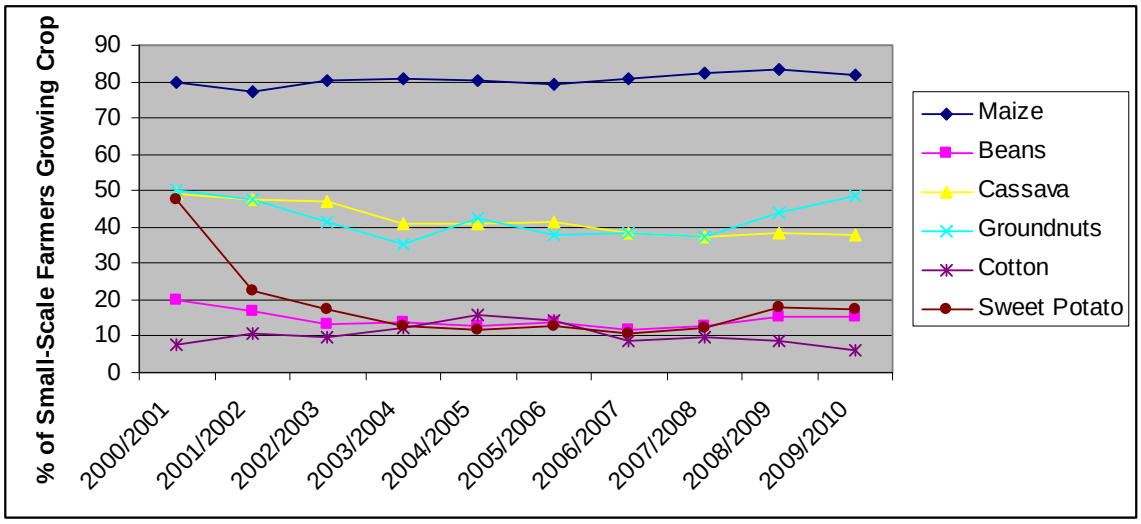
	Region I: low rainfall (under 800 mm)	Region IIa: moderate rainfall (800-1000 mm), clay soils	Region IIb: moderate rainfall (800-1000 mm), sandy soils	Region III: high rainfall (over 1000 mm)	Total
Selling maize only	14.4%	16.4%	7.3%	21.2%	17.7%
Buying maize only	51.6%	50.7%	61.2%	41.0%	47.2%
Buying and selling maize (net maize seller)	5.8%	11.9%	3.8%	8.1%	9.2%
Buying and selling maize (net maize buyer)	2.7%	2.8%	4.0%	3.0%	3.0%
Autarkic (no maize sales or Purchases)	25.5%	18.1%	23.7%	26.8%	22.9%

Source: CSO/MACO/FSRP Supplemental Survey 2008.

3.2. Cropping Characteristics

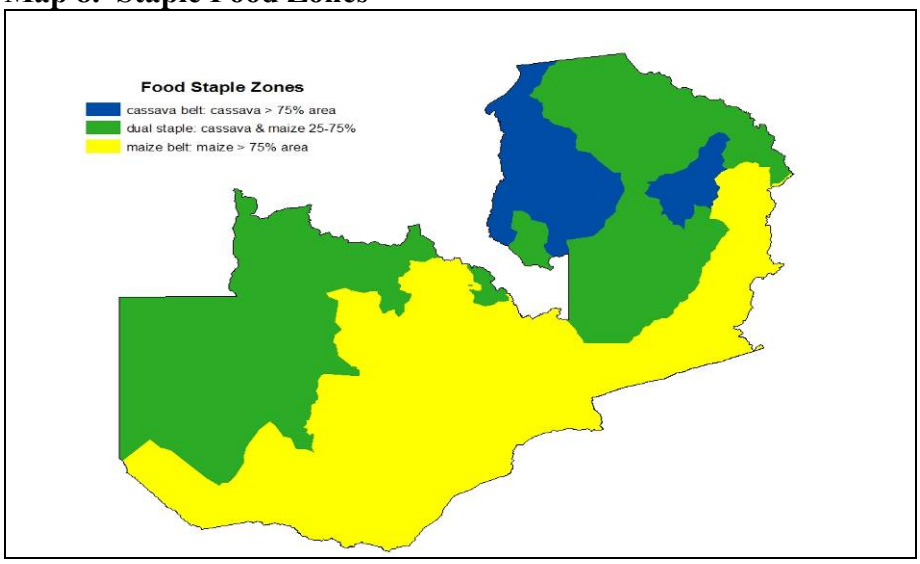
a. Small-scale farming systems in Zambia are overwhelmingly dominated by a single crop: Maize. 81.72% of all smallholders grew maize in 2009/10 (Figure 12).
b. Cassava cultivation, the second most important staple food crop, is geographic confined to the north and northwestern parts of Zambia (Figure 12 and Map 8).
c. Groundnuts, the second most widely cultivated crop in Zambia and important source of protein in Zambian diets, are frequently intercropped with maize (Figure 12). In Zambia, groundnuts are often considered a *women's crop* due to their importance for home consumption.

Figure 12. Percent of Small-Scale Farmers Growing Crop by Year



Source: CFS 2001-2010.

Map 8. Staple Food Zones

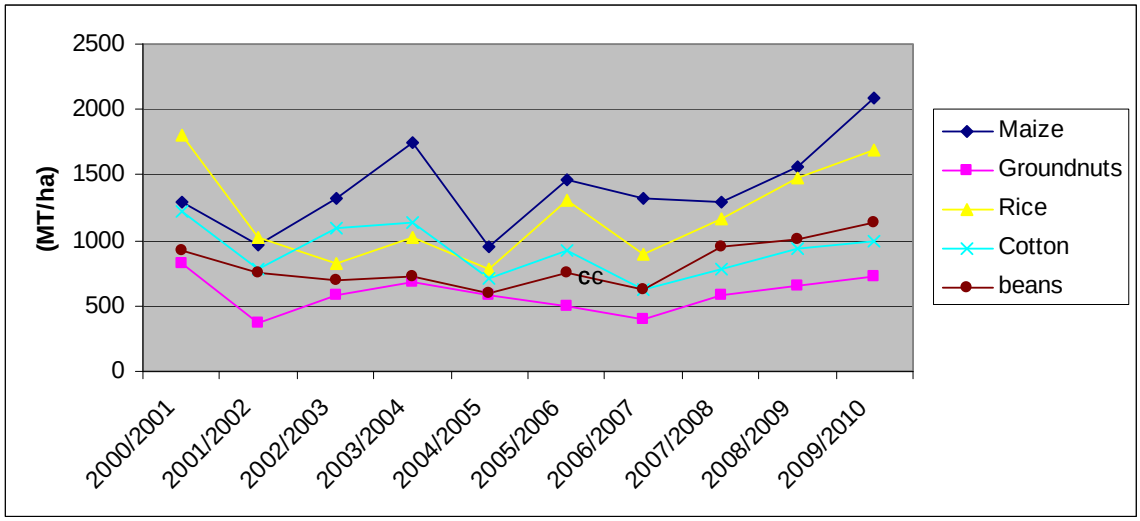


3.3. Agricultural Productivity Trends

Productivity growth in Zambia is critical for meeting the food needs of a rapidly growing and urbanizing population.

a. Yields per hectare have improved slightly for most crops since 2006, however, much of this improvement is due to favorable weather conditions (Figure 13 and Figure 14).
b. Yields for all crops in Zambia are well below global averages (Table 4).
c. However, while national yields are low, the top 10% of smallholders achieve yields that are one to nearly four mt more than average depending on the crop. This suggests the potential for yield improvements in Zambia (Figure 13a).
d. National production figures for most crops have trended upward over the last three years, but remain erratic and highly susceptible to rain-fall variations (Figures 15 and 16).
e. For the primary food crop grown by Zambian farmers, maize, production growth has been mostly driven by area expansion not yield improvements (Figure 17).

Figure 13. Yield (MT/ha) Trends for Selected Crops in Zambia



Source: GRZ CSO Crop Forecast Surveys 2001-2010.

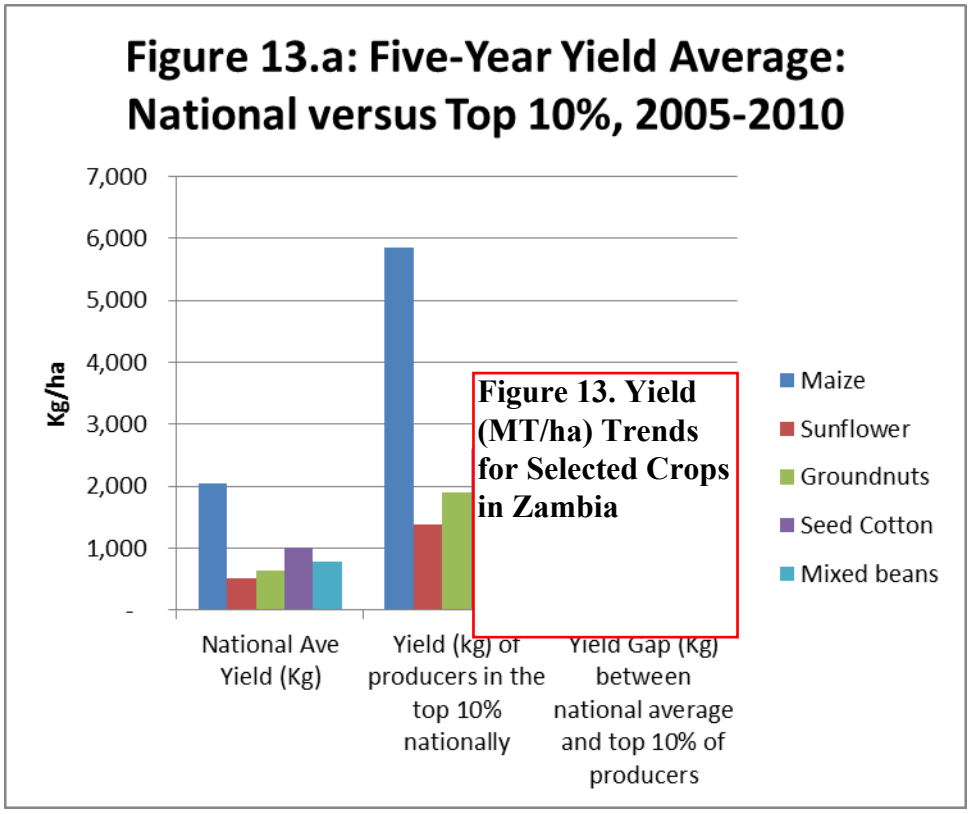
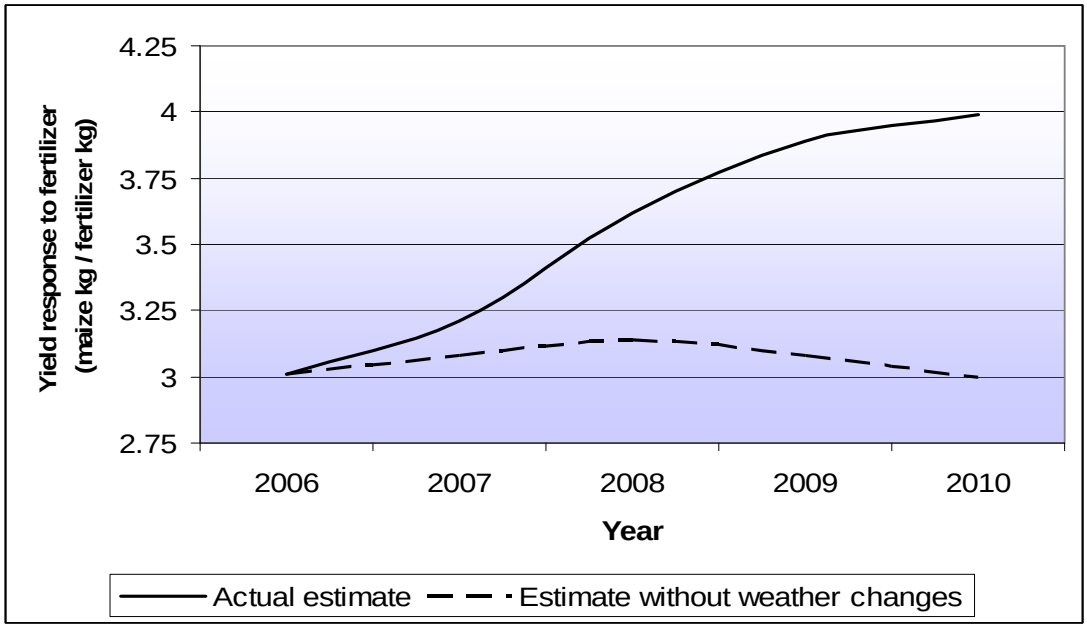


Figure 13. Yield (MT/ha) Trends for Selected Crops in Zambia

Source: CFS various years.

Figure 14. Yield Response to Fertilizer Use over Time



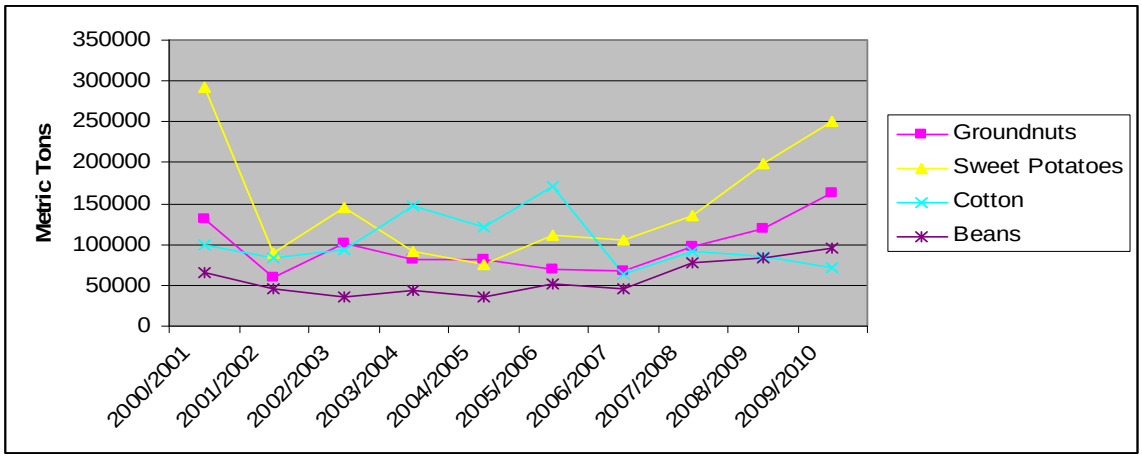
Source: GRZ CSO Crop Forecast Surveys 2001-2010.

Table 4. Crop Yields (MT/ha), 2003- Zambia vs. Global

Crop	2001/02	2003/04	2005/06	2007/08	2009/10	Global*
Maize	1.0	1.7	1.5	1.3	2.1	4.47
Sorghum	0.7	0.7	0.5	0.5	0.9	2.66
Rice	1.0	1.0	1.3	1.2	1.7	3.84
Millet	0.7	1.0	0.7	1.0	1.1	0.82
Groundnuts	0.4	0.7	0.5	0.6	0.7	1.35
Cassava		8.18				10.76
Beans		0.6				0.7
Wheat		1.38				2.66
Potatoes		4.29				13.49

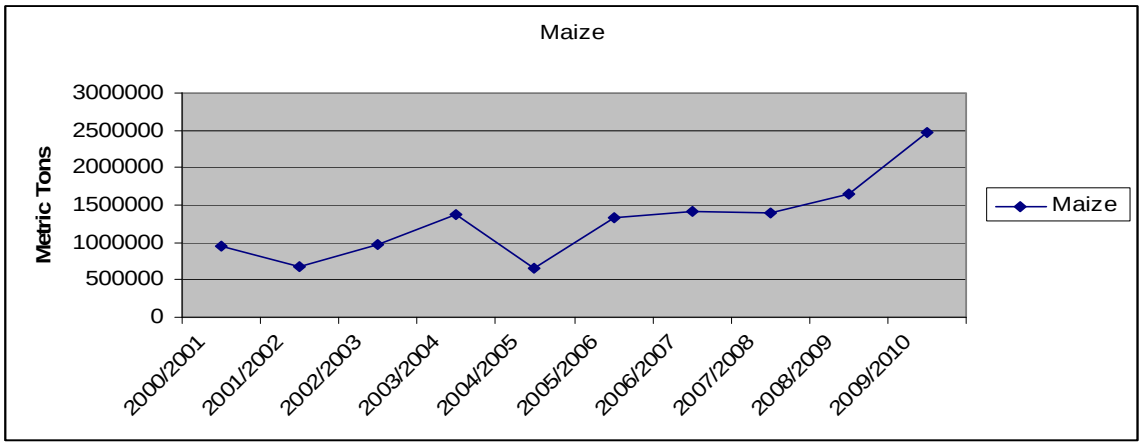
Source: FAOSTAT.

Figure 15. National Production Trends for Selected Crops



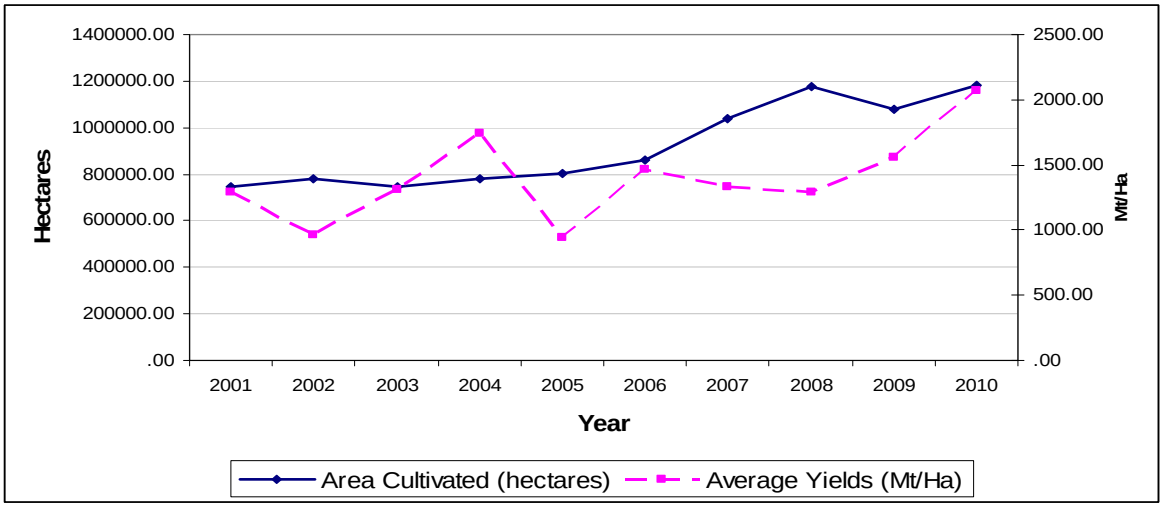
Source: CFS 2001-2010.

Figure 16. National Production Trends for Maize



Source: CFS 2001-2010.

Figure 17. Maize Production: Area Cultivated and Average Yields



Source: GRZ CSO Crop Forecast Surveys 2001-2010.

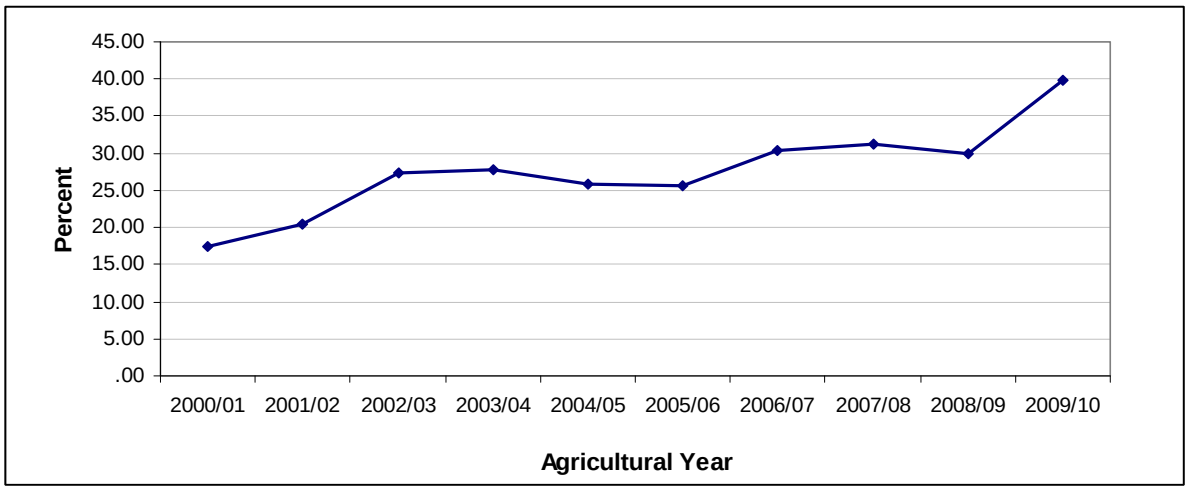
3.4. Input Use and Access

a. One of the primary constraints to yield improvement is limited access to inputs among Zambian smallholders.

b. While input use has trended upward since 2001, 60% of Zambia farmers still do not use fertilizer on their fields (Figure 18), while more than 60% do not use hybrid maize seeds (Figure 20).

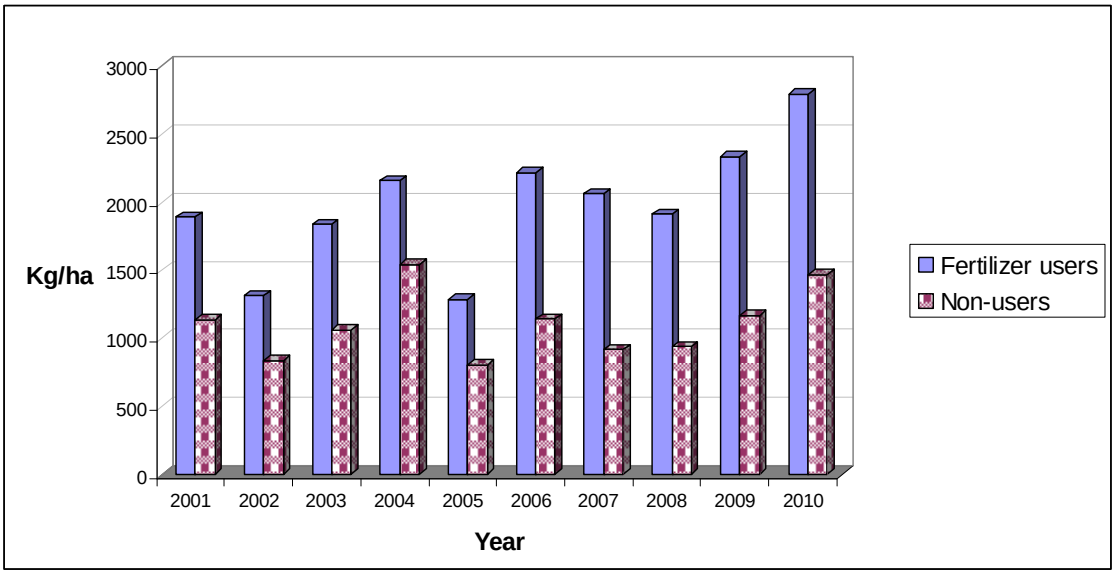
c. Of the farmers using fertilizer, the yield response to fertilizer use is extremely low. In 2010 fertilizer users produced a little over one mt per hectare more maize than none users (Figure 19).

Figure 18. Trends in % of Smallholders Using Fertilizer Nationwide



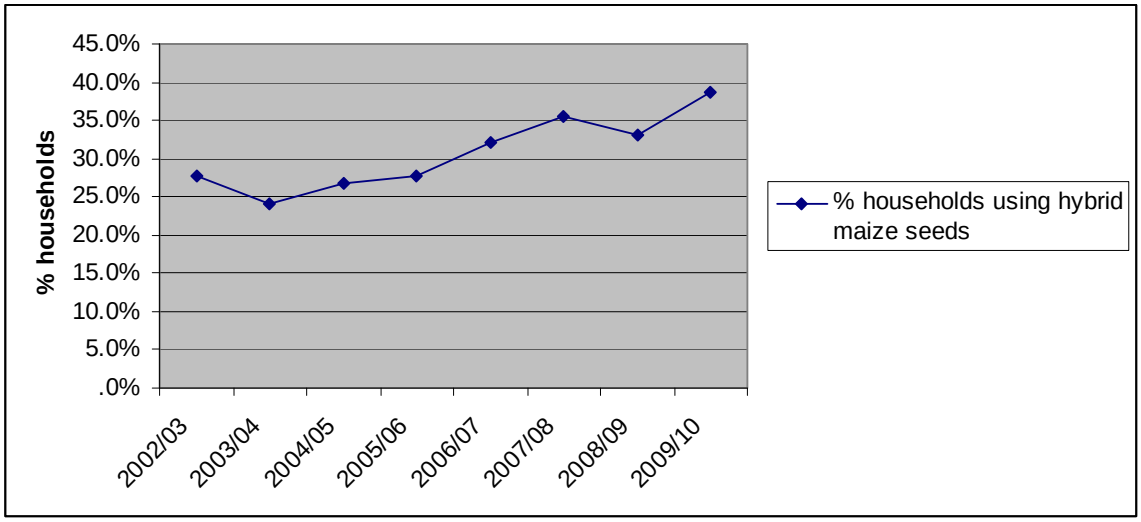
Source: GRZ CSO Crop Forecast Surveys 2001-2010.

Figure 19. Maize Yields (MT per Hectare of Area Planted), Fertilizer Users versus Non-users



Source: GRZ CSO Crop Forecast Surveys 2001-2010.

Figure 20. Trends in Hybrid Maize Seed Use, % of Smallholder Households



Source: GRZ CSO Crop Forecast Surveys 2003-2010.

3.5. Farm Structure and Land Sizes

Despite a relatively low population density, growth in the number of rural households contributes to increasing land fragmentation and shrinking land size holding in Zambia (Table 5).

a. While the mean land size holding in Zambia is 3.27 hectares, a quarter of the rural population controls on average barely 1 hectare of land (Table 6 and Figure 21 a and b).
b. At a provincial level the highest number of rural households with less than one hectare of land is in Eastern Province, followed by Southern and Northern Provinces (Map 9).
c. Even with a dramatic improvement in yields, land constrained farmers can never rely on maize or other low value cereal crops as a vehicle out of poverty.

d. Yet on a national level roughly 420,000 rural households, or 30.5% of all rural households in Zambia, farm on 1 hectare of land AND continue to grow maize.
e. Investments aimed at creating the conditions for land constrained farmers to move out of maize and toward food crops that provide greater returns per scarce unit of land is critical for reducing rural poverty.
f. Land constraints are particularly challenging for women farmers. The farm size of female-headed households – both those with a non-resident husband as well as those without a husband – are 0.7 and 0.5 hectares smaller on average than those of male-headed

Table 5. Ratio of Cultivated Land by Rural Population

Country	1960-69	1970-79	1980-89	1990-99	2000-07
Kenya	.459	.350	.280	.229	.207
Malawi	.628	.492	.361	.305	.298
Mozambique	.389	.367	.298	.249	.246
Zambia	1.367	1.073	.896	.779	.781

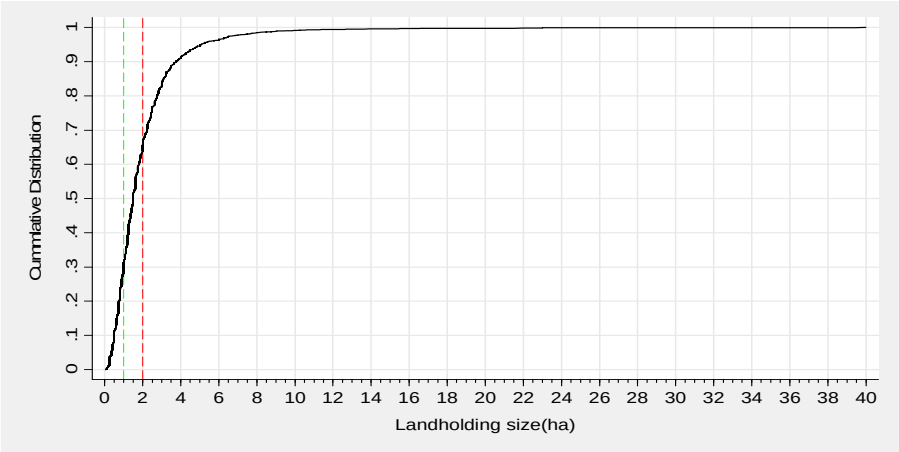
Source: FAO 2008.

Table 6. Smallholder Landholding Size per Household in Zambia and Alternative Farm Size Definition, 1999/2000

	Quartiles of Landholding Size Per Household				
	1st Quartile bottom 25%	2nd Quartile	3rd Quartile	4th Quartile Top 25%	Mean
National: cultivated + fallow only (ha)	.62	1.28	2.11	4.98	2.25
- All land including virgin + rented (ha)	***1.06***	***2.03***	***2.95***	***7.01***	***3.27***

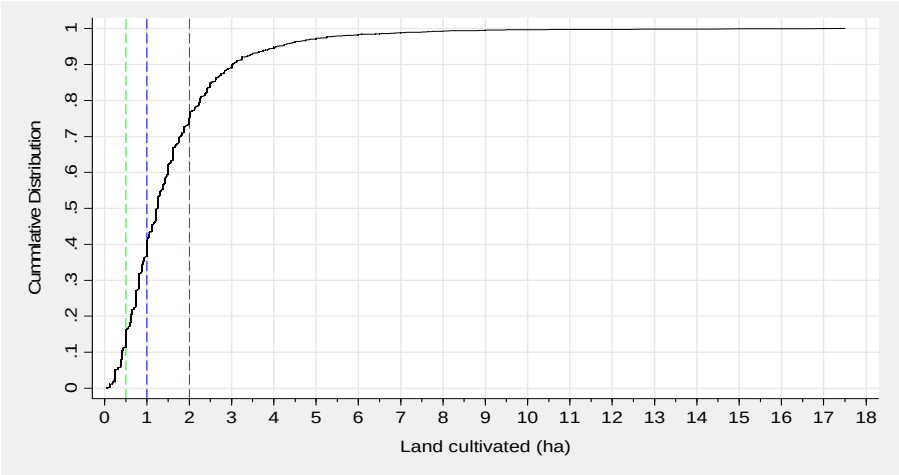
Source: CSO/MACO/FSRP Supplementary Survey to the Post-Harvest Survey of 1999/2000.

Figure 21.a. Cumulative Distribution of Landholding Size (Cultivated + Fallow), 2004



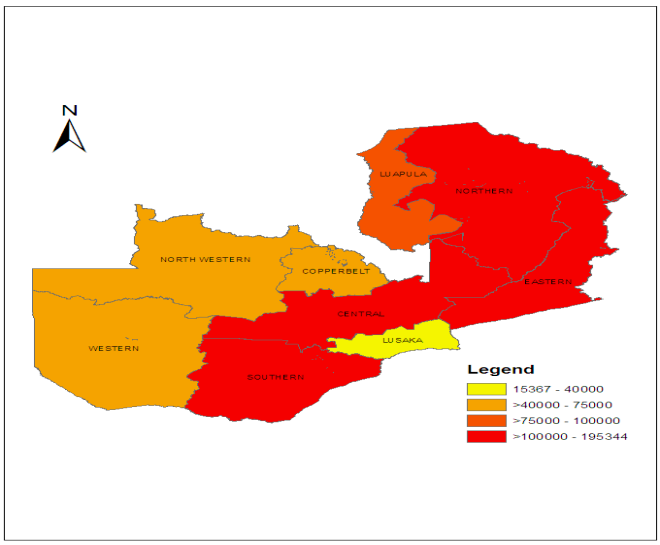
Source: CSO/MACO/FSRP Supplemental Survey 2004.

Figure 21.b. Cumulative Distribution of Cultivated Land, 2004



Source: CSO/MACO/FSRP Supplemental Survey 2004.

Map 9. Number of Households with One Hectare of Land or Less



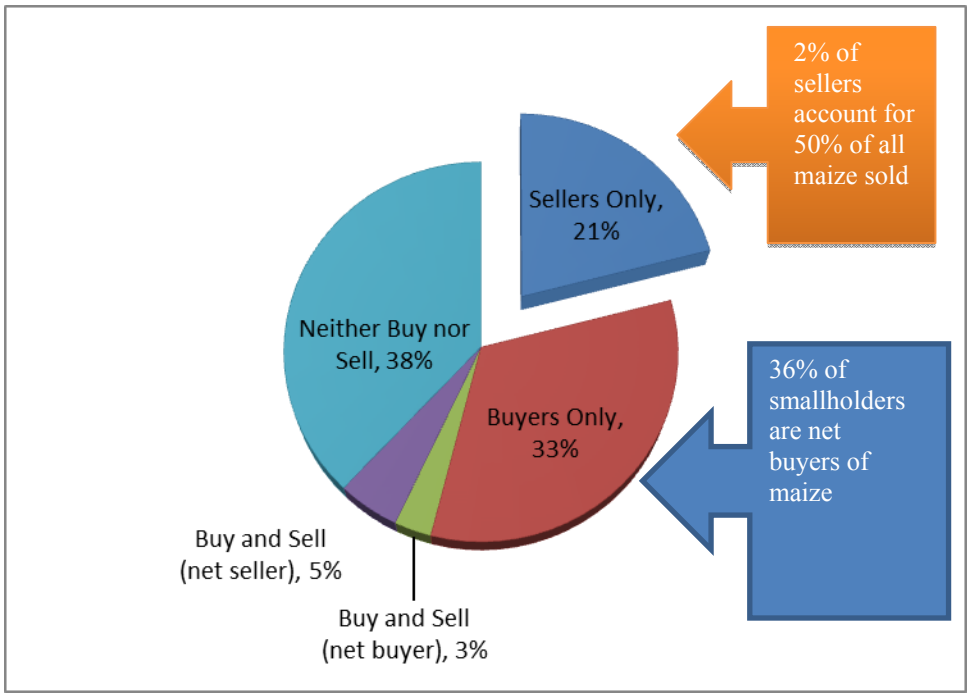
Source: CFS 2009/10

3.6. Crop Marketing Behaviors, Market Positions, and Farm Incomes

Variations in land size holdings in Zambia are closely correlated to farm income and the position of farmers in food markets.

a. In Zambia, 2% of small-medium scale farmers produce roughly 50% of the country's total maize supply. A further 19% produce the other 50% of surplus maize in Zambia. Thus, only 21% of farmers in Zambia are capable to of producing a marketable surplus of maize (Figure 22). These farmers tend to control larger land areas and are generally located in the most favorable agro-ecological zones (Table 7).
b. Despite the high prevalence of maize cultivation in rural Zambia, 36% of rural households are in fact net buyers of maize (Figure 22). These farmers tend to control smaller farm sizes and tend to be located in more marginal agro-ecological zones.
c. The implication is that farmers on the small plots of land continue to dedicate scarce land, labor, and capital to maize cultivation in an often futile attempt to meet home consumption needs. Part of the reason for this is the high cost of maize meal in rural areas during the *hunger months*.
d. Making maize markets work for these rural consumers is important if they are to shift their production systems to higher value food crops, which can generate greater returns per scarce unit of land.

Figure 22. Distribution of the Small-Scale Farmer Population According to Their Position in the Staple Grain Market, Zambia



Source: CSO/MACO/FSRP Supplemental Survey 2008.

Table 7. Characteristics of Smallholder Farmers, Zambia 2006/07

	N=	Farm Size (ha)	Asset Value (US$)	Gross Rev. Maize Sales (US$)	Gross Rev. Crop Sales (US$)	Total hh Income (US$)
Top 50% of Maize Sales	31,328 (2%)	4.3	1,132	720	1163	2932
Rest of Maize Sales	328,561 (26%)	1.6	316	88	193	634
Households Not Selling Maize	907,255 (72%)	0.9	231	0	97	415

Source: CSO/MACO/FSRP Supplemental Survey 2008

e. Land size holdings have a dramatic effect on rural household incomes. Households that control the lowest quartile of land make 28 times less from crop sales (Table 8) than the top quartile, and nearly 6 times less total farm income (Table 9).

Table 8. Zambia - Household Shares of Components in Total Crop Sales Income by Landholding Quintiles, National, 2008

Quintile of total HH landholdings	Crops Sales Income ($US)	Maize Sales	Sales of other staple food crops	Sales of high value food crops*	Traditional cash crops
1 lowest	24	34.8	21.6	42.5	1.1
2	76	31.6	21.9	38.5	7.9
3	116	28.3	17.6	36.5	17.7
4	206	32.3	13.9	33.7	20.1
5 highest	673	38.1	14.2	30.9	16.9
Total	220	33.1	16.9	35.3	14.7

Source: Central Statistical Office Supplemental Post Harvest Survey 2008.
Note: * primarily fresh fruits, vegetables, and legumes.

Table 9. Zambia - Household Share of Components in Total Gross Farm Income by Landholding Quintiles, National, 2008

Quintiles of total HH landholding size	Farm income ($US)	Maize retained	Maize sold	Other staple food crops retained	Other staple food crops sold	High-value food crops* retained	High-value food crops* sold	Traditional cash crops	Livestock products	Ag wage labor
		Mean share (%) in total gross farm income								
1-Low	241	35%	3%	18%	1%	14%	4%	0%	12%	13%
2	336	37%	5%	21%	3%	15%	6%	2%	7%	4%
3-Mid	461	33%	7%	20%	3%	16%	7%	5%	8%	2%
4	609	33%	9%	15%	3%	15%	8%	6%	9%	2%
5-High	1,426	30%	15%	12%	4%	12%	9%	6%	12%	2%
Total	615	33%	8%	17%	3%	14%	7%	4%	9%	4%

Source: Central Statistical Office Supplemental Post Harvest Survey 2008.
Note: * primarily fresh fruits, vegetables, and legumes.

f. The highest share of the income from crop sales generated by the most land poor is from high value food cops, particularly fruits and vegetables (Table 8).
Thus improving the productivity of vegetable cultivation and the market linkages between land constrained farmers and urban consumers is a critical intervention area for lowering and stabilizing the cost of vegetables for urban consumer, while raising returns for the poorest farmers.

IV. DEMAND CHARACTERISTICS IN URBAN ZAMBIA

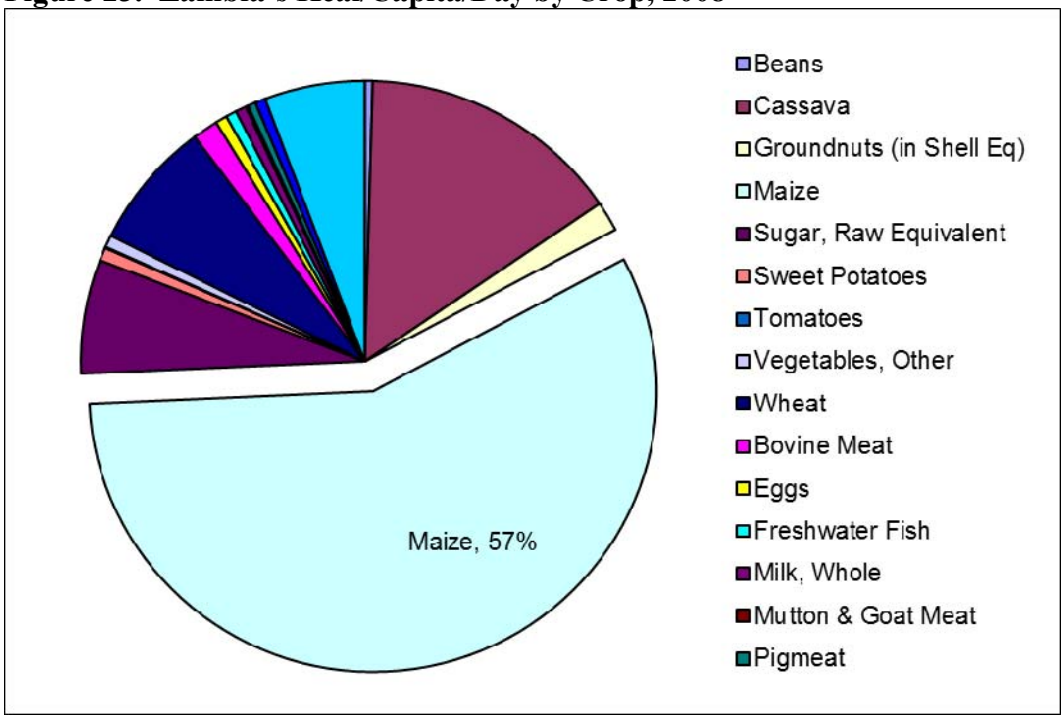
Providing Zambia's large and growing urban population with reliable access to nutritious and appropriate foods at tolerable prices is critical for improving food/nutrition security and reducing poverty in Zambia.

- Caloric intake among Zambians is overwhelmingly dominated by a single food crop, maize. According to FAOStat maize accounts for 57% of Zambians' daily caloric consumption (Figure 23).

- Rapid urbanization coupled with stagnant agricultural growth is contributing to an emerging structural deficit in staple foods. As Figure 24 shows, the region of southern Africa has recently become a net importer of maize and maize meal products, despite an overwhelming number of rural farmers producing maize.

- Food prices in Zambia tend to be high and erratic, due to poor market linkages and low and erratic productivity. For example, between 2001-08 maize prices in Lusaka spiked well above import parity on four different occasions (Figure 25). These price spikes are extremely damaging to the food security of Zambians, particularly the poorest and most vulnerable.

Figure 23. Zambia's Kcal/Capita/Day by Crop, 2008



Source: FAOSTAT.

Figure 24. Net Exports of Maize and Maize Meal in Southern Africa

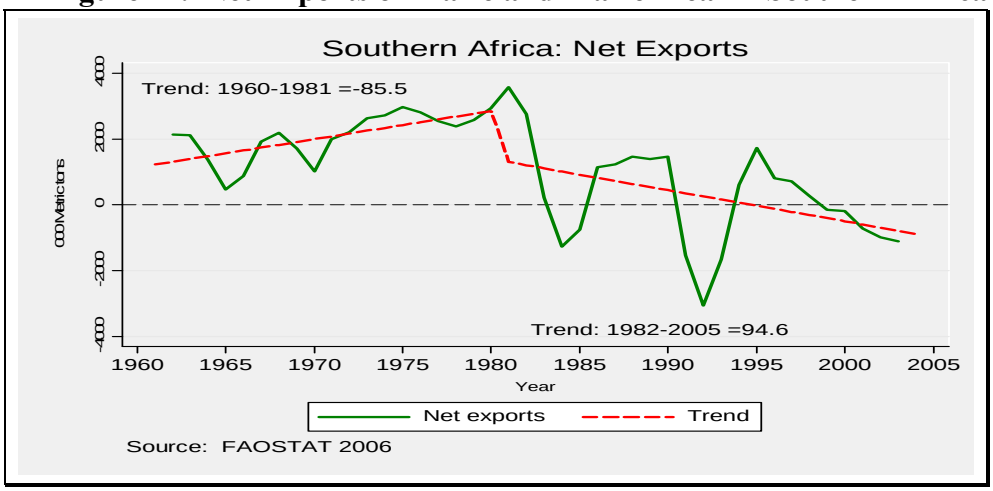
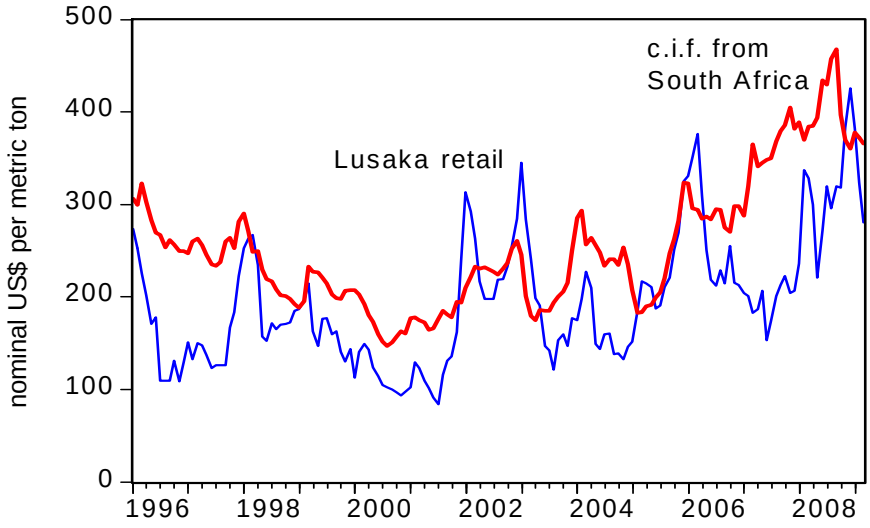


Figure 25. Lusaka Retail Maize Prices versus C.I.F. Prices South Africa



Source: AMIC, Lusaka Retail and SAFEX for South Africa.

- While food expenditure as a share of total household budget has declined in Zambia from 61% in 1991 to 46-55% in 2006/07, the poorest consumers continue to spend an extremely high amount of their total income on food (60-73%).
    a. The poorest urban consumers spend the highest share of their food budget on maize as their staple carbohydrate (Table 10), and vegetables, particularly tomato, rape, and onion, which can be considered Zambia's staple vegetables (Table 11).

- Investments aimed at lowering and stabilizing consumer prices for maize and vegetables are therefore critical for improving the disposable incomes of the poorest urban consumers in Zambia and assisting them to have reliable access to staple foods at consistently tolerable prices.
    a. These food crops are also important because the opportunities that exist for improving urban-rural economic growth linkages.

Table 10. Food Shares of Total Value of Consumption, Food Item Shares of Total Value of Food Consumption among Staple Carbohydrates, February 1, 2007 to January 30, 2008

Quintile of per adult equivalent total value of consumption		Food share of total value of consumption (%)	Food item share (%) of total consumption (Share sum to 100%)					
			Maize	Rice	Wheat	Cassava	Other staple	Other food
Lusaka	**1 Lowest**	**60.8**	**16.1**	**1.7**	**9.0**	**0.1**	**2.4**	**70.7**
	2	60.0	10.5	2.2	10.1	0.2	2.5	74.5
	3	55.5	8.3	2.3	10.2	0.2	2.1	76.9
	4	48.3	6.2	2.3	11.1	0.3	2.4	77.7
	5 highest	34.5	3.7	1.9	8.2	0.1	2.0	84.1
	Total	46.2	7.6	2.1	9.6	0.2	2.2	78.3
Kitwe	**1 Lowest**	**62.7**	**18.8**	**1.8**	**7.7**	**0.7**	**2.1**	**68.9**
	2	61.4	13.6	2.6	11.9	0.6	2.3	69.6
	3	58.1	11.1	2.7	10.4	0.5	2.3	73.0
	4	52.2	9.0	2.4	11.1	0.5	2.0	75.0
	5 highest	33.6	5.2	2.2	10.4	0.3	2.0	79.9
	Total	46.6	9.8	2.4	10.5	0.5	2.1	74.7
Mansa	**1 Lowest**	**67.7**	**16.5**	**1.8**	**1.5**	**11.1**	**3.7**	**65.4**
	2	68.3	14.0	2.3	3.1	6.4	3.1	71.1
	3	58.2	13.1	2.7	5.0	4.5	2.8	71.9
	4	52.3	10.1	2.3	7.3	2.2	2.1	76.0
	5 highest	40.0	7.4	2.4	10.0	1.5	2.0	76.7
	Total	50.7	10.9	2.4	6.7	3.8	2.5	73.7
Kasama	**1 Lowest**	**73.1**	**17.1**	**3.7**	**1.5**	**7.5**	**4.2**	**66.0**
	2	69.8	14.1	3.7	3.3	3.9	3.6	71.4
	3	63.9	12.2	2.5	4.8	2.6	2.8	74.1
	4	59.1	10.0	3.1	7.0	1.6	2.5	75.8
	5 highest	41.0	7.9	2.4	8.4	0.7	2.4	78.2
	Total	54.6	11.1	3.1	5.9	2.5	2.9	74.5

Source: CSO/FSRP Urban Consumption Survey.

Table 11. Food Consumption Shares during the Last 30 Days, July/August 2007 and January/February 2008 (Percentage of Total Value of Food Consumption over the Two 30-Day Periods)

Consumption quintile		Maize	Rice	Wheat	Cassava	Other staples	Sugar and oil	Dairy	Meat and eggs	Fish	Vege-tables	Fruit	Legumes	Other food prepared at home	Food away from home
Lusaka	**1 lowest**	**16.1**	**1.7**	**9.0**	**0.1**	**2.4**	**10.6**	**3.7**	**11.6**	**8.3**	**18.3**	**2.2**	**4.5**	**5.3**	**6.2**
	2	10.5	2.2	10.1	0.2	2.5	8.2	4.1	17.7	8.7	14.5	4.2	4.5	7.1	5.4
	3	8.3	2.3	10.2	0.2	2.1	7.2	5.8	18.4	7.0	12.2	3.3	3.3	10.5	9.1
	4	6.2	2.3	11.1	0.3	2.4	6.4	6.2	18.4	7.6	10.8	4.6	3.1	10.3	10.4
	5 highest	3.7	1.9	8.2	0.1	2.0	4.5	6.5	18.7	5.5	8.4	3.9	2.4	13.2	21.0
	Total	7.6	2.1	9.6	0.2	2.2	6.7	5.6	17.6	7.1	11.7	3.8	3.3	10.2	12.3
Kitwe	**1 lowest**	**18.8**	**1.8**	**7.7**	**0.7**	**2.1**	**9.9**	**1.5**	**11.4**	**9.1**	**19.7**	**3.2**	**3.7**	**7.0**	**3.2**
	2	13.0	2.6	11.9	0.6	2.3	9.3	3.0	14.7	8.8	14.8	3.7	3.2	7.9	4.2
	3	11.1	2.7	10.4	0.5	2.3	8.6	3.9	17.0	9.2	13.8	3.4	3.0	7.9	6.2
	4	9.0	2.4	11.1	0.5	2.0	8.0	4.3	18.0	7.7	12.1	4.9	3.0	10.2	6.8
	5 highest	5.2	2.2	10.4	0.3	2.0	6.1	6.0	19.8	7.0	8.9	4.9	2.6	12.7	11.9
	Total	9.8	2.4	10.5	0.5	2.1	7.9	4.3	17.2	8.1	12.6	4.2	3.0	9.8	7.6
Mansa	**1 lowest**	**16.5**	**1.8**	**1.5**	**11.1**	**3.7**	**7.8**	**0.2**	**7.2**	**14.4**	**12.4**	**4.9**	**4.2**	**7.1**	**7.3**
	2	14.0	2.3	3.1	6.4	3.1	8.3	0.5	10.2	13.1	12.2	3.8	4.2	8.6	10.2
	3	13.1	2.7	5.0	4.5	2.8	8.7	1.5	14.7	13.6	11.3	2.9	3.5	8.4	7.1
	4	10.1	2.3	7.3	2.2	2.1	8.4	2.8	16.6	10.7	9.3	2.7	2.9	11.4	11.2
	5 highest	7.4	2.4	10.0	1.5	2.0	8.1	4.0	17.0	9.5	8.5	3.5	2.7	12.2	11.2
	Total	10.9	2.4	6.7	3.8	2.5	8.3	2.4	14.6	11.5	10.1	3.3	3.3	10.3	9.9
Kasama	**1 lowest**	**17.1**	**3.7**	**1.5**	**7.5**	**4.2**	**8.6**	**0.3**	**10.7**	**12.4**	**16.6**	**4.6**	**4.7**	**7.0**	**1.2**
	2	14.1	3.7	3.3	3.9	3.6	8.5	1.0	13.5	13.5	14.5	4.3	4.1	8.2	3.6
	3	12.2	3.5	4.8	2.6	2.8	8.6	1.9	15.9	11.8	13.7	4.0	3.9	8.9	5.4
	4	10.0	3.1	7.0	1.6	2.5	8.6	3.1	18.2	12.4	12.0	3.5	3.0	10.0	5.1
	5 highest	7.9	2.4	8.4	0.7	2.4	8.0	4.6	18.7	9.8	10.0	4.0	2.5	12.1	8.5
	Total	11.1	3.1	5.9	2.5	2.9	8.4	2.7	16.5	11.6	12.5	4.0	3.3	9.9	5.6

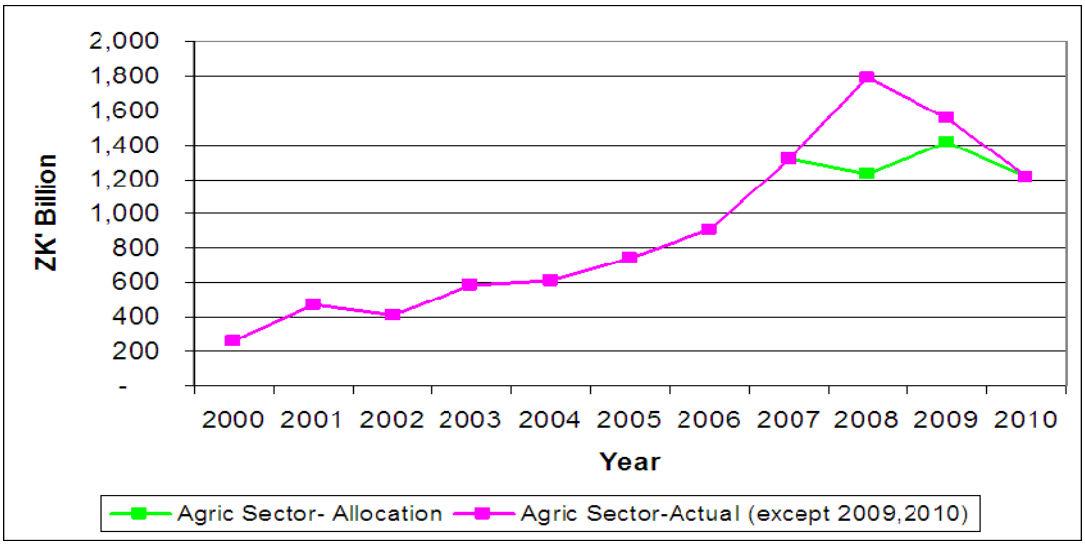
Source: CSO/FSRP Urban Consumption Survey 2007/2008.

V. PUBLIC SPENDING ON AGRICULTURAL SECTOR

Public spending is overwhelming directed toward maize production and marketing, and therefore is aimed primarily at those more wealthy farmers who are capable of producing a marketable surplus of grain.

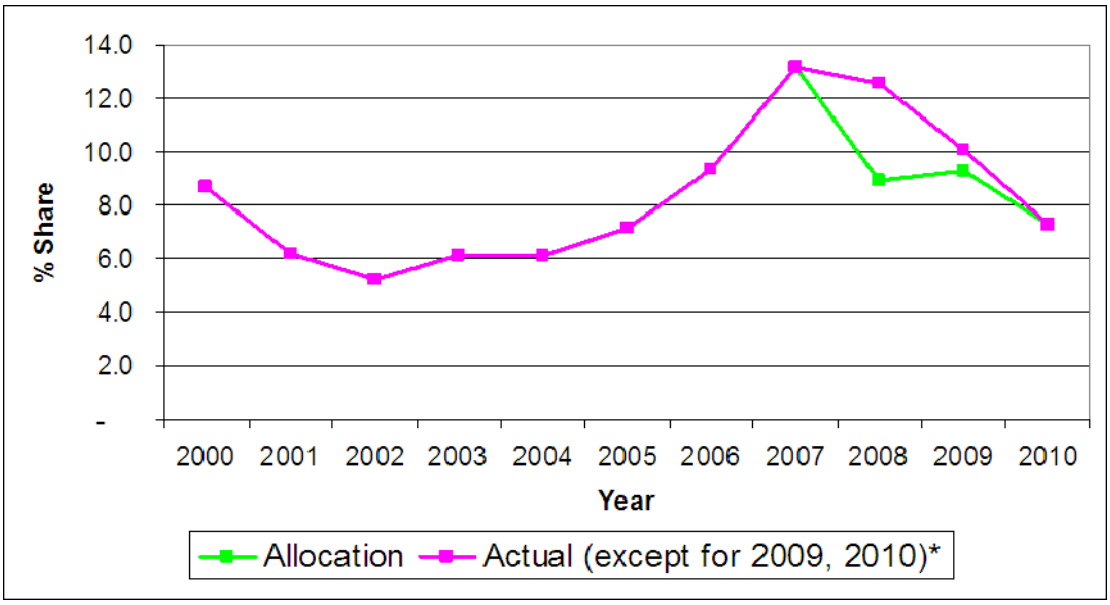
- According to the Agricultural Growth and Investment Options Report (Thurlow et al. 2008), for Zambia to achieve the CAADP annual agricultural growth rate target of 6% government spending to the sector must be increased to at least 16% of annual national budget.
- Figure 26 shows actual public spending on agriculture from 2000-2010. Figure 27 shows that current spending on agriculture is just under 10% of the total government budget, which is approaching the spending goal agreed upon under the 2003 Maputo Declaration. (Pink line is actual release, green is allocated, and the difference is driven by changes in FRA and FSP spending).
- While overall spending is growing, it is important to look at how the money is being spent. Figure 28 shows that procurement and distribution of maize through FRA and input subsidies, through FSP/FISP account for over 43% of the total agricultural budget.
    a. Studies in other countries suggest that agricultural subsidies provide the lowest returns in terms of productivity growth, compared to long-term investments in roads, research and extension, education, and irrigation.
    b. Disproportionately channeling money into maize subsidies limits the ability of the Zambian government to invest in public goods that can raise productivity and benefit a larger share of the Zambian population.
- Figure 29 shows that while government spending has increased as a share of the total agricultural budget, funding for agriculture from cooperating patterns has declined.

Figure 26. Public Spending on Agriculture, 2000-09



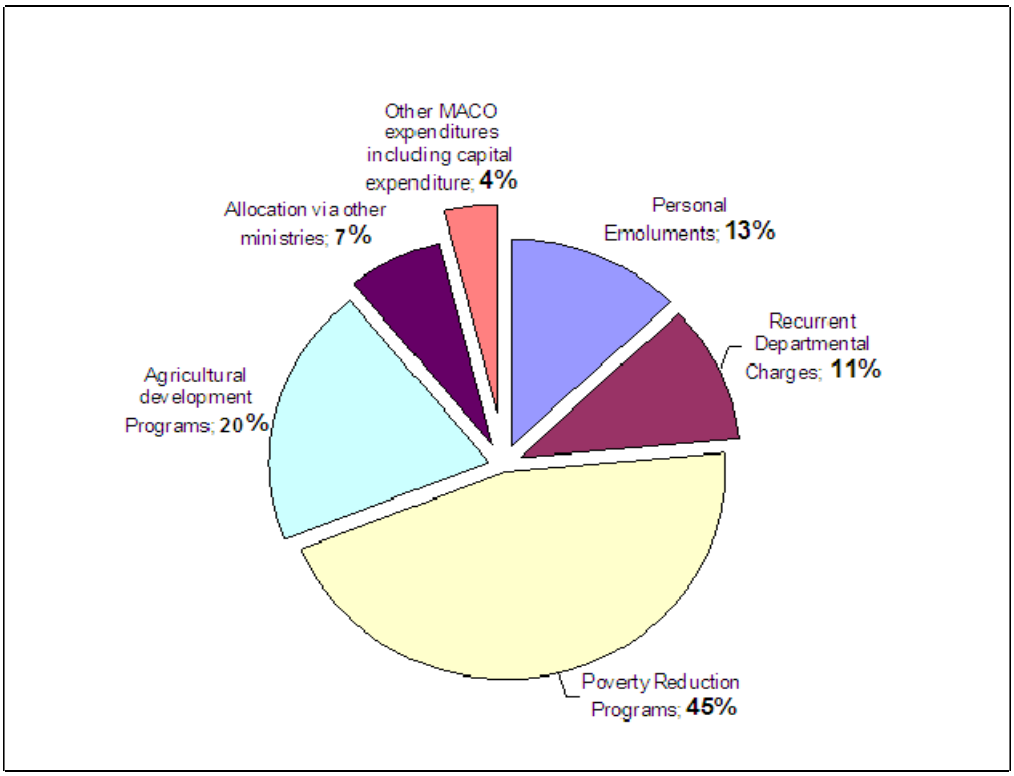
Source: Ministry of Agriculture and Cooperatives.

Figure 27. Agriculture's Share of Zambia's National Budget 2000-09



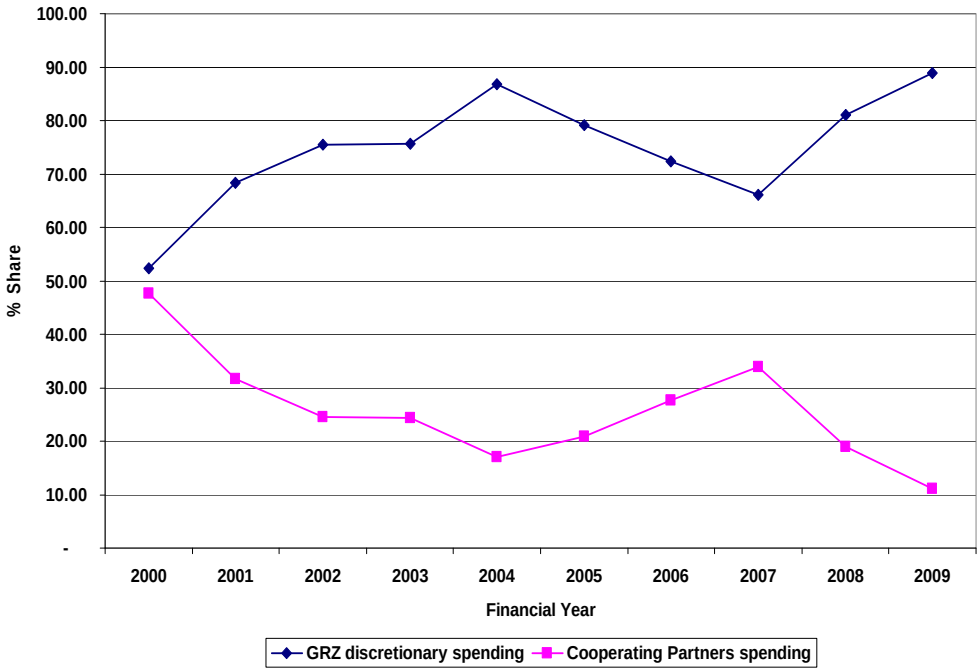
Source: Ministry of Agriculture and Cooperatives.

Figure 28. 2010 Allocation of Public Budget to Agriculture



Source: Ministry of Agriculture and Cooperatives.

Figure 29. Share of Spending on Agriculture Sector by Government versus Cooperating Partners



Source: Ministry of Agriculture and Cooperatives.

VI. STAPLE FOOD VALUE CHAINS

This section provides background information and suggests possible interventions in several of the key staple food value chains in Zambia: maize, horticulture, groundnuts, cassava, beans, village poultry, and aquaculture.

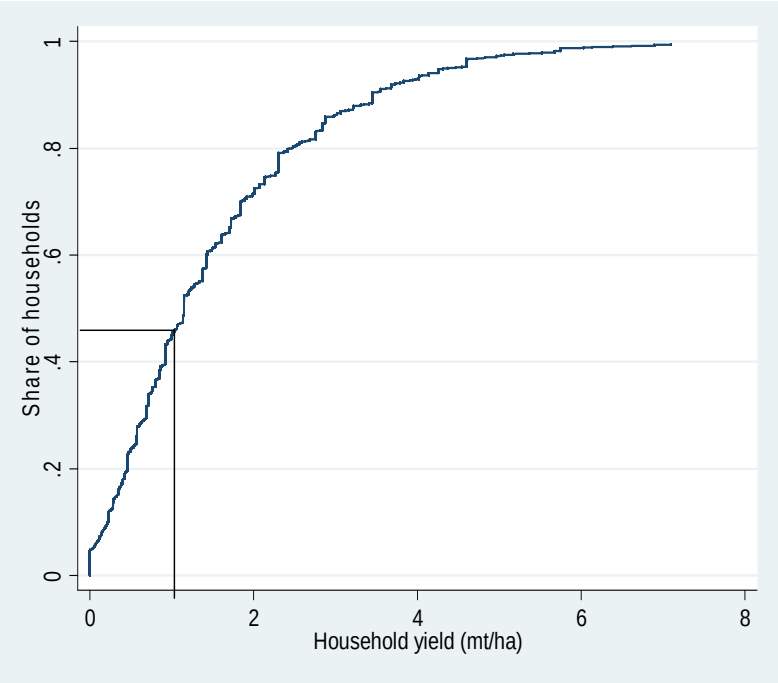
6.1. Maize Value Chain

6.1.1. *Production: Among All Food Crops Grown by Smallholders in Zambia, Maize Is the Most Important.*

a. General Production Trends

- In 2009/10, 1,212,327 (81.72%) smallholders in Zambia grew maize, more than any other food crop (Figure 30).
- In 2009/10 Zambian smallholders planted 1,182,217 hectares of land in maize, or roughly 51% of the total cultivated land in the country.
  - Thus, successful crop diversification in Zambia requires converting land currently used for maize cultivation to other crops.
- Between 2006-10 maize yields within the smallholder sector averaged 1.54 mt/ha, well below the global average of 4.47 mt/ha.
- Over the same period an average of 45% of smallholder farmers produced 1 mt/ha of maize or less while 72% produced 2 mt/ha or less (Figure 31, following Map 12), with the highest incidence of poor producers located in Western Province and the highest absolute number of poor producers located in Eastern Province (Table 12).

Figure 30. Cumulative Distribution of Household Yield per Planted ha (2006-2010)



Source: CFS harvest data 2006, 2007, 2008, 2009 and 2010

Table 12. Distribution of Households Producing 1 mt/ha or Less over Time

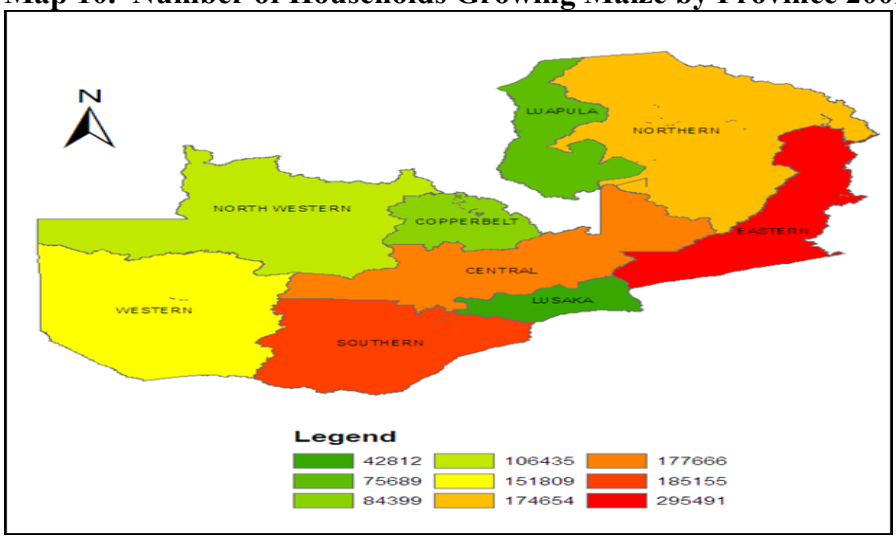
Province	Number of households producing 1 mt/ha or less (share)				
	2006	2007	2008	2009	2010
Central	66,146	64,001	85,792	71,300	37,133
	(0.39)	(0.36)	(0.48)	(0.43)	(0.21)
Copperbelt	27,234	29,822	27,672	34,420	31,250
	(0.30)	(0.35)	(0.32)	(0.40)	(0.29)
Eastern	116,854	167,554	146,750	158,573	89,911
	(0.40)	(0.59)	(0.48)	(0.48)	(0.28)
Luapula	20,275	31,759	25,139	35,769	22,511
	(0.34)	(0.46)	(0.33)	(0.36)	(0.25)
Lusaka	20,370	17,432	33,379	22,342	12,895
	(0.43)	(0.40)	(0.72)	(0.50)	(0.27)
Northen	60,845	61,250	43,104	37,694	26,735
	(0.40)	(0.36)	(0.24)	(0.21)	(0.14)
North Western	40,008	56,611	46,288	39,369	28,142
	(0.40)	(0.52)	(0.44)	(0.42)	(0.29)
Southern	79,936	116,427	190,926	116,154	82,384
	(0.38)	(0.55)	(0.84)	(0.47)	(0.33)
Western	116,422	150,044	156,321	130,014	86,336
	(0.82)	(0.87)	(0.92)	(0.82)	(0.60)
Zambia	548,089	694,901	755,370	645,637	417,298
	(0.43)	(0.53)	(0.55)	(0.46)	(0.29)

Source: CSO/MACO/ FSRP Supplemental Survey various years.

b. Regional Production Dimensions

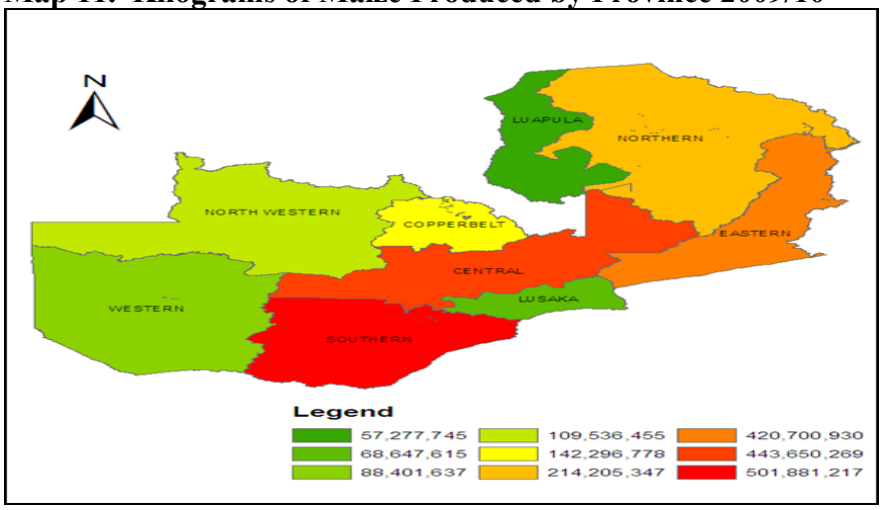
- 65% of Zambia's maize crop is produced in three provinces: Eastern, Central, and Southern. In 2009/10:
- Central Province: 177,666 (95.11%) smallholders grew maize
- Eastern Province: 295,491 (98.49%) smallholders grew maize
- Southern Province: 185,155 (87.58%) smallholders grew maize (see Map 10)
- Maize growers in these three provinces account for 41.5% of the total smallholder population in Zambia
- While the greatest number of maize producers are located in Eastern Province (Map 10) the greatest quantities of maize are produced in Southern Province (501,881,217 kg Map 11), while the highest degree of commercialization of maize is in Central Province (224,644,792 kg sold, Map 12).

Map 10. Number of Households Growing Maize by Province 2009/10



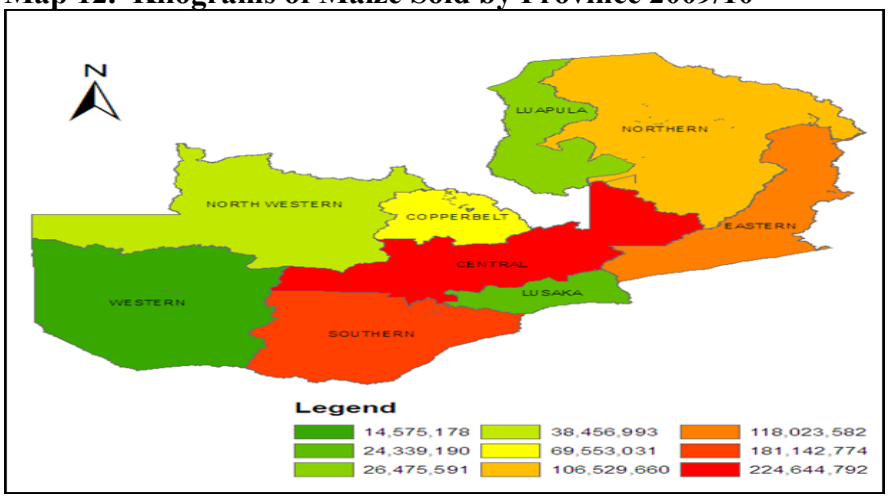
Source: CSO/MACO/FSRP Crop Forecast Surveys. 2009/10.

Map 11. Kilograms of Maize Produced by Province 2009/10



Source: CSO/MACO/FSRP Crop Forecast Surveys. 2009/10.

Map 12. Kilograms of Maize Sold by Province 2009/10

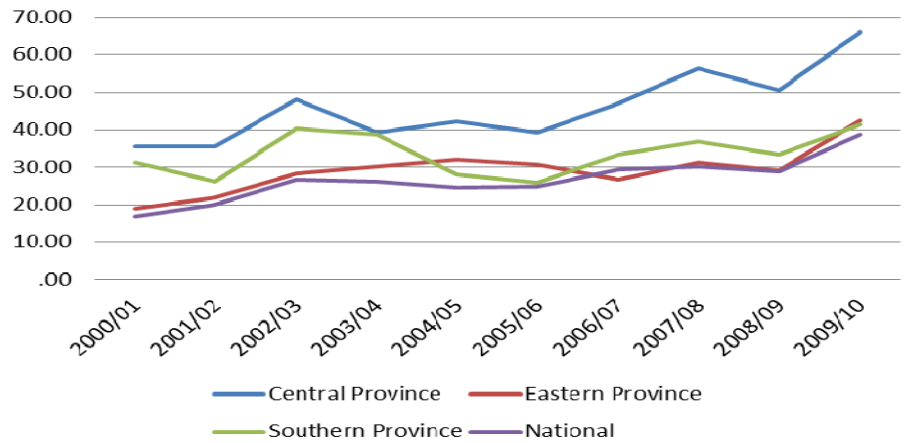


Source: CSO/MACO/FSRP Crop Forecast Surveys. 2009/10.

c. Input Access and Use

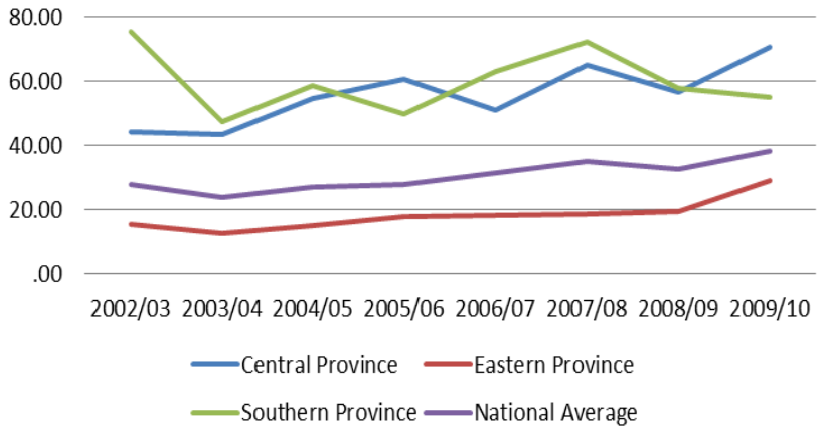
- Less than 40% of maize farmers in 2009/10 used fertilizer. A higher percentage of farmers in the major maize producing provinces accessed fertilizer than the national average, with the highest concentration of fertilizer users located in Central Province (Figure 31)
- Less than 40% of maize farmers used hybrid maize seeds
    - i. In Eastern Province only 28.81% of farmers used hybrid maize seeds, well below the national average (Figure 32)
- Average yield response to fertilizer in 2010: 1.32 MT/ha
- Both Southern and Eastern Provinces have yield responses below national average (Figure 33)
- Low response due to:
    - i. Use of inappropriate fertilizer mix for particular soil types
    - ii. Late and inappropriate application of fertilizers
    - iii. Low application rate per hectare

Figure 31. Percent of Smallholder Maize Farmers Using Fertilizer over Time

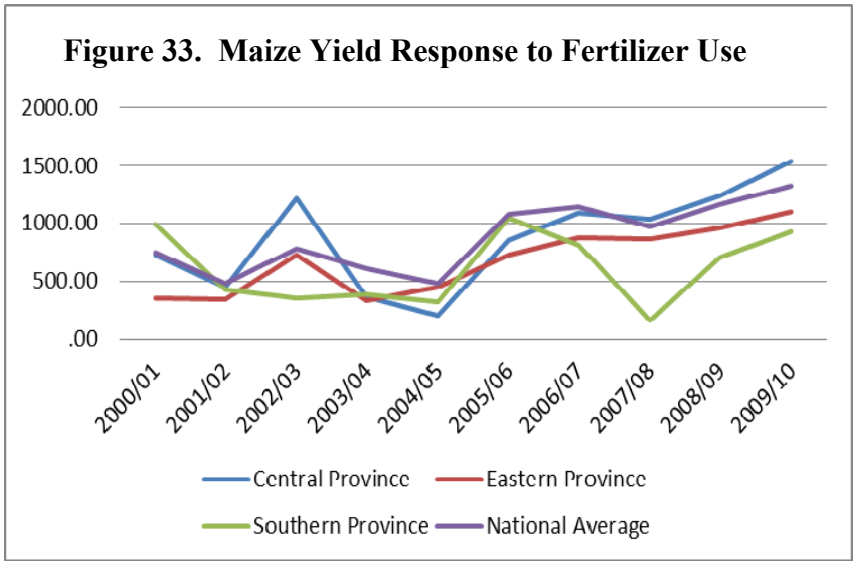


Source: CSO/MACO/FSRP Supplemental Survey various years.

Figure 32. Percent of Smallholder Maize Farmers using Hybrid Seeds over Time



Source: CSO/MACO/FSRP Supplemental Survey various years.



Source: CSO/MACO/FSRP Supplemental Survey various years.

6.1.2. Marketing

Maize is an important cash crop for Zambian smallholders. However, the maize market is characterized by a high degree of concentration and government intervention.

a. Farm Income and Market Behavior

- Maize sales are important for all subsectors of the smallholder population. However, farmers with larger land holdings derive a greater share of their household income from maize sales than those with smaller land holdings (Table 13)
- When including the value of maize retained for home consumption, maize is the most important crop grown by smallholders (Table 14)
- Based on interviews conducted with 1105 commercialized smallholder maize farmers, private sector maize buyers accounted for the bulk of maize purchases in 2009. FRA purchases only accounted for 14% of the total transactions recorded (Table 15)

Table 13. Zambia - Household Shares of Components in Total Crop Sales Income by Landholding Quintiles, National, 2008

Quintile of total HH landholdings	Crops Sales Income ($US)	Maize Sales	Sales of other staple food crops	Sales of high value food crops*	Traditional cash crops
1 lowest	24	34.8	21.6	42.5	1.1
2	76	31.6	21.9	38.5	7.9
3	116	28.3	17.6	36.5	17.7
4	206	32.3	13.9	33.7	20.1
5 highest	673	38.1	14.2	30.9	16.9
Total	220	33.1	16.9	35.3	14.7

Source: Central Statistical Office Supplemental Post Harvest Survey 2008.
Note: * primarily fresh fruits, vegetables, and legumes.

Table 14. Zambia - Household Share of Components in Total Gross Farm Income by Landholding Quintiles, National, 2008

Quintiles of total HH landholding size	Farm income ($US)	Maize retained	Maize sold	Other staple food crops retained	Other staple food crops sold	High-value food crops* retained	High-value food crops* sold	Traditional cash crops	Livestock products	A wa lal
		Mean share (%) in total gross farm income								
1-Low	241	35%	3%	18%	1%	14%	4%	0%	12%	13
2	336	37%	5%	21%	3%	15%	6%	2%	7%	4
3-Mid	461	33%	7%	20%	3%	16%	7%	5%	8%	2
4	609	33%	9%	15%	3%	15%	8%	6%	9%	2
5-High	1,426	30%	15%	12%	4%	12%	9%	6%	12%	2
Total	615	33%	8%	17%	3%	14%	7%	4%	9%	4

Source: Central Statistical Office Supplemental Post Harvest Survey 2008.
Note: * primarily fresh fruits, vegetables, and legumes.

Table 15. Distribution of Sales Points 2008/09 Marketing Season Marketing

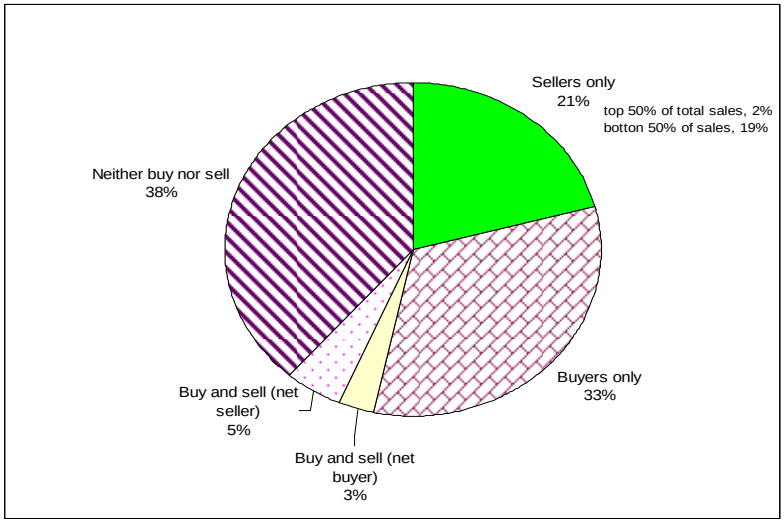
	f	%
Assemblers	282	26%
Larger trader/wholesaler	380	34%
Cooperative	8	1%
FRA	159	14%
Local trader	11	1%
Local household in need of food	56	5%
Household outside of the village	17	2%
Grain processor	185	17%
brewery	2	0%
School	5	0%
Total	1105	100%

Source: GISAMA maize value chain study 2009/10.

b. Market Concentration

- Maze sales within Zambia's smallholder population are highly concentrated, with 2% of producers accounting for 50% of the total maize sales volume in 2008.
  36% of smallholders in Zambia are actually net buyers of maize (Figure 34)

Figure 34. Distribution of the Small-Scale Farmer Population According to Their Position in the Staple Grain Market, Zambia



Source: CSO/MACO/FSRP Supplemental Survey 2008.

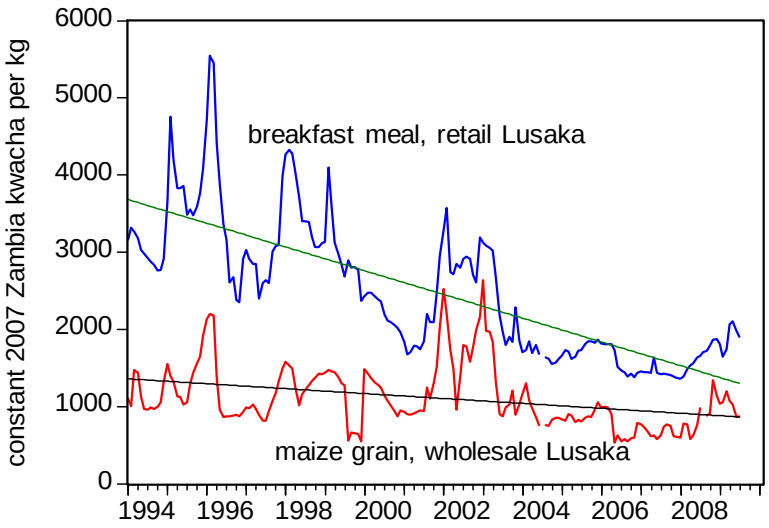
6.1.3. Consumption/Demand

As the country's staple food, Zambians derive the vast majority of their food calories from maize (57%).

a. Urban Consumption Characteristics

- Across the four major urban centers for which data are available we find that people in the lowest income quintile spend the highest share of their food budget on maize (Table 16)
- Since 1994, the price margin between wholesale maize and retail maize meal prices has steadily declined in real terms (Figure 35). This narrowing of margins has been driven in large part by the rapid expansion of small-scale maize mills.
- The urban poor frequently purchase wholegrain maize in informal retail markets and then pay to have it milled at a small-scale processor. This is considerably cheaper than purchasing refined maize meal produced by large-scale millers. However, as the Figure 36 shows, these retail markets frequently dry up during critical times of the year, which forces urban consumers to turn to higher cost maize meal products to meet their staple food needs.
    - i. In Zambia maize tends to be captured by the large scale milling and grain trading sectors during the marketing season. Once captured there, it tend to only return to retail urban markets in the form of expensive, refined maize meal. Additionally, during national deficit periods imports are channeled disproportionately to the large-scale formal sector, which in essence freezes out the informal retail and small-scale processing sectors that the rural poor depend on for chap maize meal.
- The seasonal nature of maize production, coupled with limited storage, high price volatility, and chronic under-production among some segments of the rural population contribute to recurrent maize scarcities during the months of Dec-Feb (Figure 37)

Figure 35. Price Trends for Retail Breakfast Meal and Wholesale Maize Grain, Lusaka, Zambia



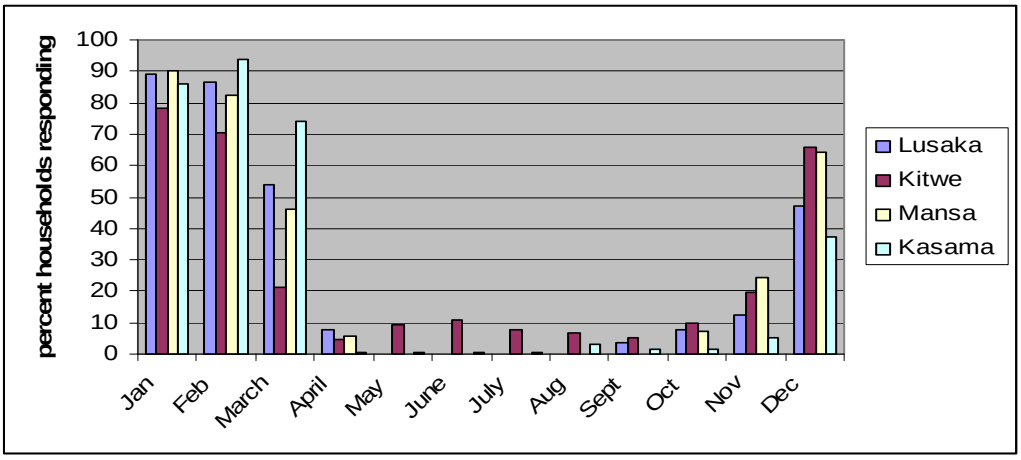
Source: AMIC various years.

Table 16. Food Consumption Shares during the Last 30 Days, July/August 2007 and January/February 2008 (Percentage of Total Value of Food Consumption over the Two 30-Day Periods)

Consumption quintile		Maize	Rice	Wheat	Cassava	Other staples	Sugar and oil	Dairy	Meat and eggs	Fish	Vege-tables	Fruit	Legumes	Other food prepared at home	Food away from home
Lusaka	**1 lowest**	**16.1**	**1.7**	**9.0**	**0.1**	**2.4**	**10.6**	**3.7**	**11.6**	**8.3**	**18.3**	**2.2**	**4.5**	**5.3**	**6.2**
	2	10.5	2.2	10.1	0.2	2.5	8.2	4.1	17.7	8.7	14.5	4.2	4.5	7.1	5.4
	3	8.3	2.3	10.2	0.2	2.1	7.2	5.8	18.4	7.0	12.2	3.3	3.3	10.5	9.1
	4	6.2	2.3	11.1	0.3	2.4	6.4	6.2	18.4	7.6	10.8	4.6	3.1	10.3	10.4
	5 highest	3.7	1.9	8.2	0.1	2.0	4.5	6.5	18.7	5.5	8.4	3.9	2.4	13.2	21.0
	Total	7.6	2.1	9.6	0.2	2.2	6.7	5.6	17.6	7.1	11.7	3.8	3.3	10.2	12.3
Kitwe	**1 lowest**	**18.8**	**1.8**	**7.7**	**0.7**	**2.1**	**9.9**	**1.5**	**11.4**	**9.1**	**19.7**	**3.2**	**3.7**	**7.0**	**3.2**
	2	13.0	2.6	11.9	0.6	2.3	9.3	3.0	14.7	8.8	14.8	3.7	3.2	7.9	4.2
	3	11.1	2.7	10.4	0.5	2.3	8.6	3.9	17.0	9.2	13.8	3.4	3.0	7.9	6.2
	4	9.0	2.4	11.1	0.5	2.0	8.0	4.3	18.0	7.7	12.1	4.9	3.0	10.2	6.8
	5 highest	5.2	2.2	10.4	0.3	2.0	6.1	6.0	19.8	7.0	8.9	4.9	2.6	12.7	11.9
	Total	9.8	2.4	10.5	0.5	2.1	7.9	4.3	17.2	8.1	12.6	4.2	3.0	9.8	7.6
Mansa	**1 lowest**	**16.5**	**1.8**	**1.5**	**11.1**	**3.7**	**7.8**	**0.2**	**7.2**	**14.4**	**12.4**	**4.9**	**4.2**	**7.1**	**7.3**
	2	14.0	2.3	3.1	6.4	3.1	8.3	0.5	10.2	13.1	12.2	3.8	4.2	8.6	10.2
	3	13.1	2.7	5.0	4.5	2.8	8.7	1.5	14.7	13.6	11.3	2.9	3.5	8.4	7.1
	4	10.1	2.3	7.3	2.2	2.1	8.4	2.8	16.6	10.7	9.3	2.7	2.9	11.4	11.2
	5 highest	7.4	2.4	10.0	1.5	2.0	8.1	4.0	17.0	9.5	8.5	3.5	2.7	12.2	11.2
	Total	10.9	2.4	6.7	3.8	2.5	8.3	2.4	14.6	11.5	10.1	3.3	3.3	10.3	9.9
Kasama	**1 lowest**	**17.1**	**3.7**	**1.5**	**7.5**	**4.2**	**8.6**	**0.3**	**10.7**	**12.4**	**16.6**	**4.6**	**4.7**	**7.0**	**1.2**
	2	14.1	3.7	3.3	3.9	3.6	8.5	1.0	13.5	13.5	14.5	4.3	4.1	8.2	3.6
	3	12.2	3.5	4.8	2.6	2.8	8.6	1.9	15.9	11.8	13.7	4.0	3.9	8.9	5.4
	4	10.0	3.1	7.0	1.6	2.5	8.6	3.1	18.2	12.4	12.0	3.5	3.0	10.0	5.1
	5 highest	7.9	2.4	8.4	0.7	2.4	8.0	4.6	18.7	9.8	10.0	4.0	2.5	12.1	8.5
	Total	11.1	3.1	5.9	2.5	2.9	8.4	2.7	16.5	11.6	12.5	4.0	3.3	9.9	5.6

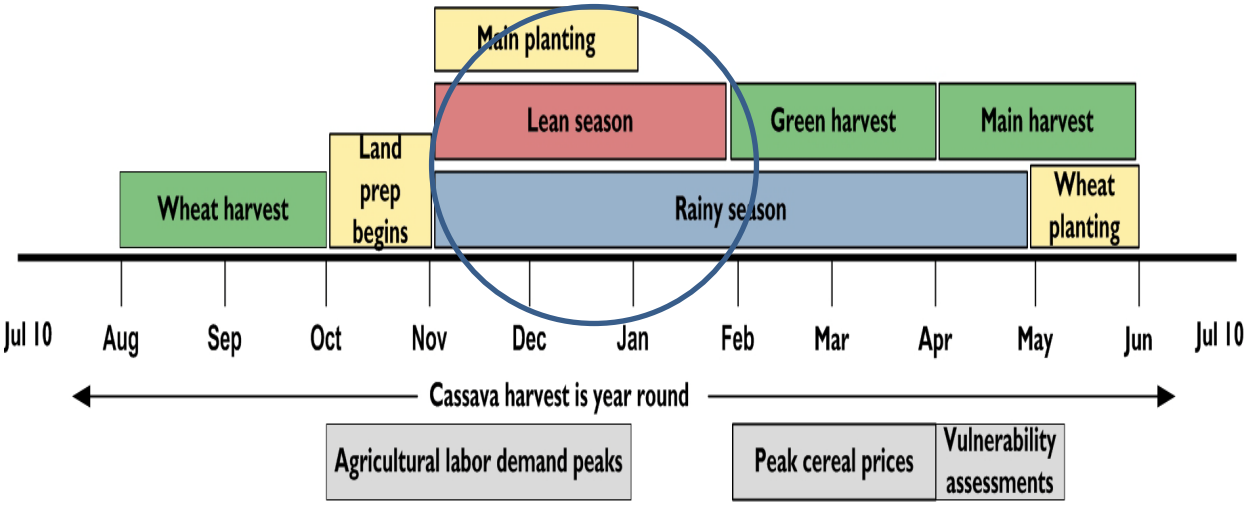
Source: CSO/FSRP Urban Consumption Survey 2007/2008.

Figure 36. Percentage of Urban Consumers Indicating That Maize Grain Is Unavailable to Buy in Local Markets, Four Cities in Zambia, 2007/08



Source: CSO/FSRP Urban Consumption Survey 2007/08.

Figure 37. Annual Food Calendar



6.1.4. Research and Development in the Maize Sector

a. Private Sector R/D

- Currently there are nine private seed companies selling maize seed in Zambia, of those three are breeding new varieties in Zambia, three are testing existing varieties for Zambia's conditions, and three are using publicly available germplasm.
- All nine companies multiply seeds in Zambia, but only one uses smallholders to multiply seeds.

b. Public R/D: Zambian Agricultural Research Institute (ZARI)

- Two new hybrids: GV 640 and GV 659. Both are medium to late maturing. Yield Potential: 9-10 mt/ha. Nutrition Impact: These hybrids are bred for their high protein content (40-50%).
- Four new OPVs: ZM 521, ZM 621, ZM 421, and Obatamba. Yield Potential: 4-5 mt/ha. Require less fertilizer than hybrids (75kg basal and 75kg urea per ha).

Nutrition impact: All OPVs are bred for high protein content; Obatamba has the highest protein content at 90%.

c. Harvest Plus

- Orange Maize: Biofortified with high levels of pro-vitamin A
  i. Vitamin A deficiency affects more than half of Zambian children, which contributes to the high rate of growth stunting
  ii. Orange maize contains 8 milligrams of pro-vitamin A per gram, research is underway to increase this to 10-15 mg/gr
- Late maturing, bred for regions II and III, yet research suggests it also performs well in region I
- Yield Potential: Comparable to the best local hybrids, 8-9.5 mt/ha under good management

6.1.5. Interventions and Investment Opportunities within the Maize Value Chain

a. Making Maize Markets Work for Rural Consumers

- With 36% of rural households being net buyers of maize developing reliable rural consumer food markets is a necessary precondition for the rural poor- particularly for those who do not control sufficient land to produce a marketable surplus of grain yet continue to cultivate grain- to shift their production systems toward higher value food crops without exposing themselves to excessive risk of hunger.
- Improving rural food maize markets will help to limit the number of rural people who are forced to forego meals due to a lack of maize, and thus address the wide disparity in stunting rates between urban and rural Zambians.
  i. Regional warehouse networks developed under ZAMACE provide an opportunity to meet rural maize needs without incurring redundant transport costs, which currently place upward pressure on rural maize meal prices (i.e. shipping maize out of rural areas to urban processors and then back again to rural areas to meet demand during the hunger months).

b. Supporting Urban Maize Consumers through Improvements in the Informal Retail and Small-scale Processing Sectors

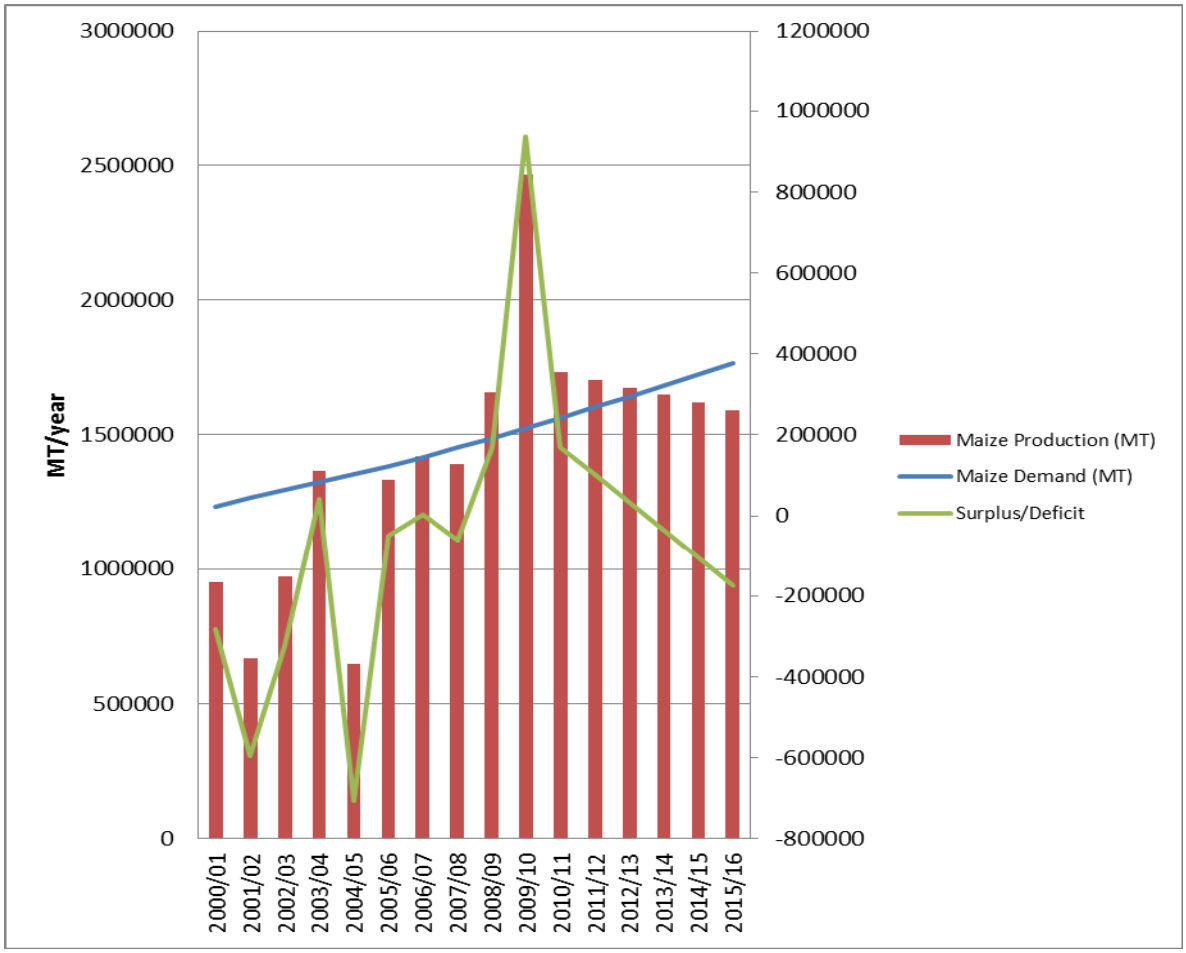
- The urban poor in Zambia spend the greatest share of their staple carbohydrate food budgets on maize. Thus improving the functioning of the maize markets upon which they rely is critical for addressing issues of poverty and malnutrition.
- Growth in the small-scale processing sector is largely responsible for driving decreases in marketing margins between wholesale grain prices and retail maize meal prices (Figure 35).
- The urban poor frequently purchase wholegrain maize in informal retail markets and then pay to have it milled at a small-scale processor. This is considerably cheaper than purchasing refined maize meal produced by large-scale millers. However, as the Figure 36 shows, these retail markets frequently dry up during critical times of the year, which forces urban consumers to turn to higher cost maize meal products to meet their staple food needs.
  i. In Zambia maize tends to be captured by the large scale milling and grain trading sectors during the marketing season. Once captured there, it tend to only return to retail urban markets in the form of expensive, refined maize meal. Additionally, during national deficit periods imports are channeled disproportionately to the large-scale formal sector, which in essence freezes

out the informal retail and small-scale processing sectors that the rural poor depend on for chap maize meal.

- Working to ensure that maize grain is consistently available in local consumer markets will help to drive down the price paid by consumers for their staple maize meal and promote greater competition between the large and small scale processing sectors, thereby further contributing to the narrowing margin between wholesale maize and retail maize meal prices shown in Figure 35.
- Given the seasonal nature of maize production in Zambia provisioning of local retail markets will require substantial improvements in the incentives to invest in grain storage at the wholesale level of the value chain.

c. *Addressing Maize Productivity Constraints:* In 2010 the average maize yield (MT) per hectare was 2.413. This strikingly low number is actually a significant improvement over previous years and contributed substantially to the record maize harvest recorded in Zambia. Poor maize yields are driven by a number of factors:
   - Limited access to inputs. Despite improvements in targeting of subsidized inputs, the majority of small-scale farmers do not have access to inputs.
   - Dependence on rain-fed production exposes farmers to significant risk of crop failure due to drought.
   - Limited public investment in agricultural research and development:
     i. Public spending on agricultural research and development has declined from ZK89 billion in 1991 to ZK24 billion in 2001 to ZK20 billion in 2008 (Flaherty and Mwala 2010).
     ii. Poor extension services for small-scale farmers. A disproportionate percentage of the agricultural budget goes toward *poverty reduction strategies*, namely input subsidies and maize procurement and distribution at the expense of investments in extension services.
     iii. Successful crop diversification will require a significant portion of land in Zambia to be transitioned from maize to other crops. Yet for this to be feasible, from a political and household food security perspective, maize yields must increase to compensate for population growth and a decrease in area planted with maize. Based on population growth estimates, if Zambia's area dedicated to maize decreases by 3% per year while yields remain constant Zambia will face a deficit of 247,627 mt of maize in 2015 (Figure 38).

Figure 38. Projected Maize Production and Demand to 2015/16 with 0% Annual Yield Increase and 3% Annual Decrease in Land Area Dedicated to Maize

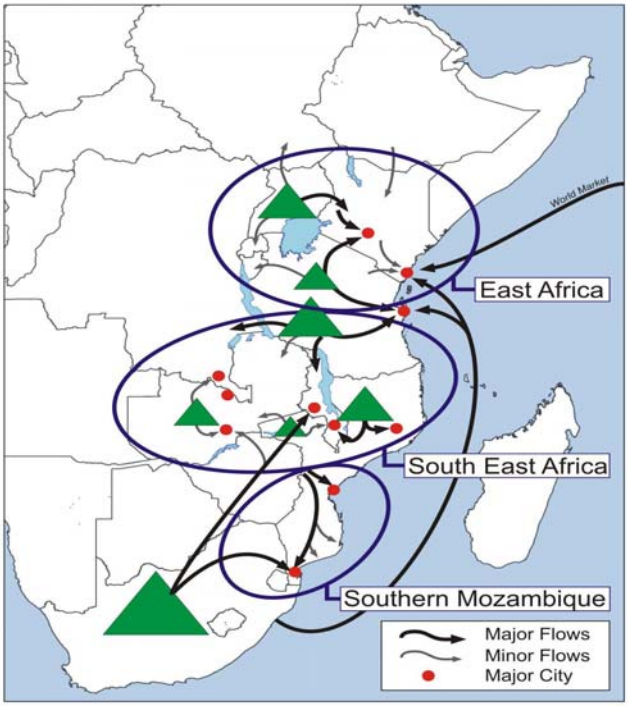


Source: Calculated from FAOSTAT data.

d. Facilitate Regional Maize Trading Opportunities

- Zambia is well situated in the region to effectively exploit existing grain sheds to import and export maize and other agricultural commodities (Map 13)
- Zambia has a ready export market for maize in nearby DRC, as well as Malawi, Zimbabwe, and Tanzania in certain years.
- These markets are essential for supporting producer prices for maize during high production years.
- Import markets that utilize structured trading systems, particularly SAFEX, can serve to set ceiling prices for maize at import parity. Price spikes over import parity are extremely damaging for the poorest of urban consumers
- Facilitating improvements in both policy and infrastructural constraints to regional trade can help to smooth maize price volatility, which is beneficial to producers, traders, millers, and consumers.

Map 13. Grain Marketing Sheds in Eastern and Southern Africa



6.1.6. Policy Challenges in the Maize Value Chain

The primary challenge to enhancing the performance of the maize sector is the unpredictable and discretionary way in which the government continues to intervene in the market.

a. Tariff and Non-tariff Barriers to Trade

- Maize imports channeled through the government rarely end up in the hands of the informal retail and small-scale processing sectors, upon which the poor rely, this contributes to the trend highlighted in Figure 24. Supporting reliable access to maize grain within the informal maize trading and small-scale processing sector, particularly during deficit periods, is critical for enhancing the food security of the urban poor.
- Export bans and regulations, enacted in the name of national food security, starve farmers of important regional markets, which are particularly important for supporting producer prices in times of surplus.

b. Maize Grain Procurement and Distribution by the FRA

- High FRA buying prices are well above export parity, which undermines Zambia's ability to be a regional breadbasket and stifles private sector involvement in the market.
- Unpredictability of procurement quantities and distribution prices stifle private sector investment in maize markets, including investment in much needed maize storage.
- This unpredictability also undermines the potential development of structured trading systems, such as ZAMACE.

c. *Input subsidies*
   - Undermines private sector investment in commercial input distribution systems and associated extension services and local research.

d. *Continued investment in policy research and outreach is therefore critical for highlighting the effects of government interventions in the maize market and to guide policy-makers to make agricultural policy decisions based on empirical evidence.*

6.1.7. Gender Issues in the Maize Value Chain

a. Female headed households control on average 0.5 hectares less land than male headed households.
   - Given the relationship between land size and position within maize markets, women may be disproportionately unable to produce a marketable surplus of maize.

b. Within agrarian households in Zambia women often do produce their own maize, in addition to the *household* maize supplies produced on their husband's fields. However, women in Zambia are disproportionately saddled with meeting household consumption demands, which may limit their ability to use the maize they produce to generate an income (Farnworth 2010).

6.2. Horticulture Value Chain

6.2.1. Production

a. In 2009/10 1,230,242 (82.9%) of smallholder farmers in Zambia grew fresh fruits and vegetables (FFV).

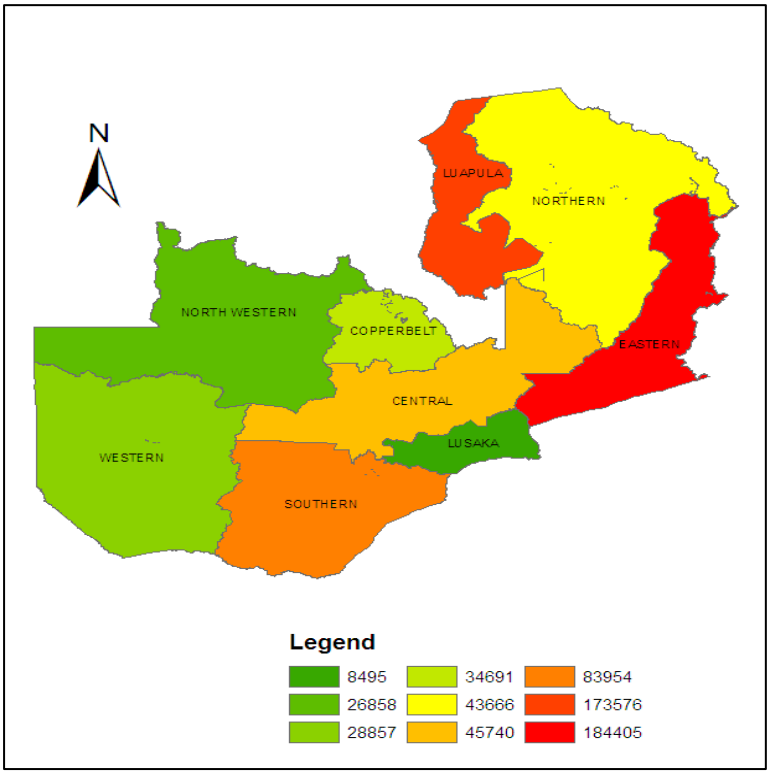
b. Eastern Province recorded the highest number of FFV producers, with 184,405 producing HHs (Map 14).

c. FFV production is particularly important for households earning less than $2 per day with 360,986 (30% FFV growers) households. The majority of these are concentrated in Eastern and Luapula Provinces (Figure 39).
   - Vegetable sales make up the greatest share of the farm income from crop sales (roughly 42%) generated among the most land constrained farmers (Table 8).

d. Of all the FFV produced, 5 crops dominate smallholder production systems accounting for 86% of the total value of FFV sales within the smallholder sector: tomato, rape, cabbage, watermelon, eggplant, and onion (Table 17).

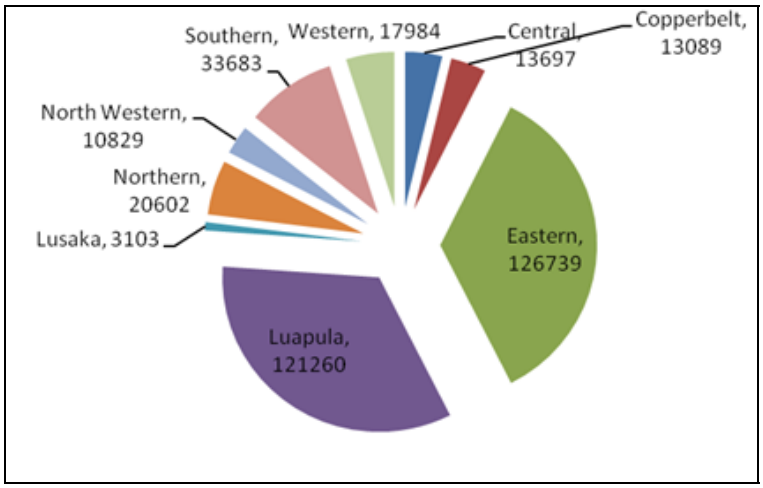
e. Yields obtained by smallholders for major vegetable products compare favorably with potential yields achieved at research stations, ranging from 55% for cabbage to 82% for onion (Table 18).

Map 14. Number of Households Growing Fruits and Vegetables



Source: CSO/MACO/FSRP Crop Forecast Survey 2009/10.

Figure 39. Households Growing FFV with HH Income Less than $2 Per Day, 2009/10



Source: CSO/MACO/FSRP Supplemental Surveys to the 1999/2000 PHS 2008.

Table 17. The Five Most Valuable FFV Items Sold by Smallholder Farmers in 2004 (SS 2004) and 2008 (SS 2008) in Lusaka Markets

FFV item	Share of total value of sales	
	SS 2004	SS 2008
Tomato	38.4	44.1
Rape	23.2	16.1
Cabbage	12.3	12.9
Water melon	0.4	7.7
Egg plant	4.3	0.7
Onion	3.4	5.2
Total	**81.6**	**86.0**

Source: CSO/MACO/FSRP Supplemental Surveys 2004 and 2008.

Table 18. Comparison of Yields of Common Vegetables Obtained by Small Scale Growers Compared to Recommended Optimum Yield

Commodity	Current Yield (Small scale growers)	Potential yield (Research conditions)[z]	Yield efficiency[y]
Tomato	15	25 **(40)**	60
Cabbage	15	30 **(50)**	55
Rape	3.5	5 **(20)**	70
Onion	15 (75- 90)	20 **(25)**	82

Source: UNZA, Crop Science Dept. Research Compendium, ZARI Vegetable Annual Reports (2009, 2010).
[z]Figures in parenthesis indicate data obtained in temperate regions under more suitable environmental conditions. [y]Efficiency under local conditions using data Zambian research data as optimum yield.

f. Issues of Seed Quality and Availability

- Most of the seed is imported as Quality Declared Seed (QDS). QDS is cheaper and thus attractive to importers but the quality is generally poor.
- Conditions during distribution, storage, and retail are not standardized and therefore further compromising seed quality.
- Unlike maize, legislation does not allow for detailed inspection throughout the distribution chain. Seed mixtures and contamination are common and the farmers are not adequately protected.
- There is need to enforce sanitary regulations in the production of Seedlings for prevention of diseases.
- For commodities where seed can be produced locally, investment in seed breeding is needed.

6.2.2. Marketing

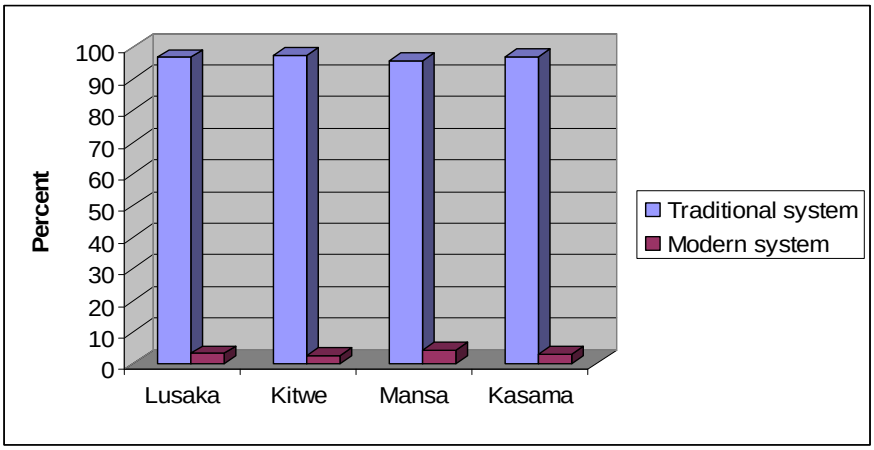
a. FFV marketing is primarily conducted through informal market channels, which link producers to consumers; most consumers in Zambia acquire their FFV through traditional informal markets rather than modern supermarket chains (Figure 40).

b. Due to their proximity to urban markets farmers in Central and Copperbelt Provinces achieve the highest value of FFV production in the country (Map 15).

c. Yet in terms of the percent of total national sales of key vegetables, Southern, Eastern, and Northwestern Provinces are shown to also be important (Table 19).

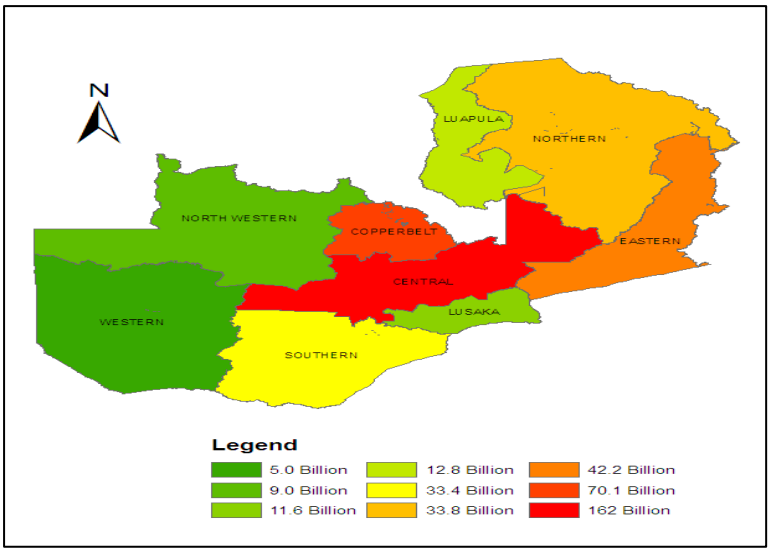
d. Soweto market in Lusaka is the primary wholesale market for FFV in Zambia, from Soweto FFVs are sold to local consumers while some are forwarded on to other local and regional markets. The majority of the market's tomato and rape are acquired from surrounding districts, while the majority of onion are imported from South Africa (Maps 16 a, b, and c).

Figure 40. Market Channels for Fresh Produce by Urban Center



Source: FSRP Horticulture Value Chain Study.

Map 15. Value of Fruit and Vegetable Sales by Province, 2008



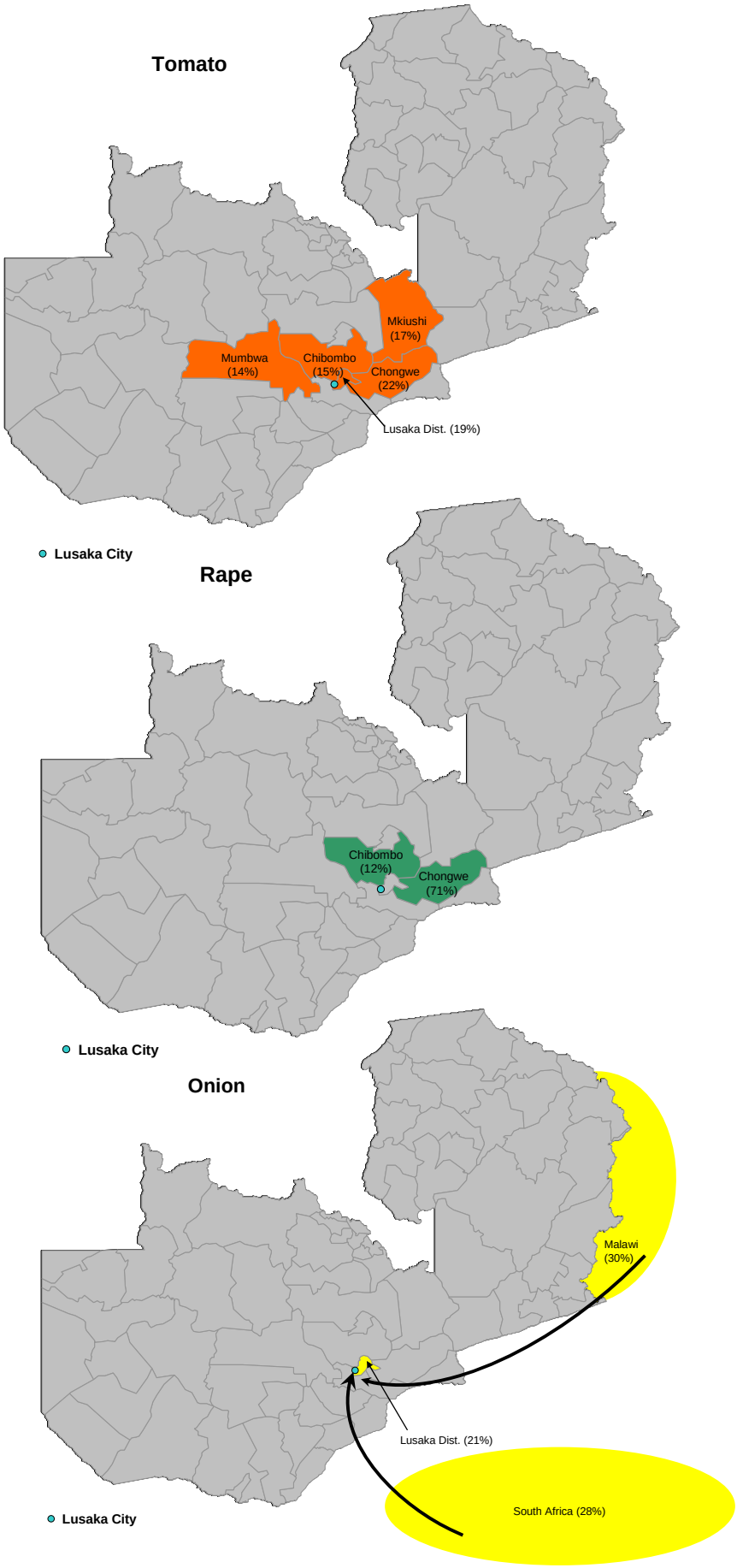
Source: CSO/MACO/FSRP Supplemental Survey 2008.

Table 19. Share of National Sales by Province for Key Vegetables, 2001 and 2004

FFV	2001			2004		
	%National Sales	Top 3 Selling Provinces	%National Sales	%National Sales	Top 3 Selling Provinces	%National Sales
Tomato	37.8	Copperbelt	36.2	38.4	Northwestern	32.0
		Central	24.5		Copperbelt	20.6
		Eastern	12.4		Central	11.3
Rape	22.7	Eastern	20.9	23.2	Copperbelt	20.9
		Central	19.7		Southern	19.0
		Copperbelt	17.5		Eastern	16.3
Cabbage	17.2	Copperbelt	31.8	12.3	Copperbelt	36.4
		Northwestern	16.7		Southern	13.1
		Eastern	11.8		Eastern	12.1
Onion	3.1	Eastern	24.6	3.4	Eastern	21.7
		Northern	14.7		Copperbelt	19.8
		Luapula	13.2		Southern	15.1
Eggplant	.		.	4.3	Lusaka	33.7
	.		.		Central	33.1
	.		.		Copperbelt	14.3
Okra	2.8	Central	47.6	.		.
		Lusaka	19.4	.		.
		Southern	17.0	.		.

Source: Supplemental Survey 2001 and 2004.

Map 16. A, B, and C. District Shares of Tomato, Rape, and Onion Supplied to Soweto Market, Lusaka



6.2.3. *Consumption/Demand*

a. *Local Demand*

- In terms of total food budget expenditures, FFV make up the highest share of urban consumer budgets behind staple cereals, ranging from 15-19% of food budgets in Lusaka, Kitwe, Mansa, and Kasama (Table 20).
- Among all FFV, tomato, rape, and onion make up the greatest share of household food budgets, ranging from 6.9% to 9.4% (Table 21).
- Due to the seasonal nature of FFV production in Zambia prices tend to spike during the rainy season, when crop production decreases, for many important FFV products (Figures 41 a, b, c).

Table 20. Urban Household Expenditure Shares on Food by Urban Area

Urban household expenditure shares of different food groups per adult equivalent

Food Items	Lusaka	Kitwe	Mansa	Kasama
Weighted No. of Households	267,934	78,398	9,305	20,769
	---------- % of Food Expenditures----------			
Cereals & staples	24.1	27.4	28.0	27.2
Dairy items	5.2	3.6	1.7	2.0
Meat & eggs	16.8	15.6	12.7	14.5
Fish	7.6	8.4	12.4	12.5
Vegetables	13.7	15.0	11.4	14.2
Fruits	3.6	4.0	3.7	4.0
Legumes	3.7	3.4	3.7	3.7
Sugar & oils	7.9	8.9	8.5	8.7
Other foods	4.7	4.8	4.7	6.0
Tobacco & alcohol	5.3	4.6	6.3	4.0
Food away from home	7.3	4.3	6.9	3.2
Total %	100	100	100	100

Source: CSO/MACO/FSRP Urban Consumption Survey, 2007-2008

FFV share ranges from 15% to 19% of total expenditure on food

Source: CSO/MACO/FSRP Urban Consumption Survey 2007/08.

Table 21. Percent Shares of Total Food Expenditure of Different FFV Items

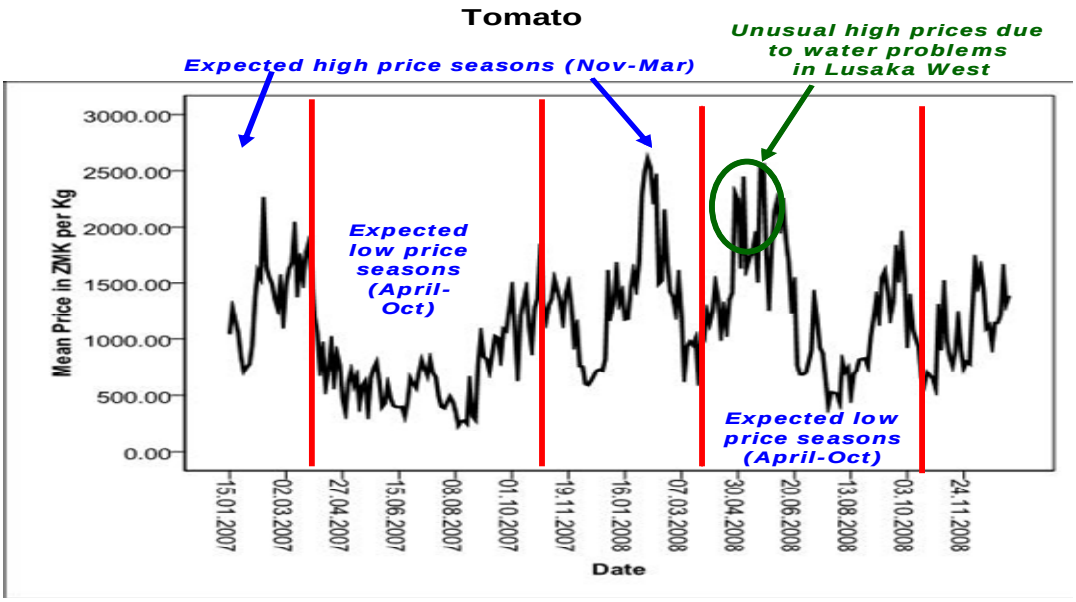
Food items	Lusaka	Kitwe	Mansa	Kasama
N of households	267,934	78,398	9,305	20,769
Rape	4.0	4.7	2.8	4.1
Tomato	3.5	3.8	2.9	3.6
Onion	1.6	1.9	1.2	1.4
Cabbage	.7	.5	.7	.7
Local leaves	2.2	2.8	2.8	2.8
Other vegetables	1.6	1.3	1.1	1.6
Banana	1.1	1.0	.7	.7
Oranges / tangerines	.7	.7	.5	.4
Apple	.5	.5	.2	.2
Other fruit	1.3	1.9	2.3	2.8
Cereals & staples	24.1	27.4	28.0	27.2
Animal protein	24.4	24.0	25.1	27.0
Other food prepared at home	26.9	25.3	25.0	24.4
Food away from home	7.3	4.3	6.9	3.2
Total	100	100	100	100

Source: CSO/MACO/FSRP Urban Consumption Survey, 2007-2008

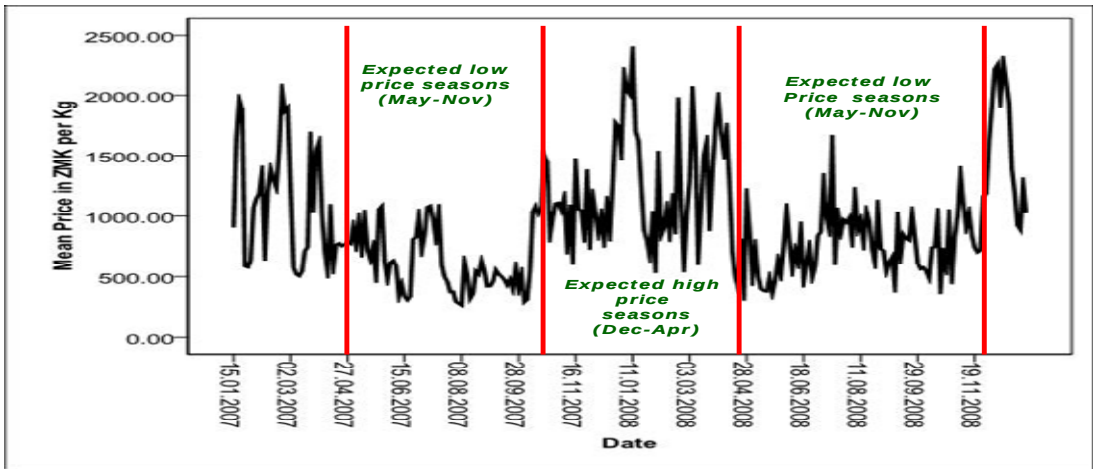
The 3 most important items account for 6.9% to 9.4% of food budget

Source: CSO/MACO/FSRP Urban Consumption Survey 2007

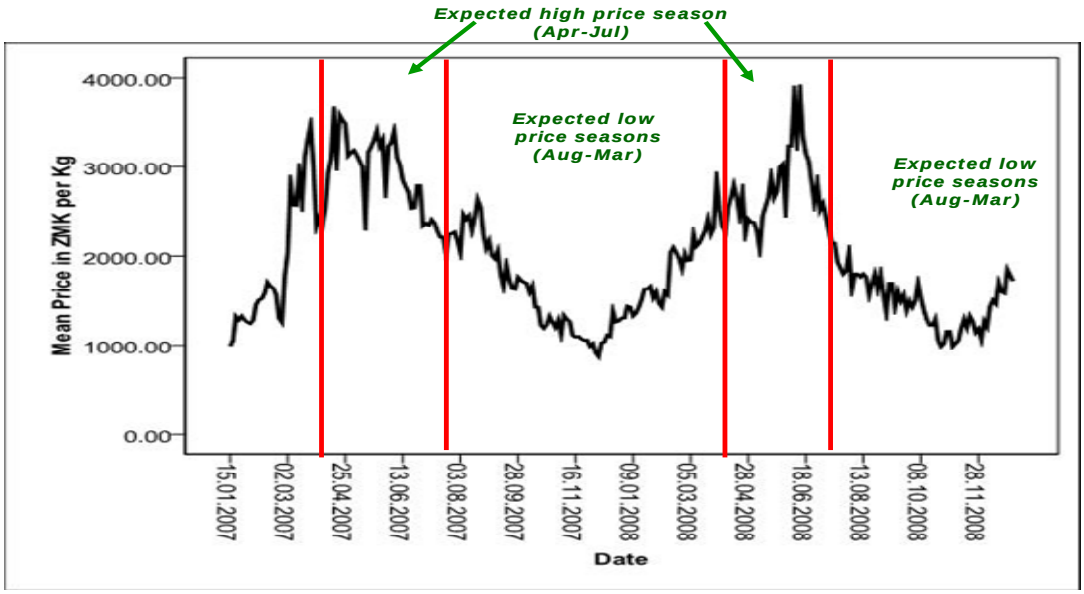
Figures 41. A, B, C. Seasonal Price Volatility in Soweto Market, Lusaka



Rape



Onion



Source: FSRP Horticulture Value Chain Study.

b. Export Demand

- Zambia Export Growers Association (ZEGA) is the primary export market for Zambian FFV.
- Smallholder exports of FFV are low and tend to be carried out through informal channels, making enumeration difficult. That said, interviews with traders in Soweto market suggest that as much as 31% of tomatoes passing through the market are forwarded on for export to DRC.

6.2.4. Research and Development within the Horticulture Sector

a. Public Sector Research (Tables 22 and 23)

- Zambia Agricultural Research Institute
  Horticultural programs (Vegetable Research and the Tree and Plantation programs) are part of the eight programs under the Crop Improvement and Agronomy Division within the Zambia Agricultural Research Institute of the Ministry of Agriculture, and Cooperatives (MACO).

- University of Zambia
  Two units within the University, School of Agricultural Sciences, and the Department of Biological Sciences are involved in agricultural related research that includes horticulture.

Table 22 Major Public Horticultural Research in Zambia

Major Commodity	Core research Focus	Experimental Station
Fruits (Tropical fruits)	Cultivar evaluation/ Introduction Production, Protection Post harvest	NIRS, UNZA SoA Mt Makulu, Mufulira NISIR (Indigenous fruits)
Coffee	Cultivar evaluation/ Introduction Production, Protection	Misamfu
Vegetables (Tropical and) Exotic)	Cultivar evaluation/ Introduction Production, Protection	NIRS, UNZA (SoA), Mt Makulu
Flower and Ornamentals	Post harvest and Cultivar evaluation	UNZA, SoA

Table 23. Fresh Vegetable Research Being Done in Zambia

Commodity	Major research activity
Cabbage	Cultivar evaluation & introduction Plant protection (control of pests and diseases) General production (fertilizer response, planting time, and plant density)
Rape	Germplasm conservation; Cultivar evaluation & introduction; Plant protection (control of pests and diseases); Plant production (fertilizer response, plant density, and planting time). Seed production
Onion	Cultivar evaluation & introduction Plant protection (control of pests and diseases) General production (fertilizer response, plant density)
Tomato	Cultivar evaluation & introduction Plant protection (control of pests and diseases) General production (fertilizer response, plant density) Postharvest and fruit quality studies.

Source UNZA, Crop Science Dept. Research Compendium, ZARI Vegetable Annual Reports (2009, 2010).

b. Private Sector Research

- Seed Companies
  The major private sector players in research are Seed companies. However, the majority of seeds are developed and tested overseas.

6.2.5. Interventions and Investments in the Horticulture Sector

a. Addressing the Needs of Small-scale, Informal FFV Producers

This sector comprises the bulk of the small scale horticulture producers. The system is largely informal and disorganized, with production levels generally suboptimal; for most FFV crops smallholder productivity is less than 50 % of the optimum. Furthermore the quality of the produce is of sub standard and not able to be marketed to formal sector processors. For example, tomato total soluble solid content is less than the 4 % that demanded by processors. Critical interventions that are needed to improve include:

- Organizing farmers into groups so that their limitations can be assessed much easily and the assistance can be delivered to large number in a concentrated manner.
- Re organizing the research system to ensure that it is driven by the agenda of the real problems of the growers. This can be done by adopting participatory research and extension methods.
- Facilitating information dissemination system to ensure that the technology development outputs reach the end-users. The recommendations are for other areas and not necessarily based on prevailing socio economic and soil/ climatic conditions.

b. Investments

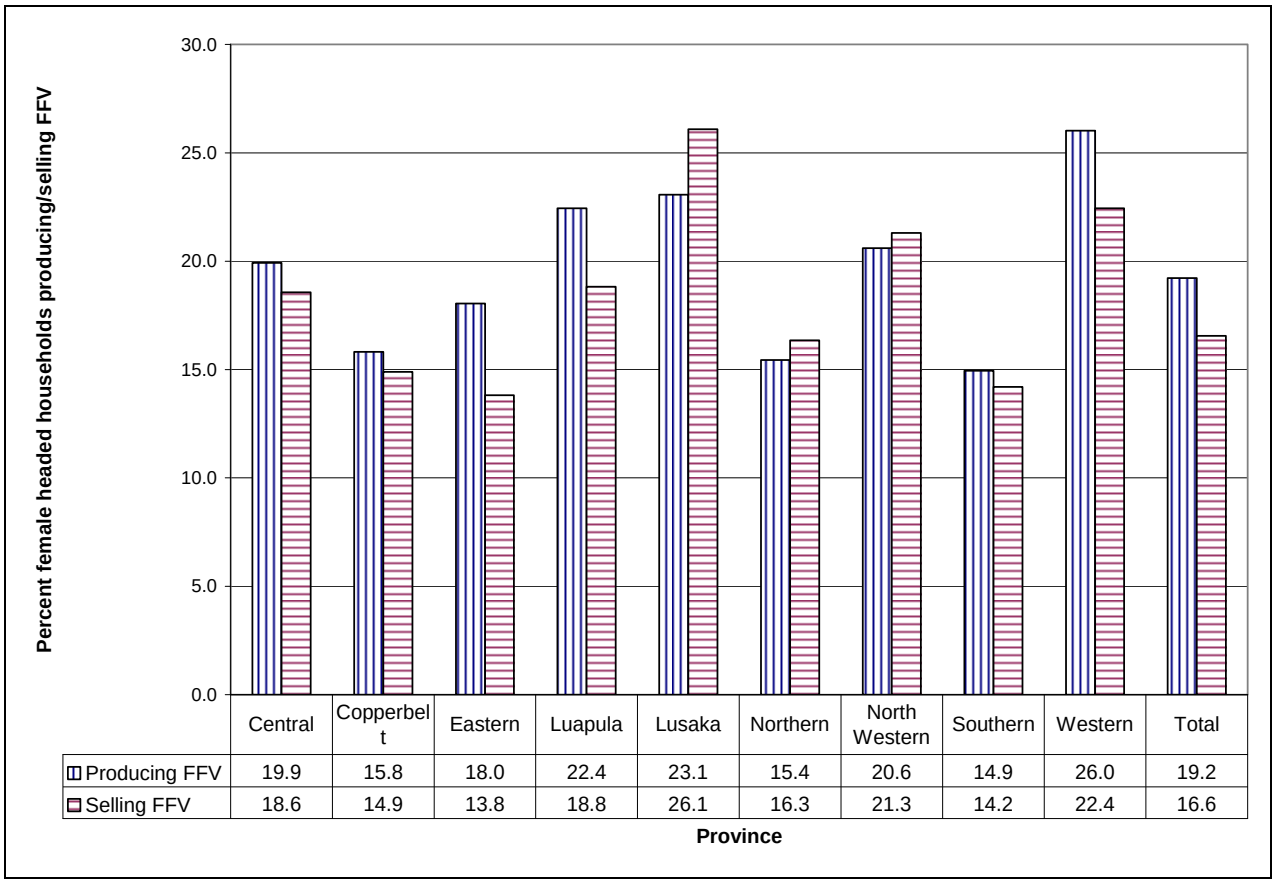
- Support to extension system recurrent expenditure.
- Optimizing information/ technology delivery.
  i. Intensive targeted training system (defining training needs and training of trainers); and
  ii. Logistical support such as transport and other top up remunerations.

6.2.6. Role of Women in FFV Production and Marketing

Women play a major role in the production and marketing of FFV. This is both as a source of labor and as owners of fields. Survey data available, however, does not indicate the gender of the person involved in management or ownership of each of the fields in households. This notwithstanding, women are quite often more involved in the production of vegetables such as okra, African egg plants and the leafy ones such as rape, Chinese cabbage, spinach, and the local traditional leaves. Analysis of the vegetables trade flows and pricing dynamics data of the FSRP shows that 13% of the rape first sellers at Lusaka Soweto market (the main FFV wholesale market) are women compared to 8% and 6% for tomato and onion respectively.

At the wider national level, about 19% of the smallholder farmers that produce FFV and 17% of those that sell are female headed (Figure 42). Women participation in these activities is higher in Lusaka, Western, Northwestern, and Luapula provinces.

Figure 42. Proportion of Female Headed Households Producing and Selling FFV by Province

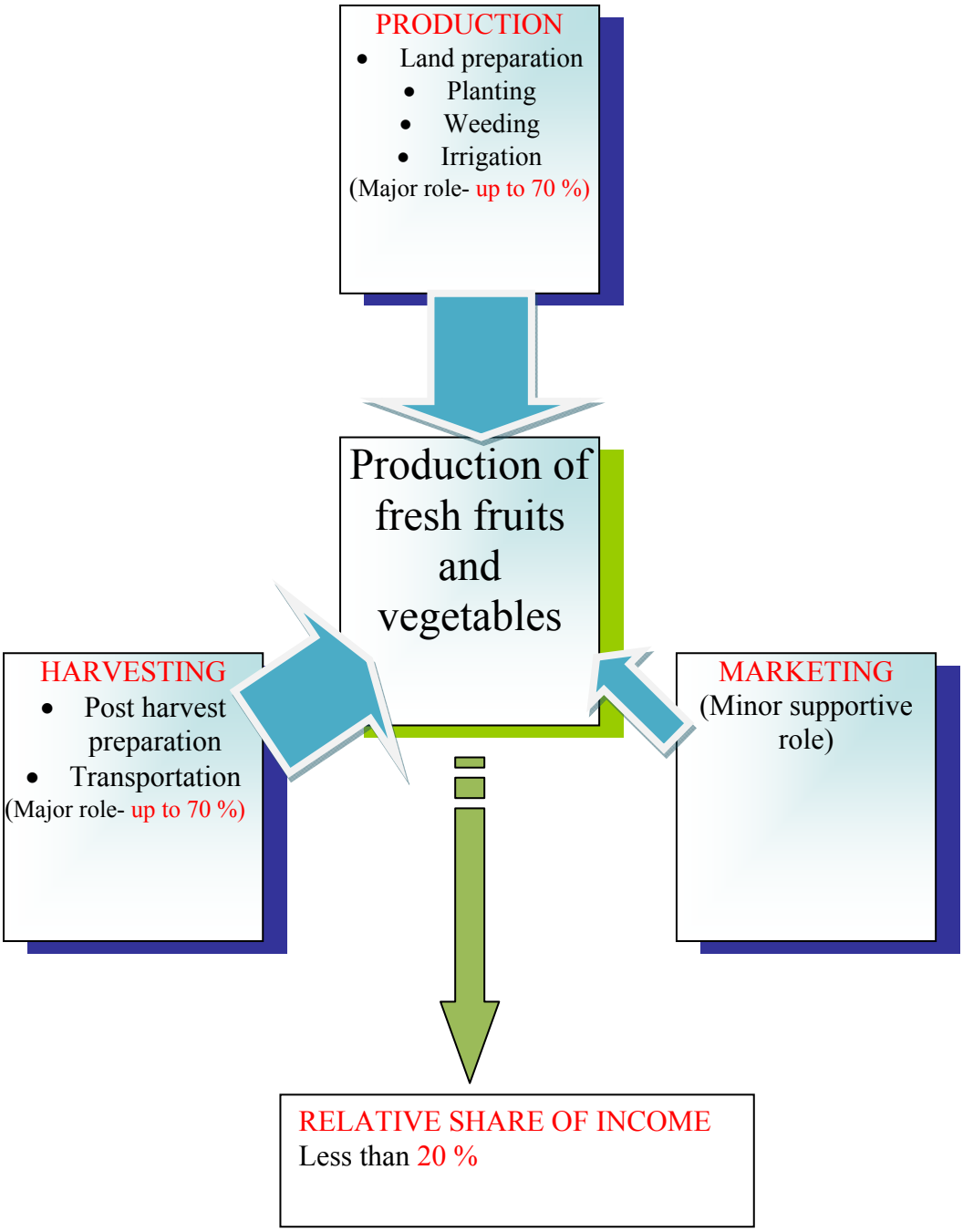


	Central	Copperbelt	Eastern	Luapula	Lusaka	Northern	North Western	Southern	Western	Total
Producing FFV	19.9	15.8	18.0	22.4	23.1	15.4	20.6	14.9	26.0	19.2
Selling FFV	18.6	14.9	13.8	18.8	26.1	16.3	21.3	14.2	22.4	16.6

Source: CSO/MACO/FSRP Supplemental Surveys to the 1999/2000 PHS 2008.

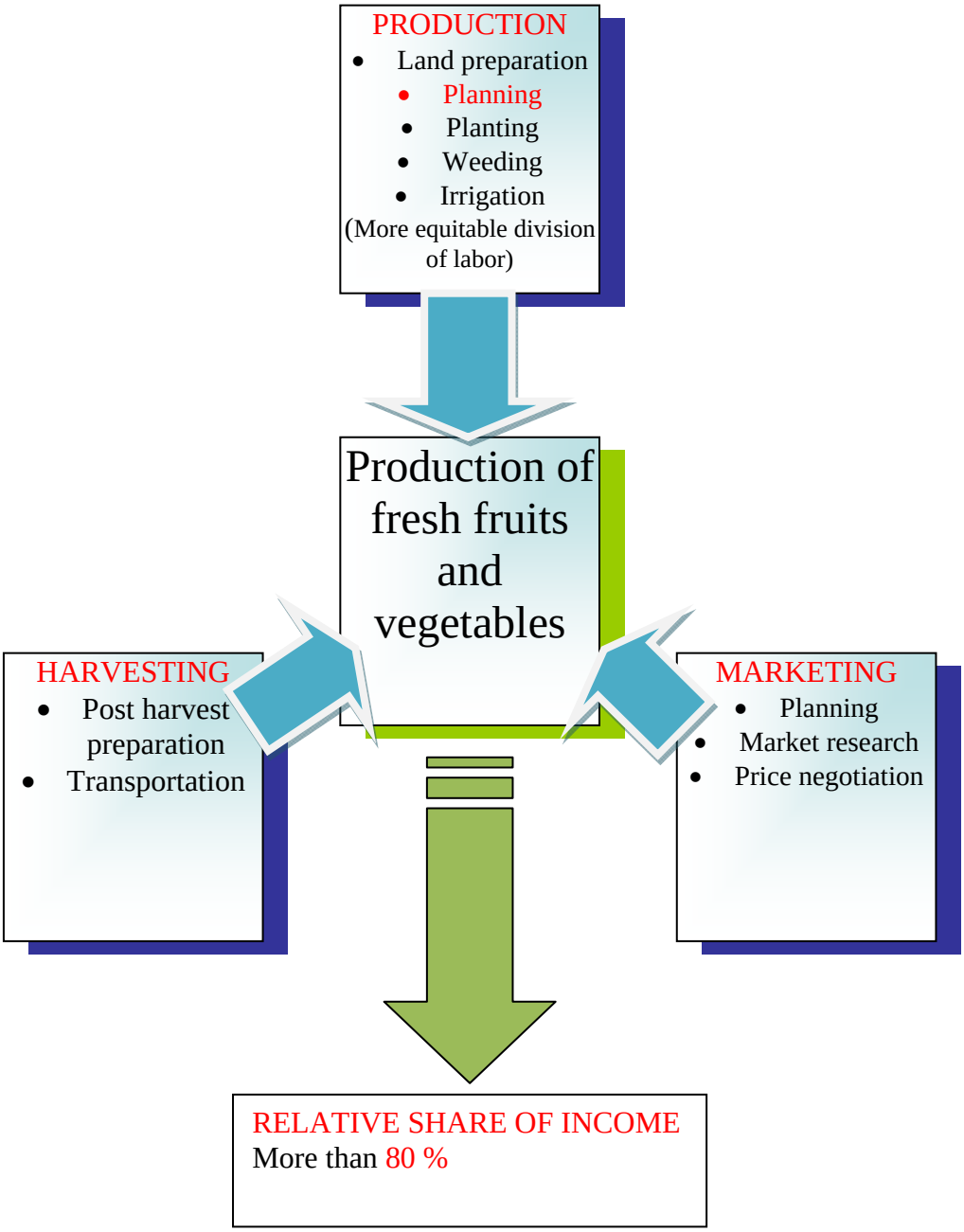
Figures 43 and 44 provide a schematic description of the differential roles played by women in the FFV value chain within male and female-headed households respectively.

Figure 43. Different Roles Played by Women and Children in Horticultural Production: Male Headed Households (The Size of the Arrow Denotes Scale of Involvement)



Source: Serageldin 2004.

Figure 44. Different Roles Played by Women and Children in Horticultural Production: Female Headed Households (The Size of the Arrow Denotes Scale of Involvement)



Source: Serageldin 2004.

6.3. Groundnut Value Chain

6.3.1. Production

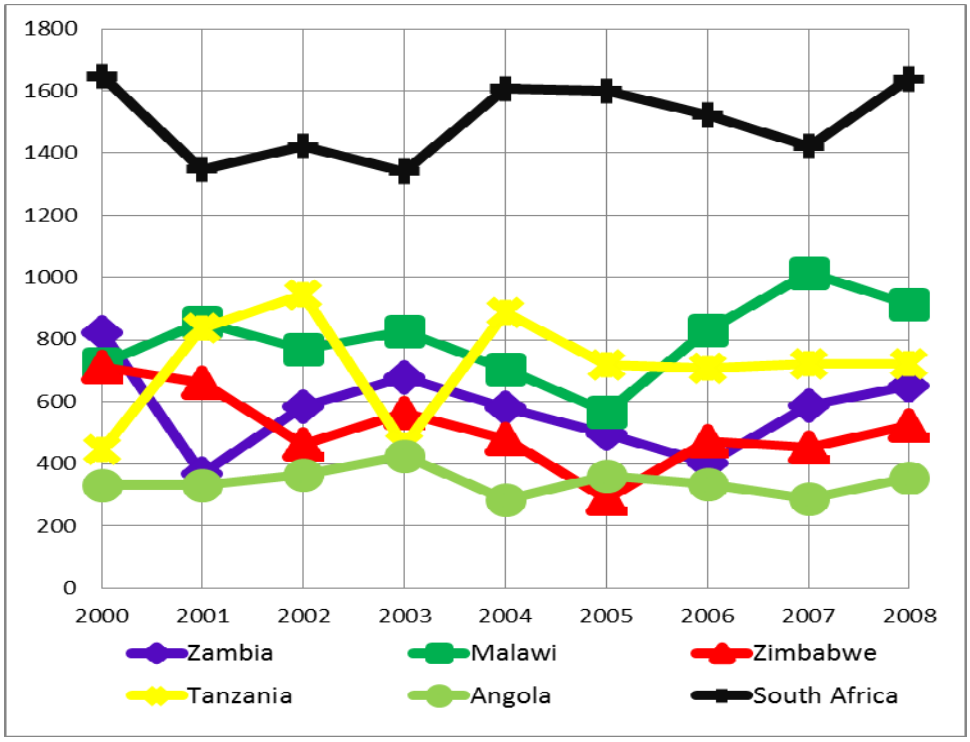
a. General Trends

- In 2009/10 720,688 (48.58%) households cultivated groundnuts, making it the second most important single food crop grown by Zambian smallholders.
- In 2009/10 Zambian farmers planted 267,578 ha of land in groundnuts.
- Total production of groundnuts in 2009/10 stood at 163,738 mt.
- Groundnut yields in Zambia are low, even by regional standards (Figure 45), averaging .5 mt/ha from 2000-2008. In 2009/10 average yields stood at .731 mt/ha.

b. Regional Production Dimensions

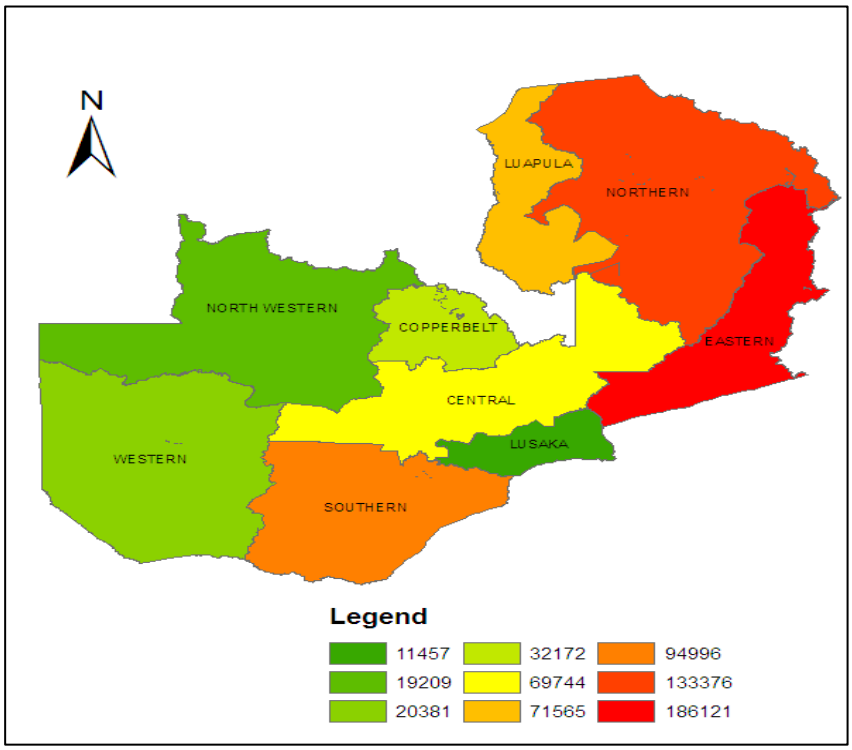
- Groundnut production is concentrated in Eastern and Northern Provinces
- In 2009/10 319,497 hhs in Northern and Eastern Provinces grew groundnuts, which is equivalent to 44% of all groundnut producers in Zambia (Map 17).
- Combined Eastern and Northern provinces accounted for 29.16% of total national production of groundnuts in 2009/10 (47,759 mt) (Map 18).
- In 2009/10 groundnut yields ranged from 661 kg/ha in Central Province to 900 kg/ha in Northwestern. Eastern Province achieved yields below the national average (731) at 670 kg/ha, while Northern outperformed the national average at 832 mt/ha.

Figure 45. Groundnut Yields (mt/ha) in Southern Africa, 2000-2008



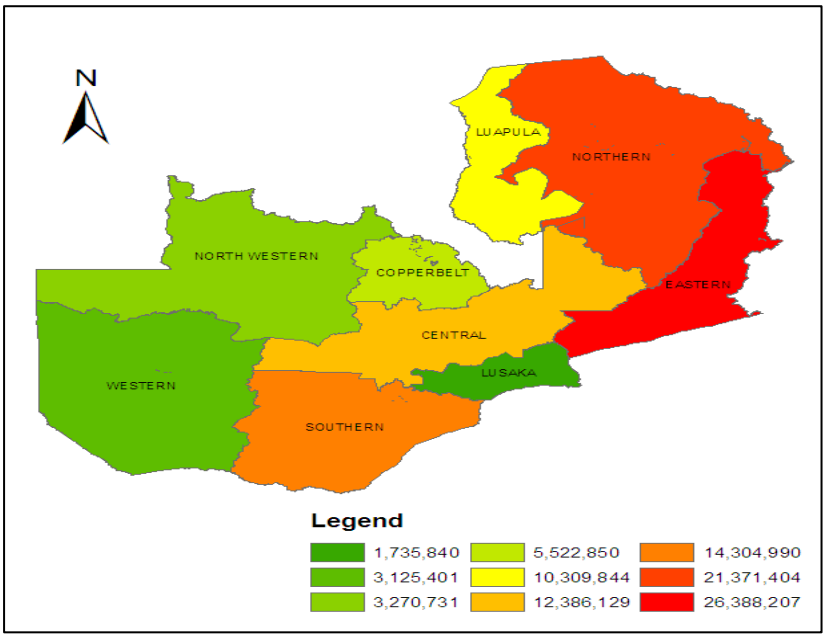
Source: FAOSTAT.

Map 17. Number of Households Growing Groundnuts by Province, 2009/10



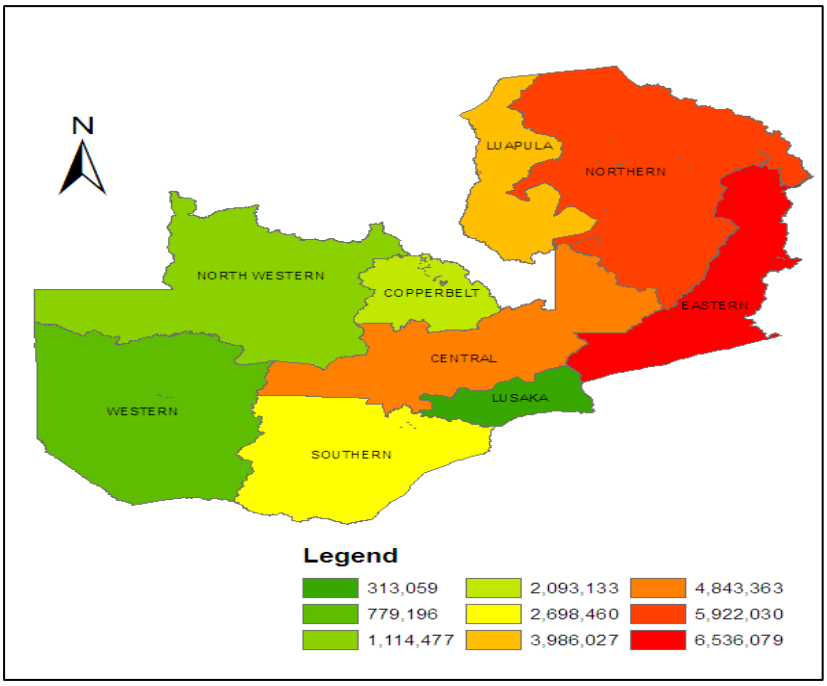
Source: CFS 2009/10.

Map 18. Kilograms of Groundnuts Produced by Province, 2009/10



Source: CFS 2009/10.

Map 19. Kilograms of Groundnuts Sold by Province 2009/10



Source: CFS 2009/10

6.3.2. Marketing

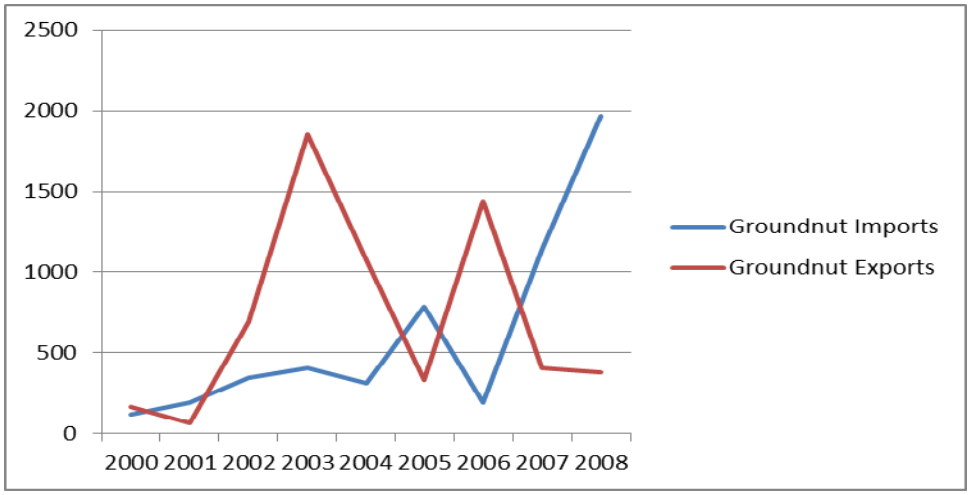
a. National Markets

- The majority of groundnuts sold pass through informal market channels.
- 45% of groundnut producers in Zambia sold groundnuts in 2009/10.
- Eastern and Northern Provinces were the most important regions of Zambia in terms of quantities of groundnuts sold (Map 19).

b. Export Markets

- Zambia was once an exporter of groundnuts to Europe. Between 1960 and 1970 the Easter Province Cooperative Marketing Union(EPCMU) exported over 8000 Mt of groundnuts to the UK.
  i. However, concerns over aflatoxins and low quality standards (size and shape of nut) led to a collapse of this market.
- Since 2000 Zambia has oscillated between being a net importer and net exporter of groundnuts (Figure 46). However, trade volumes for groundnuts remain low, not exceeding 2000 mt for imports or exports in a given year.

Figure 46. Import and Export Trends for Groundnuts (mt), 2000-2008



Source: FAO TradeSTAT.

6.3.3. Consumption and Demand

a. Legume makes up a relatively small component of urban consumers' food expenditure basket, ranging from 3-3.3% of total household food budgets in Lusaka, Kitwe, Mansa, and Kasama (Urban Consumption Survey 2007/08).
- However, high production levels suggest that groundnuts do form an important part of Zambian diets.

b. FAOStat estimates current consumption demand for groundnuts in Zambia at 69,964 mt, suggesting a good deal of Zambia's total production is channeled into industrial processes, informally exported, or lost due to spoilage.

6.3.4. Research and Development in the Groundnut Sector

a. Public Research
- Research in groundnuts is mainly done at Msekera Research Station Eastern Province.
- Msekera has released over nine groundnuts varieties in recent years: some are resistant to the common disease, some have high oil content (see Table 24).

b. Private Research
- Farmers recycle groundnut seed so private seed companies do not take up seed multiplication of groundnuts in Zambia as it is not a profitable venture.

6.3.5. Women's Roles in Groundnut Value Chain

a. Female-headed households are actively involved in groundnut production, with 24% of all female headed households growing groundnuts.
- In Eastern Province 30% of female-headed households grew groundnuts (Figure 47).

b. In male headed households groundnuts are often gendered as a female crop.

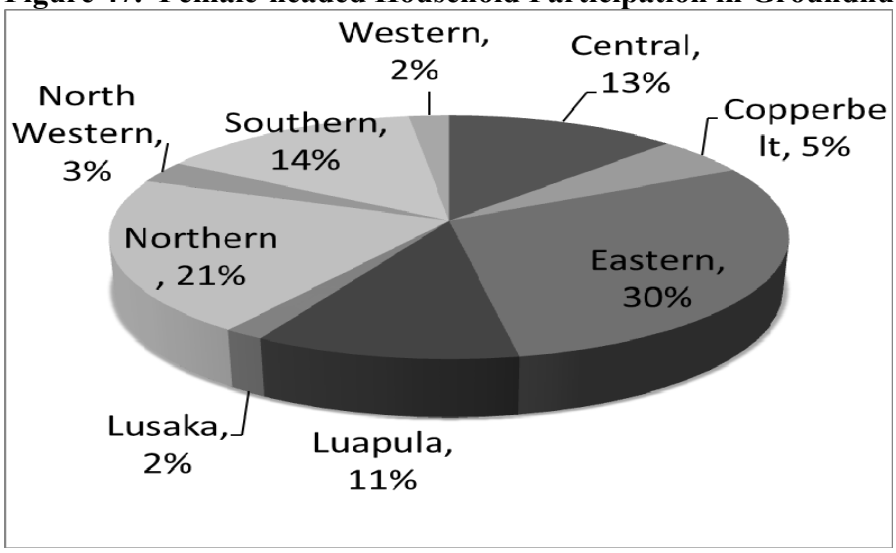
- Women are primarily responsible for the planting, weeding, and harvesting of groundnuts. In terms of marketing, women tend to dominate the small-scale informal groundnut trade in rural and urban markets.

Table 24. Groundnut Varieties in Zambia

Variety	Oil content %	Days to Maturity	Yield (t/ha)	Year Released	Seed size
MGS-2	45-48	130 - 140	1.0 – 2.0	1988	Medium
MGV-4	48-50	120 - 130	1.5 – 3.0	1992	Medium
Makulu Red	48-50	130 - 145	2.0 – 2.5	1964	Small
Champion	48-50	130 - 140	1.5 – 3.0	1998	Large
Chishango	48	130 - 140	1.5 – 4.0	2007	Medium
Luena	48-50	90 - 100	1.0 – 2.0	1998	Small
Chalimbana	48-50	150 - 160	0.5 – 1.0	1966	Large
Natal Common	45-48	90-100	0.5 - 1.0	1976	Small
MGV-5	45-48	130 - 140	1.5 – 4.0	2008	Large
Comet	45-48	90 - 100	0.5 - 1.5	1970	Small
Chipego	48	100 – 110	1.0 - 1.5	1995	Small
Katete	43	90 - 100	1.0 – 2.0	2008	Small

Source: Msekera Research Station.

Figure 47. Female-headed Household Participation in Groundnut Cultivation



Source: CSO/MACO/FSRP 2008.

6.3.6. Investments and Intervention Opportunities in the Groundnut Sector

a. Improve export market potential
- Requires tackling the issue of aflatoxins. There is need to invest in technologies that can reduce incidences of aflatoxins, e.g. invest in cocoons and improved sacks.

b. To improve productivity so that the country is price competitive.
- Train farmers on agronomic aspects: e.g., crop rotation.
- Promote adoption of improved groundnut varieties.

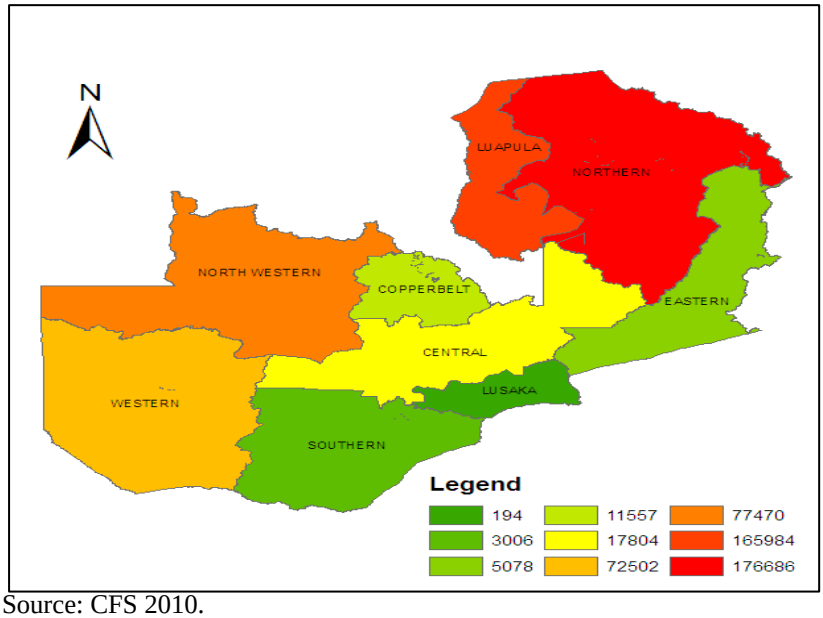
c. Promoting outgrowing schemes as the model for groundnuts production. Examples:
- Former Eastern province Cooperative Marketing Union that used to export groundnuts to the UK in 1960s and 1970s.
- Then the newly formed Eastern Province Cooperatives Limited, which has 1000 farmers who grow groundnuts and then sale to the cooperative.
- COMACO, which works with farmers who live in game management areas. It has about 45,000 farmers in its program of which 19,000 are groundnut farmers. It gives groundnuts seed on credit to farmer then it buys the produce.

6.4. Cassava Value Chain

6.4.1. Production

a. In 2009/10 there were 562,249 cassava producing hhs, making up 37.9% of total smallholder population.
- Cassava production has a strong regional dimension (Map 20):
  i. Luapula Province 157,885 producers (92.16%);
  ii. Northern Province 210,706 producers (80.13%); and
  iii. Northwest Province 74,618 producers (67.95%).

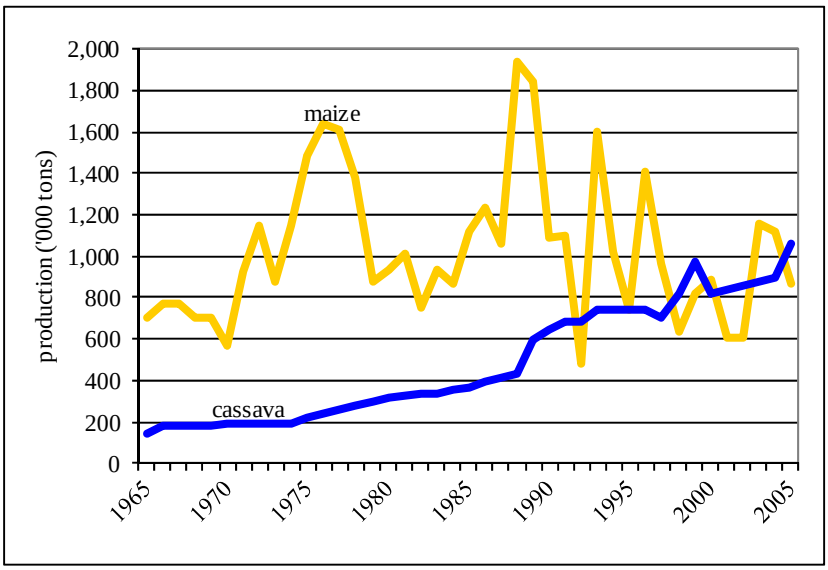
Map 20. Number of Households Growing Cassava by Province, 2009/10



Source: CFS 2010.

- These three provinces account for 78.8% of all cassava producers in Zambia.
- Since 1965 cassava production in Zambia has grown steadily. This growth has been driven in large measure by the decreasing role of the state in the maize sector since liberalization (Figure 48).
- Cassava yields vary dramatically between producers using traditional cassava varieties (1 mt/ha dry) and improved varieties (2-3.5 mt/ha dry). On farm yields are significantly lower than yields obtained under controlled situations (2 tons traditional 7-11 improved varieties) (Table 25).
- In terms of the production of cassava chips, Zambia produced 421,790,490 kg in 2009/10. 74% (316,268,352 kg) were produced within the three primary cassava producing provinces (Map 21).

Figure 48. Trends in Cassava Production 1965-2005



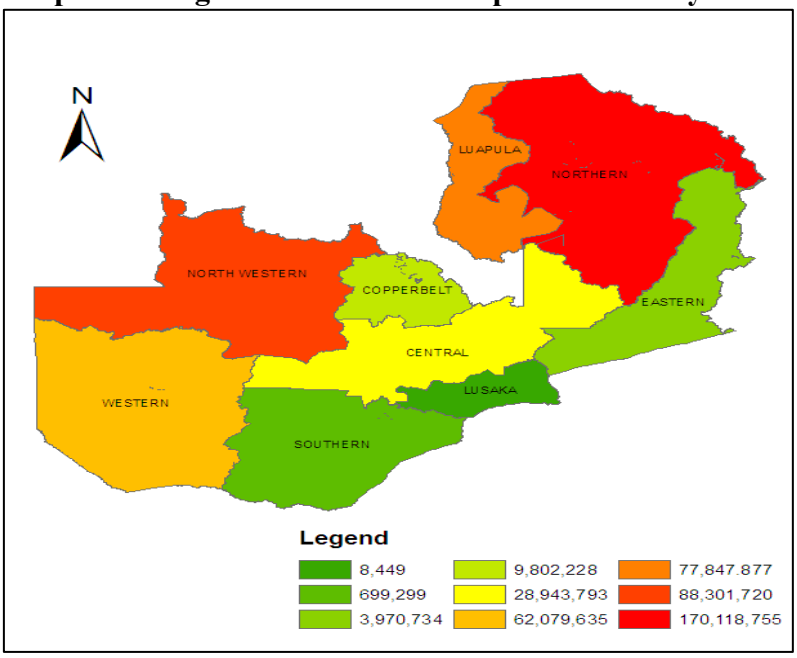
Source: FAOSTAT.

Table 25. Cassava Yields in Zambia (mt/ha)

	Farm		Research	
	Dry	fresh	Dry	fresh
New cassava Varieties	2-3.5 tons	6-12 tons	7-11 tons	22- 41 tons
Local cassava varieties	1tons	3.5 tons	2 tons	7 tons

Source: Chitundu, Droppelmann, and Haggblade 2006; Simwambana et al. 2004.

Map 21. Kilograms of Cassava Chips Produced by Province 2009/10



Source: CFS 2009/10.

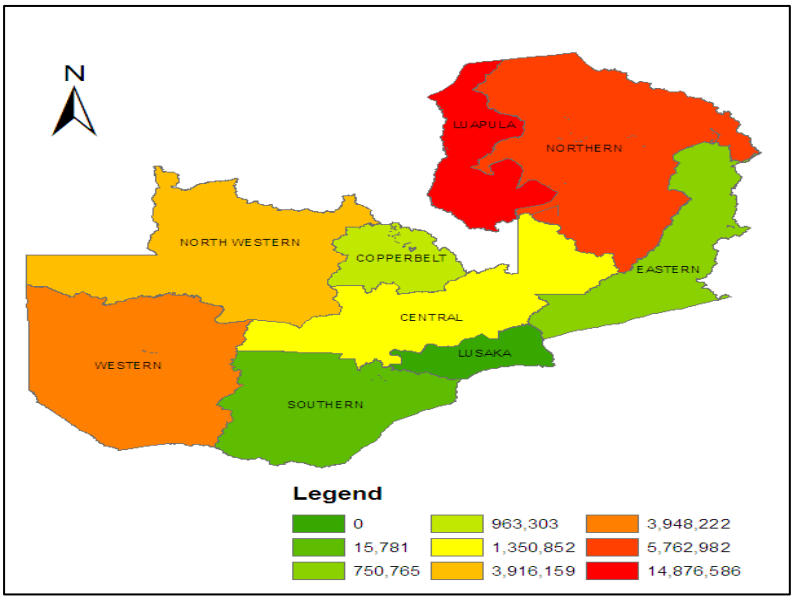
6.4.2. Marketing

a. Cassava markets are primarily informal in nature.

b. Of the 421,790,490 kg of cassava chips produced in Zambia in 2009 only 32,933,502 kg were sold (7.8%), the remained was retained for home consumption (Map 22).

- Northern Province is the most important province in terms of cassava commercialization.

Map 22. Kilograms of Cassava Chips Sold by Province 2009/10



Source: CFS 2009/10.

c. Animal feed and other industrial uses of cassava are estimated to be minimal, totaling 1000 mt dry weight.

d. Formal and informal exports of cassava to DRC and Angola are estimated at 4000 mt dry weight.

6.4.3. Consumption and Demand

a. As a share of total urban food budgets cassava ranks low relative to other staples:
- Lusaka 0.2%, Kitwe 0.5%, Mansa 3.8%, and Kasama 2.5%.
- However, for the poorest quintile of consumers in Mansa and Kasama cassava is very important, with cassava purchases absorbing 11.5% and 7.5% of food budgets respectively.

b. Expansion of industrial processing of cassava and its increased use in animal feeds is projected to drive increased demand for cassava in the future.

c. Cassava leaves also serve as an important food source in Zambia.

6.4.4. Research and Development

a. Root and Tuber Improvement Programme (RTIP) at Mansa and Solwezi research stations.
- Released stream of new cassava varieties in 1993 and 2000 after 15 years of research.
- Research on cassava has stalled because of lack of funding.

6.4.5. Women's Roles in the Cassava Value Chain

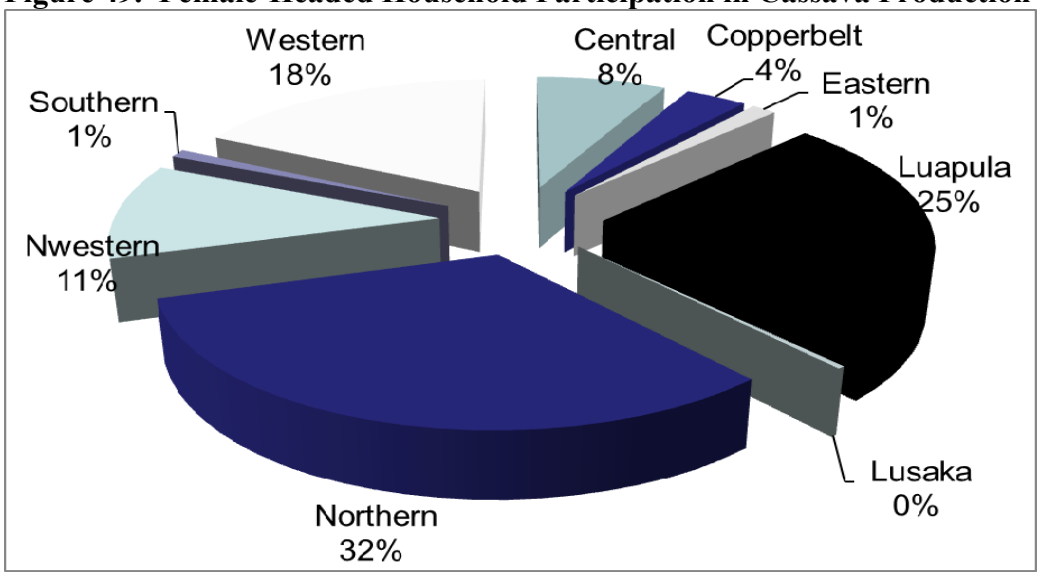
The low labor intensity of cassava production makes it an important crop for labor constrained female-headed households. In Northern Province 32% of female-headed households grew cassava in 2006/07, while 25% of female-headed households in Luapula Province grew cassava (Figure 49).

6.4.6. Intervention and Investment Opportunities in the Cassava Sector

a. There is need to create demand.
- Implementation of the CASSAVA STRATEGIC PLAN – Budget of US $ 11.7million (Donors made pledges: FAO, IFAD, FINNIDA, etc.).
- Product development by food technology.

b. To enhance productivity/processing.
- Continued funding to the research programs.
- Investing in cheap but durable technologies that can be used at farm level.

Figure 49. Female-Headed Household Participation in Cassava Production



Source: CSO/MACO/FSRP Supplemental Survey 2008.

6.5. Beans Value Chain

6.5.1. Production

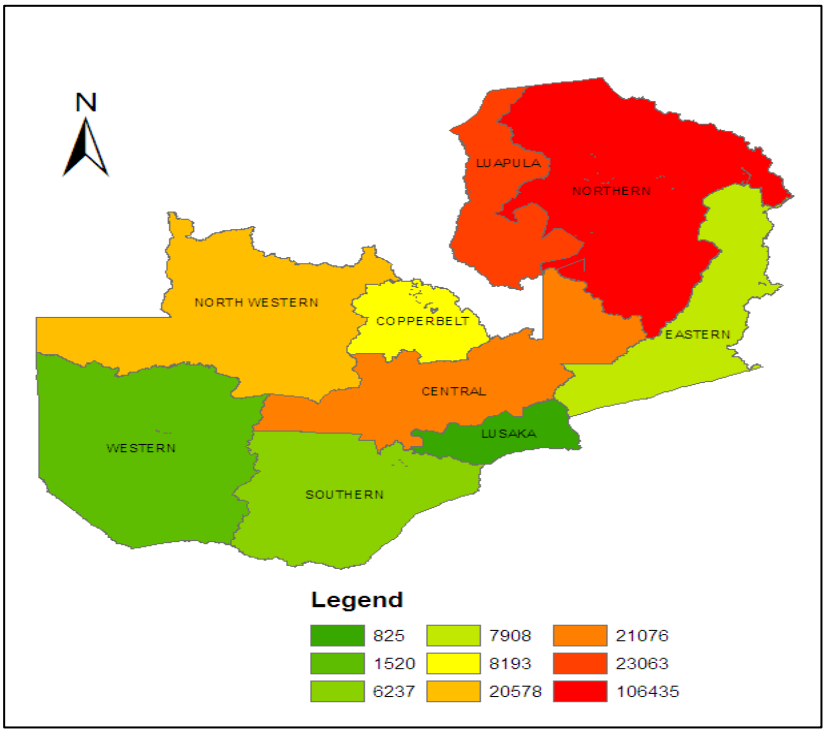
a. In 2009/10 15.34% (195,835 farmers) of Zambian smallholders produced beans
- Bean production is highly concentrated in Northern Province where 47.96% of farmers grow beans (106,435). Thus, Northern Province represents 54.3% of all bean producers in Zambia (Map 23).

b. In 2009/10 83,735 hectares of land were planted in beans, equivalent to an average of .42 hectares per bean producer.

c. In 2009/10 Zambian farmers produced 95,333 mt of beans representing a 12,000 mt increase over the previous year (Map 24).
- Bean production in Zambia has grown by 4.7% per annum since 2004 (Figure 50).

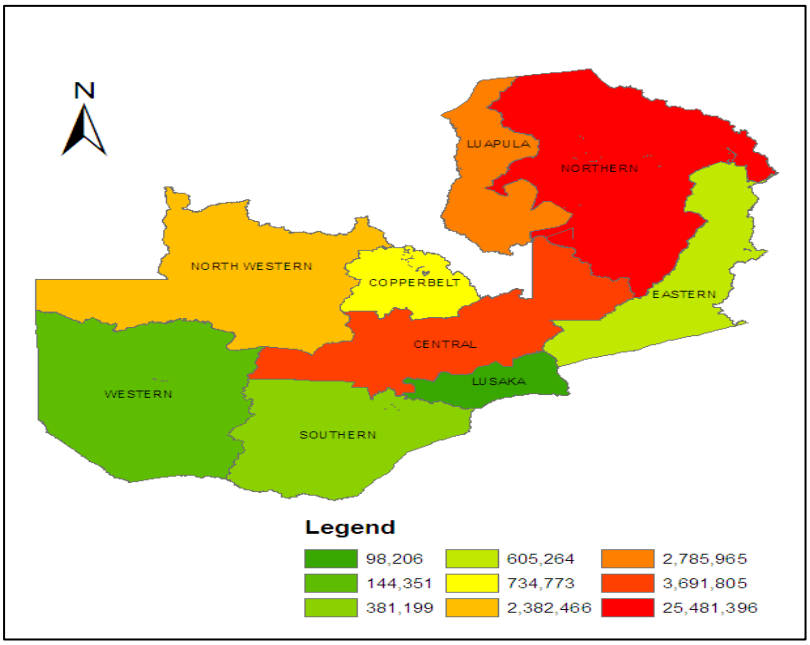
d. Maize yields in 2009/10 stood at 1.1 mt/ha, with Eastern Province recording the highest yields at 5.5 mt/ha (Figure 51).
- It should be noted that high bean yields in Eastern Province are attributed to the two production cycles per year obtainable in that region.

Map 23. Number of Households Growing Beans by Province 2009/10



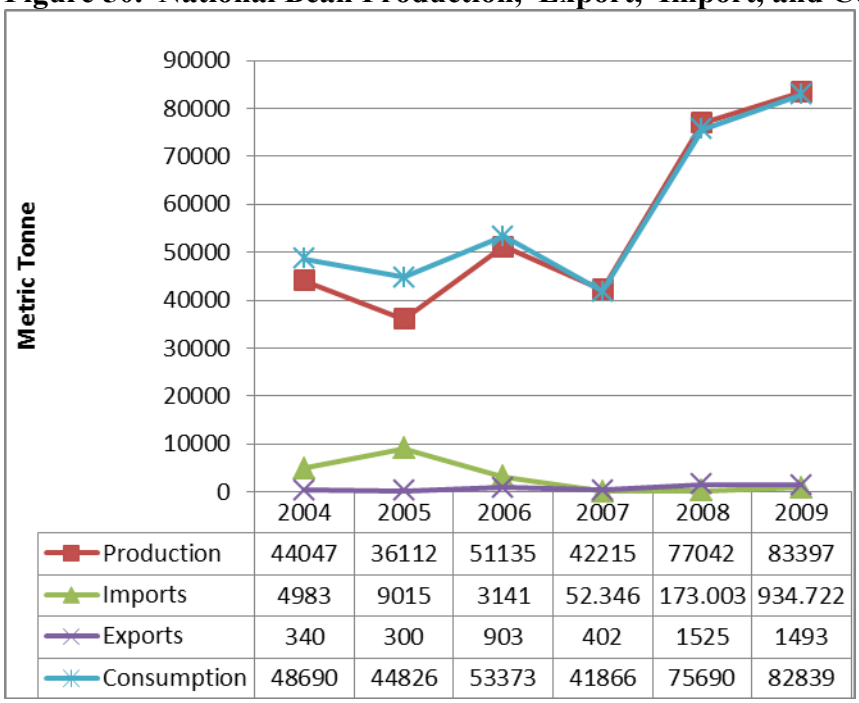
Source: CFS 2009/10.

Map 24. Kilograms of Beans Produced by Province 2009/10



Source: CFS 2009/10.

Figure 50. National Bean Production, Export, Import, and Consumption Trends



	2004	2005	2006	2007	2008	2009
Production	44047	36112	51135	42215	77042	83397
Imports	4983	9015	3141	52.346	173.003	934.722
Exports	340	300	903	402	1525	1493
Consumption	48690	44826	53373	41866	75690	82839

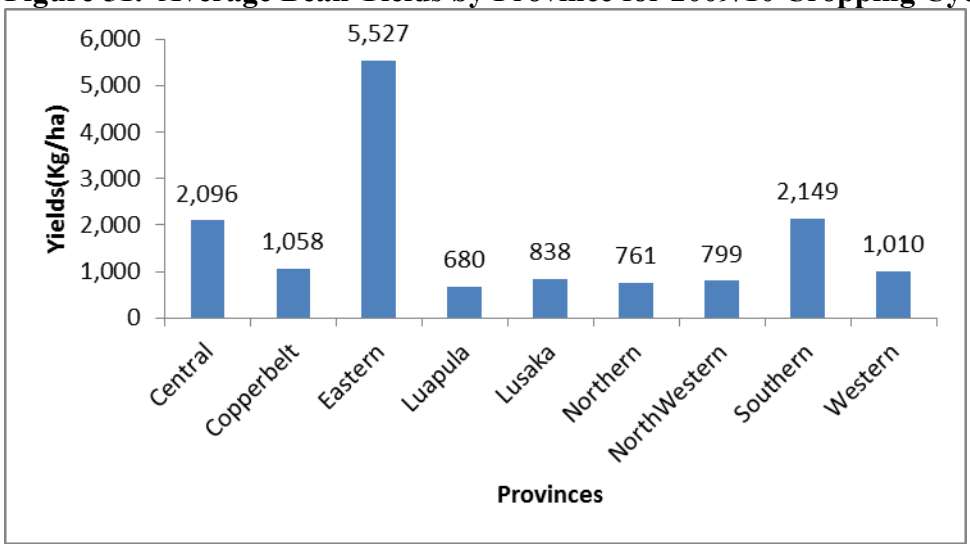
Source: CFS various year and FAOSTAT.

6.5.2. Marketing

a. In 2009/10 total bean sales in Zambia were 17,054 mt.

- 17.8% of total production was sold, the remainder was retained for household consumption.
- Bean commercialization is highly concentrated in Northern Province, which accounted for 74.5% of all beans sold in Zambia (Map 25).

Figure 51. Average Bean Yields by Province for 2009/10 Cropping Cycle



Source: CFS 2009/10.

b. Bean marketing is primarily done through informal market channels, for which data is difficult to obtain.

c. Local Processing is limited but growing, Freshpikt's current market share for baked beans stands at 42.8% and 58.2% for mixed beans.

d. Formal exports of beans from Zambia are minimal, with just 1493 mt exported in 2009.

- Limited exports are the result of poor quality standards, the use of inappropriate varieties, high costs of production, and limited market linkages between producers and exporters.

e. Informal cross border bean trade has been growing at 8.9% per annum over the last four years, with Zambia accounting for 23.4% (2160MT) of the total 9235 MT informal bean cross border exports with the bulk going to DRC, while it imported 1070MT(11.6%) in 2008/09 marketing season (FEWSNET 2009).

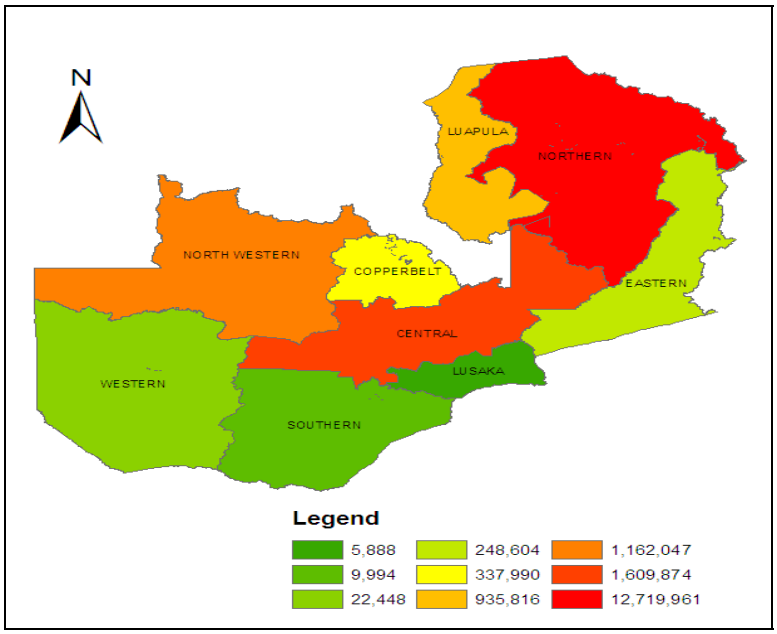
f. In 2009, WFP global purchases of pulses amounted to 188,806 MT, which is 7% of the total purchases of all commodities. However, in 2009 WFP purchased only 237 MT from Zambia (a market share of 0.1%); because of the high price of Zambian beans (US$ 800/Mt) compared for instance to those sourced from Malawi and Mozambique whose landed cost is US $ 600/Mt.

6.5.3. Consumption and Demand

a. Local demand

- FAOStat estimates current bean consumption in Zambia at 10 kg/capita/yr. Based on current population growth projections demand for beans is expected to rise to 158,000 mt by 2015.

Map 25. Kilograms of Beans Sold by Province 2009/10



Source: CFS 2009/10.

- Freshpitk has put together an ambitious plan to expand its local procurement of beans by 43 % p.a. to 46,000 mt by 2015.

b. *Export Demand*

- Regional trade statistics indicate 88, 830 Mt of kidney beans being imported in 2008 by five selected countries (South Africa, Zimbabwe, Zambia, Botswana, and Angola) in the region; showing a 31% increase in import volumes from 2004 to 2008.
- South Africa offers an great market opportunity as imports of kidney and navy beans stood at 64,378Mt and 18,000Mt respectively by 2008 (ECIAfrica 2010).
- The majority of current imports come from China, though Zambia could compete favorably given the 10% duty preference it enjoys as a SADC member.

6.5.4. Research and Development

a. Public Sector

- Zambia Agricultural Research Institute (ZARI)
- Golden Valley Research Trust (GART)
- University of Zambia (UNZA)

b. Private Sector: seed companies

c. Bean Research Networks

- National: Zambia Bean Research Network (ZABRN)
- Regional: Southern African Bean Research Network (SABRN)
- Continental: Pan African Bean Research Network (PABRN)

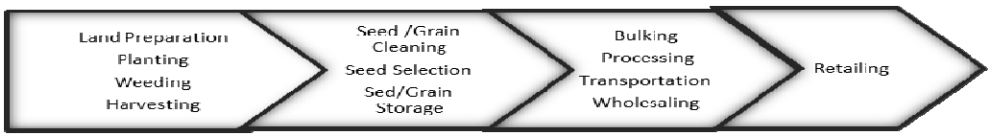
d. New Varieties

- From 1998 to 2009, 15 bean varieties that are resilient to multiple stresses have been released some of which include: Chambeshi (A197), Lukupa (PEF 14), Lyambai (CAL 143), Kalungu (SPS2-4P24), Kabale (KID 31), Kabulangeti, Kapisha (C30 – P20), Lwangeni (OPS-KW1), Bounty, Cardinal, Speckled ice, PAN 148, PAN 116, PAN 128 and SR3(SCCI,2009).

6.5.5. Role of Women in Bean Value Chain

Although national statistics of the number of bean farmers disaggregated by gender is lacking, it is widely accepted that women play a critical role in bean production and marketing (See Figure 52). Women are actively involved in on farm activities and retailing. The on farm activities are labor intensive yet the share of the total value from the bean value chain that women get is relatively small compared to other key players that perform marketing functions such as bulking, processing, transportation and wholesaling. Therefore it is important to develop and disseminate labor saving technologies that would have an impact on the wellbeing and incomes of women such as conservation farming techniques. It has been suggested that conservation farming could reduce labor for land preparation by 30% and when using herbicides decreases labor demand for weeding by 70%. It is also important that women are linked to supply chains that would increase their share of the total value added to

Figure 52. Role of Women in Bean Value Chain



the bean value chain. Lastly, development agenda for improving bean productivity should target women, as they are key decision makers in bean production.

6.5.6. Investment and Inervention Opportunities

a. Bean seed multiplication of 3 high yielding improved varieties that are demanded within the Sub Saharan Region: Kabale, Lyambai and Lwageni (canning); by encouraging public private partnerships (research and financial institutions, farmer groups, NGOS and markets) aimed at uplifting the welfare of smallholder farmers.

b. Transfer of bean production(agronomic, soil, integrated disease, and pest management practices) and post harvest and food processing technologies to farmers through outreach programs.

c. Linking farmers to sustainable and equitable markets.

6.6. Village Poultry Value Chain

6.6.1. Production

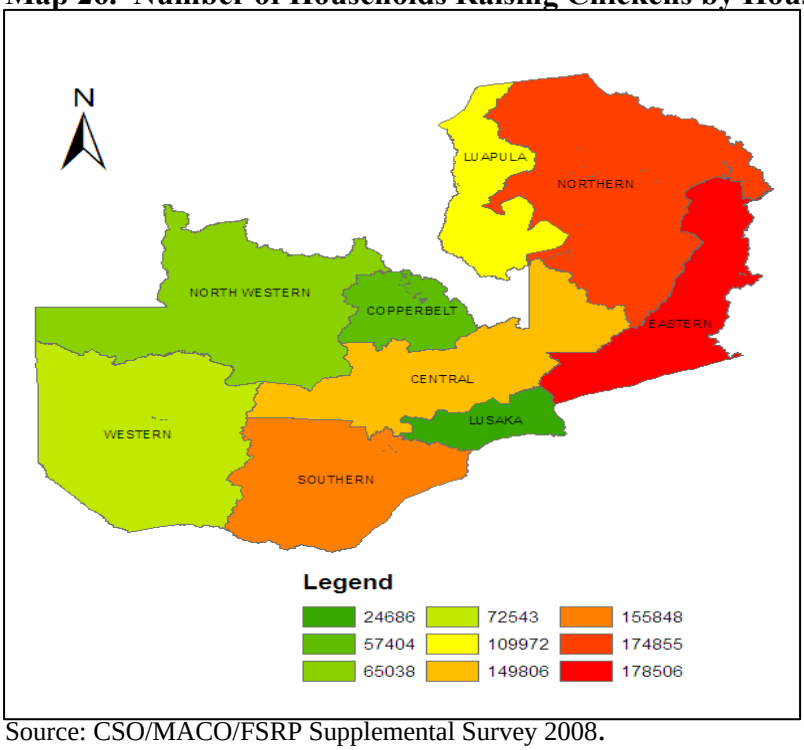
a. In 2007/08 988,658 (66.6%) small-scale farming households raised chickens, with the highest number of chicken owners located in Eastern Province (Map 26).

b. The total number of village chickens in Zambia is estimated at 14 million

c. Village chicken production tends to extremely low input.
- Village chickens rarely receive vaccinations (particularly for Newcastle disease).
- Village chickens are rarely given supplemental feed; most are left to scavenge for food.
- Few are kept in containment facilities.

d. Though official production figures are lacking, results from research stations suggest that low input village production contributes to low production levels (Bwalya and Mwanguhya 2010).
- Village chickens take 20-22 weeks to reach maturity compared to 6 weeks for the broiler.
- Lay 70 eggs per annum (compared to 300 for commercial layer).
- Egg weight is between 40-42g (120g for commercial layer).
- Number of eggs brood by the bird 7-18 at a time with a hatchability of 85-90%.
- 14.55% mortality in chicks has been recorded.

Map 26. Number of Households Raising Chickens by Household



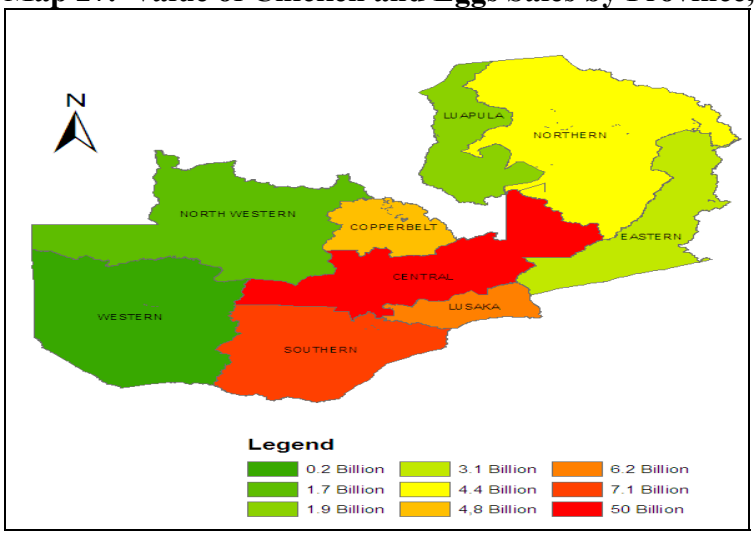
Source: CSO/MACO/FSRP Supplemental Survey 2008.

6.6.2. Marketing

a. Village chicken markets are highly informal, with most farmers selling small numbers of chickens to meet pressing financial needs.
- As a result, the use of middlemen to connect farmers to major consumer markets is critical.

b. In terms of value of poultry products sold by small-scale farmers Central Province is far and away the most important (Map 27). However, this is primarily driven by small-scale broiler chicken operations rather than village chicken sales.

Map 27. Value of Chicken and Eggs Sales by Province, 2007/08



Source: CSO/MACO/FSRP Supplemental Survey 2008.

6.6.3. Consumption/ Demand

a. Chibolya market in Lusaka is the largest livestock market in the country. It, therefore, provides a proxy for broader marketing trends for the village poultry sector.
- Village chicken inflow 230-350/day
- Estimated demand 1500/day
- Shortfall 1150
- Wholesale price
  i. ZMK 20000 hen
  ii. 25000-30000 cockerel
- Retail price
  i. Hen K30000-35000
  ii. Cock K40000-45000
- Congo market 25% of chibolya inflows
- 70% trade through middlemen
- Only 20% producers sell directly to consumers
- Main sources of supply
  i. Central 5%
  ii. Western 15%
  iii. Southern 80%
- Livestock movement ban in Eastern province limits participation
- 60% of suppliers are females, 50% males
- 50% female sellers and 50% males
- Trade is in the open.

6.6.4. Consumption/Demand

Demand for village chickens is difficult to gauge, however based on the rapid expansion of the commercial poultry sector (Since 2000 production of broilers has increased to 28million from 13 million and layers from about 500,000 in the year 2000 to 3 million in 2010), the price differential between broilers and village chickens (roughly 20,000 per bird), and the latent demand at Chibolya market (deficit of birds 1,150) we can assume strong and growing demand for village chickens.

6.6.5. Research and Development

a. Use of ethno veterinary products, for example Martha Musukwa (UNZA) has been conducting research using moringa plant as a protein supplement as well as a remedy for certain ailments. The idea behind is to reduce cost of feed production as this replaces soya which is an expensive component and to encourage organic farming.

b. The development of a thermal stable Newcastle vaccine with the view of replacing Lasota a cold chain sensitive vaccine. Trials currently under way in various provinces. This will reduce mortality from the disease and will allow broader coverage even to remote areas with no refrigeration facilities.

c. Hatchery for local chickens started in Batoka by Gart. If successful this could save as source for day old chicks for village chickens. The hatchery has been made using

local materials to make it sustainable. This in itself will address all the productivity shortfalls addressed earlier.

d. Research to assess the socioeconomic impact of village chickens done in western province by Dr. Banda and Dr. Simainga as a well of mitigating HIV/AIDS, alleviating poverty, income generation, and nutritional enhancement. This is important in shifting perceptions that cover this noble industry as an inferior venture when compared to the broiler.

e. Provision of improved layer housing units by some NGOs that are environmentally acceptable and cheaper than the battery cages. Advantage is that the work well for village setup layer production units. This leads to increased production of eggs and allows for easy handling for interventions such as vaccinations.

f. The Government has set up a number of facilities for research in the Livestock Industry. These include a Ministry of Livestock and Veterinary departments. In addition, agriculture research stations (Mount Makulu, GART, Msekera, etc) are available in most provincial centers and include research in Poultry.

g. Establishment of VETLAB through the efforts of PAZ with assistance from USAID and other stakeholders (Ross, Hybrid, Zambeef, Agrivet, Golan Poultry Solutions, Nutri Feeds, Olympic Milling, and Bokomo). These laboratory services cover all sectors of livestock and are charged at commercial rates. Feed testing is also done on request from clients.

h. Infrastructure has expanded by 100% for hatcheries and feed making companies. Broiler production has reached a staggering 28million per year and is expected to rise. The capacity of production is estimated at 1.8million per week but it's yet to be attained. If this is attained it will give 1.8million per week.

i. The local market is so huge that companies are only allowed to export 10% of their production to avoid shortages.

6.6.6. Role of Women in Village Poultry Value Chain

a. Women feature prominently in village chicken rearing and marketing. Evidence from Chibolya market suggests that 60% of producers and 50% of retailers are women.

6.6.7. Investment and Intervention Opportunities

a. *Establishment of Village Chicken Breeding/ Multiplication Centers:* The establishment of such centers would facilitate bulk production of the local chicken and its marketing. The system can use Women's groups for labor as well as marketing. This would result in selection of good breeding stock in the required ratio of cockerel to hen as opposed to current trends where farmers use spent cockerels with a long history of inbreeding.

b. *Women Capacity Building*: Women need to be empowered with training in management skills, bookkeeping, and value addition activities if the value chain is to be of any significance. This would help them interpret business trends and hedge against risks. They would act from an informed view. In terms of village chickens,

women must be made to appreciate the use of ethno-veterinary products and feed supplementation if the chicken is to be considered organic. Focus should also be attached to veterinary interventions so that loses due to viral diseases are minimized.

c. *Poultry Certification Systems:* This system would ensure that Poultry products are certified for quality and source. This would also facilitate tracking in case of diseases and other eventualities. This would involve establishment of testing centers and provision of certificates. If many small scale farmers register on the program, their bargaining power for the prime markets such as Shoprite, spar would be strengthened. Intermediate buyers could be organized to provide warehousing facilities for the farmers. This would mean the small scale farmer would stick to his program of all in all out production without incurring extra costs for storage or further feeding. Under this certification system small scale farmers are to be requested and taught how to meet certain minimum standards such as branding and other processes if they are to compete favorably on the market.

d. *Policy Streamlining:* The introduction of poultry-specific policy would facilitate regulation, training, monitoring as well as general control of the sector. The currently situation where the veterinary department is very strong at HQ and weakest at camp level requires urgent redress. If women farmers in the villages are to be promoted, the camp staff must be equipped with modalities to execute his programs.

e. *Poultry Support Programs:* The establishment of a program to support small-holder poultry producers would be good. This could include loan facilitating, a sub-contracting arrangement with a guaranteed market which would include a package of chicks, medication, training, and basic management skills. Under this program there should be creation of women friendly markets and not the rough markets they are subjected to now. The infrastructure should have descent facilities like trade area, ablution, etc.

VII. ADDITIONAL VALUE CHAINS

7.1. Aquaculture Value Chain, from World Fish

7.1.1. Rationale: Why Invest in Aquaculture?

a. *There is strong and growing demand for fish in Zambia and the region – and aquaculture is the main means to meet this demand*. Market demand for fish and fish products is strongly increasing in Zambia and neighboring countries and is projected to increase further with growing populations, urbanization, and economic development in the region. Market prices for fish in Zambia have increased sharply over the past years. While they vary seasonally, in most months these increases have been above average food price increases and have ranged from 4% to over 13% per month in 2008.

   Per capita supply of fish in Zambia has fallen from over 11kg p.a. in the 1970s to 6.5kg today. The 'supply gap' for maintaining the current level will require a further 10,000mt p.a. by 2015; bringing it back to 10kg will require an additional annual increase of at least 50,000mt by 2015.

   Markets for fish are particularly strong in the expanding urban areas in Zambia including Lusaka and the Copperbelt towns, as well as in neighboring Katanga province, DRC and other regional centers. In addition, demand among rural populations is growing, if more scattered.

   Capture fisheries, while still providing the bulk of fish supply in the country, have on the whole reached their productive capacity and may decline due to external factors stemming from infrastructure development (dams), land use changes, pollution and climate change.

   Aquaculture will be the main means to narrow the 'supply gap' of fish in Zambia and the region. While aquaculture currently provides about 8,000mt p.a. (roughly 10% of officially recorded national fish production), there is great scope for broad and rapid growth to meet production targets of at least 50,000mt by 2015 and 100,000mt by 2020. To enable sustainable increases in production and productivity, targeted investments in the aquaculture value chain are required. Initial focus is required on improving input markets (seed, feed), strengthening services to the sector (finance, business development, research/information), and rationalizing the regulatory and policy environment.

b. *Fish is an important source of high-quality nutrition for the poor in Zambia.* Fish is an important source of high quality nutrition for the poor in Zambia. In addition to providing over 30% of protein, it is often a main source of vital micronutrients. Surveys suggest that fish consumption is particular important among the poor who can access small and easily divisible quantities of fish. Within households, fish is more equally shared by women, men, children, and the elderly than most other animal-based food.

   These benefits can make significant contributions to addressing major malnutrition challenges in Zambia including protein, vitamin, and mineral deficiencies.

   Aquaculture can meet the strong demand for fish among the poor very efficiently. Several tilapia species are being farmed in Zambia that are generally well suited for aquaculture expansion and intensification. Managing tilapia production for small size

food fish allows two or three harvests a year in most parts of Zambia and can regularly yield large quantities of fresh fish products for the poor.

There are basically two avenues for delivering food and nutrition security benefits through aquaculture that are relevant in Zambia:

- Smallholder aquaculture among the rural poor for on-farm consumption and local markets, and
- Commercial aquaculture through small and medium scale enterprises that target urban and regional markets.

c. *Smallholder aquaculture increases incomes and farm productivity and improves nutrition security among the rural poor.* Aquaculture on smallholder farms can be an efficient way to produce highly nutritious food from locally available resources. Fish production levels will be modest but will make significant contributions to household food security and will generate limited surpluses for local marketing.

Integrated Agriculture Aquaculture (IAA) technologies have been shown to improve farm productivity, nutrition security, and incomes among smallholders in Southern Africa. In addition to fish production, fish ponds strengthen productivity and nutrition impacts of mixed farming systems at smallholder level. Water is used for small-scale irrigation during the dry season, allowing continued production of vegetables as well as staple crops. In view of likely climatic changes in Zambia and the region, improved on-farm water management will become increasingly important for securing viable smallholder livelihoods.

Smallholder aquaculture can also provides significant opportunities for households headed by women or children and for families affected by HIV/AIDS. Labor requirements are limited beyond the initial construction and harvesting for food or sale is flexible and can be timed and apportioned to meet specific household needs.

d. *SME aquaculture generates rural economic growth and provides affordable, highly nutritious food for national and regional markets.* Commercial private investments in aquaculture are growing in Zambia. Currently, about 20-30 aquaculture enterprises in the SME sector are producing fish from ponds and/or cages. These are clustered mainly to supply urban markets in Lusaka and the Copperbelt towns. The number of commercial farms is growing and their scale of operation is expanding (average of 20-30 ponds per enterprise). Government estimates put productivity of these systems to about 5-6 tons (tilapia) per hectare, which suggests semi-intensive production using purchased fingerlings and supplementary feed. Experience from similar production systems elsewhere shows that productivity can be significantly increased (by over 100%) with access to improved seed, feed and production methods.

The high degree of urbanization in Zambia and its position in relation to regional markets provide an accessible, solid, and growing consumer base for SME aquaculture. Specific additional opportunities exist in targeting significant demand among mining populations. Mining companies are starting to invest in aquaculture production through outgrower schemes, which could be profitably managed by SMEs.

Aquaculture SMEs are often the drivers of sector development, stimulating investments in improved input markets and service sectors, which in turn increases productivity and lowers costs of inputs and triggers further investment in fish production. This momentum is starting to show also in Zambia with private sector hatcheries and feed mills increasing their investments. With further targeted support

to critical points in the value chain, Zambia could enter a similar growth curve as is currently witnessed in Uganda (from 5,000mt in 2002 to 51,000mt in 2007) or Nigeria (30,000mt to 85,000mt over the same 5-year period).

Benefits from SME aquaculture include large quantities of highly nutritious food at affordable prices for major population centers, employment opportunities for rural and urban poor through the value chain, and investment opportunities in input value chains, service industry, transport, and marketing.

7.1.2. Opportunities for Investing in Aquaculture in Zambia

Opportunities for investing in aquaculture in Zambia have improved strongly. Driven by increasing demand for fish, also by the poor, the economic context of the sector is strong today. In response, private investments are growing.

The policy and regulatory environment is improving and Government of Zambia has further prioritized aquaculture as a growth sector in the SNDP. Capitalizing on this momentum for change, support can be targeted at updating the institutional framework and specifying policies and regulations to meet the demand of increased investments in sustainable aquaculture production.

Broadly speaking, a two-pronged approach to investing in aquaculture in Zambia is recommended:

a. Strengthening the aquaculture value chain through SMEs to generate local economic growth and increase fish supply to expanding national and regional markets; and

b. Enhancing and scaling-up smallholder aquaculture to improve incomes and food and nutrition security among the rural poor and increase productivity and climate resilience of smallholder farming.

This approach responds to specific and complementary opportunities in different socio-economic settings in Zambia and would result in a diversified aquaculture sector contributing to meet the needs of the poor as producers, consumers, and stakeholders in wider agricultural development.

7.1.3. Challenges and Constraints and How they Can Be Addressed

a. *What are the barriers to adopting aquaculture, why are so few farmers doing it? What sorts of market barriers are there? What sorts of investments could best address these challenges.* Poor smallholders- defined here as those with less than 1 ha land-holdings – are generally only able to build small ponds, not least because transforming substantial areas of crops to fish production can increase vulnerability (markets; weather; etc.). A lack of assets – land, education, money – means that pond productivity must be driven by on-farm wastes, which are usually of poor quality and available only in small quantities. As a result, production is rarely more than a few tens of kg per year. Such smallholders are also are poorly connected to markets, both input (seed, feed, affordable credit, technical information) and output (access to areas where fish demand and prices are high). Among other things, for example, this results in partial harvests of bigger fish in order to leave the smaller fish behind, which then breed and generate the seed for the next season. Over several generations this strategy serves to select for poor growing fish, with the result that the strains grown in such

farms often perform worse than those taken directly from the wild. Another effect is that the volumes (and quality, especially sizes) of fish produced by individual poor smallholders are insufficiently attractive to traders to buy.

While there can be good reasons to support this sub-sector (improved nutritional and food security; reduced vulnerability to external shocks [e.g. climate change], an element of a considered national Poverty Relief Support Plan), experience tells us that it can be expensive to support. Investment in the formation of Farmers Organizations, which may then be able to secure seed and feed at competitive prices, market their produce together and develop peer-to-peer sharing of best practices. However, such cooperative action is not always easy to achieve in some cultures. Other models include contract growing, something that is being piloted with some success in at least one place in Zambia.

Investment is needed in the development of profitable technologies appropriate to Zambian conditions and different producer types. Priorities would include the development of productive species and strains, affordable feeds, understanding markets (local; regional; export) and the improvement of value chain performance. Investment in participatory value chain analysis would identify where investment is best targeted. (See tables 26 and 27 for aquaculture production and statistics.)

Table 26. Overview of Aquaculture Production Systems in Zambia

Farming system/ category	Key features/ locations	Species produced	Productivity and estimated output (mt)	Number of farmers	Key constraints	Issues and potential
Extensive pond aquaculture	Reliant on on-farm and local inputs; large clusters of farmers in Eastern, NW, Northern and Central Provinces	Various local tilapia species	2-3 tons per ha 1,200 mt +	Over 8,500	Seed quality and regular access to seed;	Potential to stabilize production levels and scale-out proven integrated technologies; able to reach vulnerable rural populations in most parts of Zambia;
Semi-intensive or intensive ponds	Purchase seed and feed: (i) semi-intensive – locally; (ii) intensive – nationally; Clusters in Copperbelt, Lusaka and Lower Zambezi	Various local tilapia species; Nile tilapia Nile tilapia preferred by most intensive producers	5-6 tons per ha 2,400mt +	30 (?)	Quality seed; feed quality and price;	Strong potential to increase production with reliable access to improved seed and feed;
Intensive cage culture	Purchase seed and feed nationally; own hatcheries; Clusters in Lake Kariba and Lower Zambezi;	Nile tilapia	7-8 tons per cage (size?) 680mt	9 (?)	Sites; feed; seed; disease(?)	Potential to grow further in specific sites; requires risk management and environmental monitoring;
Small water bodies (dams, reservoirs)	Intermittently stocked and self-seeding; no supplementary feed; Southern Province, Eastern Province	Various local tilapia species; Nile tilapia	0.5 tons per ha 1,700mt +	700 small water bodies	Tenure and access; productivity;	Potential to increase productivity and production through introduction of small cages; tenure and access issues to be resolved;

Table 27. Basic Aquaculture Statistics for Zambia

National Aquaculture Production, 2007													
NUMBER OF FISH FARMERS			NUMBER OF FISH PONDS, CAGES AND SMALL WATER BODIES (SWBs)				AREA OF PONDS (Ha) AND CAGES			ESTIMATED PRODUCTION IN (mts)			
Small-scale	Large-scale earthen	Large-scale cages	Small-scale	Large-scale earthen	Cages	SWBs	Small-scale	Large-scale earthen	Cages	Small-scale	Large-scale earthen	Cages	SWBs (Dams/ Reservoirs)
1,469			4,200			135	126			252			338
2,003			3,655			33	146			292			83
639		1	1,007		3	63	30			60		24	158
3,124	1		5,694	30		9	170	26		340	312		23
345			1,178			3	35			70			8
304	5		749	117		7	22	81		44	972		18
240	5		419	159		5	13	89		26	1,068		13
185			236		82	69	7			14			173
150		8	250			367	7			14		656	918
8,459	11	9	17,388	306	85	691	556	196	0	1,112	2,352	680	1,732

2007 Aquaculture fish production estimate from small-scale fish farmers, large-scale, cages, and SWBs is 5,876 mts.

Source: Department of Fisheries.

7.2. Rice Value Chain

7.2.1. Background

Rice has sub-regional comparative advantages in Northern Province Zambia, around Chama, and in Western Province, centered around Mongu, and to a lesser extent Eastern Province (Table 28 and 29). The rice growing regions in Zambia therefore are quite isolated from major urban consumption centers. Given the poor state of Zambia's infrastructure in these regions transfer costs between production areas and consumption centers are high, which drives up the cost of domestically produced rice and limits the profitability of rice production for farmers. (See maps 28 and 29 for rice production.)

In terms of the share of urban food budgets rice is quite low, relative to other staple carbohydrates. However, the proximity of important rice growing regions to Tanzania, where rice is one of the primary staple foods, does provide some regional trade opportunities.

Table 28. Percent of Small and Medium Scale Farmers Growing Rice by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.70	.56	.26	1.23	1.43	.00	.73	.10	.87	.42
Copperbelt	.44	.33	.04	.02	.03	.08	.03	.06	.11	.07
Eastern	6.41	5.41	.76	5.85	5.49	5.48	4.62	3.67	3.35	4.77
Luapula	2.29	1.94	2.21	1.92	2.01	2.21	2.98	2.97	3.30	2.14
Lusaka	.00	.00	.00	.00	.11	.10	1.86	.47	.73	.65
Northern	7.85	7.86	5.64	7.09	6.05	4.29	6.55	6.53	10.82	10.03
Northwestern	.00	1.15	.00	.66	.28	.27	.31	1.19	2.04	.53
Southern	.00	.00	.00	.00	.00	.02	.00	.00	.03	.00
Western	12.80	11.62	5.67	4.33	9.77	3.48	9.59	9.97	14.17	15.14
National	4.54	4.21	2.06	3.31	3.64	2.49	3.59	3.41	4.61	4.49

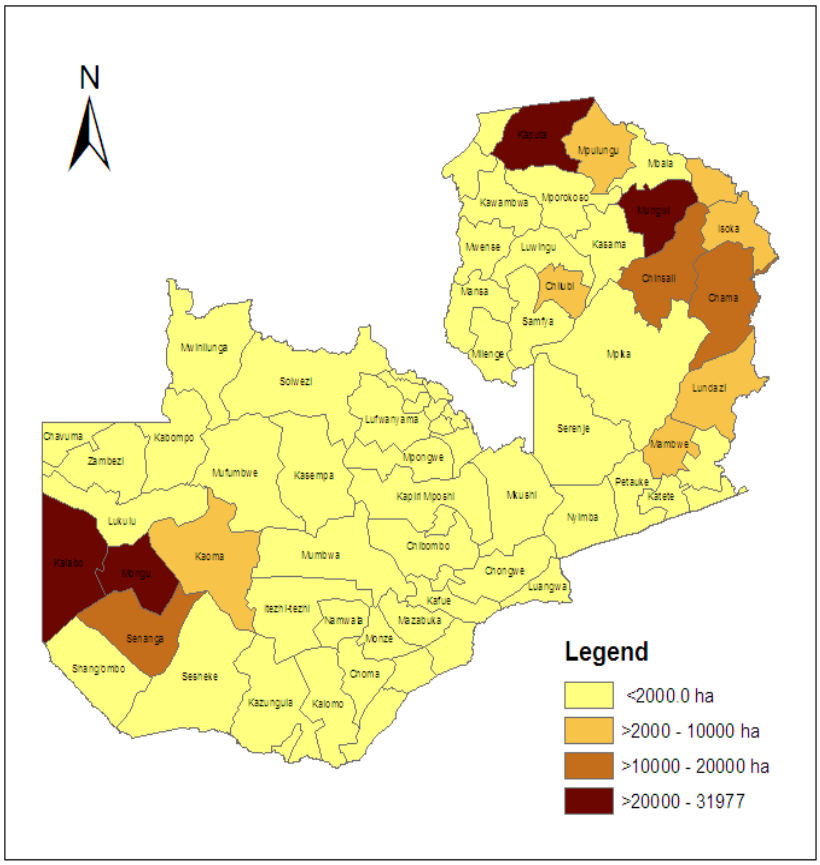
Source: CFS various years.

Table 29. Rice: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	149	384	109	291	463	0	253	89	262	152
Copperbelt	27	52	4	14	5	11	7	7	30	27
Eastern	2,510	3,013	644	3,980	3,827	3,867	3,699	3,175	3,021	4,249
Luapula	1,190	637	432	593	696	1,007	1,247	1,320	1,353	1,043
Lusaka	0	0	0	0	10	8	154	53	99	76
Northern	8,703	8,481	5,884	6,101	6,478	5,938	10,469	12,017	14,110	15,308
Northwestern	0	234	0	373	210	54	163	746	863	484
Southern	0	0	0	0	0	3	0	0	13	0
Western	7,342	6,438	4,053	3,025	7,260	1,911	7,751	12,264	11,282	14,503
National	19,921	19,238	11,127	14,377	18,949	12,799	23,743	29,671	31,032	35,841

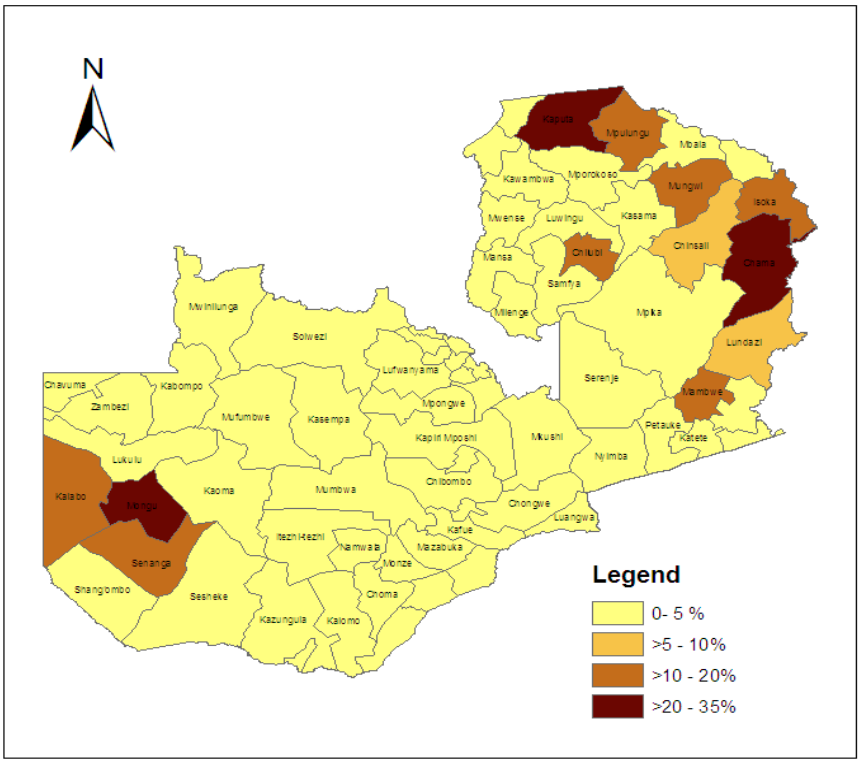
Source: CFS various years.

Map 28. Rice Production – Hectares 2009/10



Source: CFS 2009/10

Map 29. Rice Production, % Smallholders by District 2009/10



Source: CFS 2009/10.

7.3. Cotton Value Chain

7.3.1. Background

The percent of smallholders growing cotton has declined sharply since its peak in 2005/06 (tables 30 and 31). Much of the wide variations in cotton production are the result of poorly developed regulatory frameworks, which contribute to high levels of side selling and *pirate buying*.

Profitable cotton cultivation is highly dependent on access to sufficient land and labor, which are beyond the scope of the poorest and most vulnerable rural people in Zambia. Table 8 shows that, as a share of crop income, traditional cash crops like cotton play a negligible role in the incomes of land constrained smallholders. (See maps 30 and 31 for cotton cultivation.)

Table 30. Percent of Small and Medium Scale Farmers Growing Cotton by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	8.27	14.33	17.52	20.69	25.42	26.85	8.94	11.97	8.76	8.00
Copperbelt	.00	.00	.00	.05	.11	.03	.09	.06	.02	.03
Eastern	29.08	37.11	35.23	41.49	52.31	45.41	35.77	40.12	33.10	26.96
Luapula	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Lusaka	3.78	8.33	1.30	3.40	7.72	5.00	3.54	1.72	1.03	.83
Northern	.00	.00	.00	.00	.06	.00	.12	.12	.12	.01
Northwestern	.00	.00	.00	.27	.00	.13	.01	.00	.00	.00
Southern	5.32	12.29	5.45	15.45	19.49	17.08	4.58	6.93	6.41	2.26
Western	.15	.00	.13	.61	.71	1.01	.20	.18	.08	.07
National	7.56	10.81	9.73	12.47	15.70	14.25	8.55	9.93	8.49	6.36

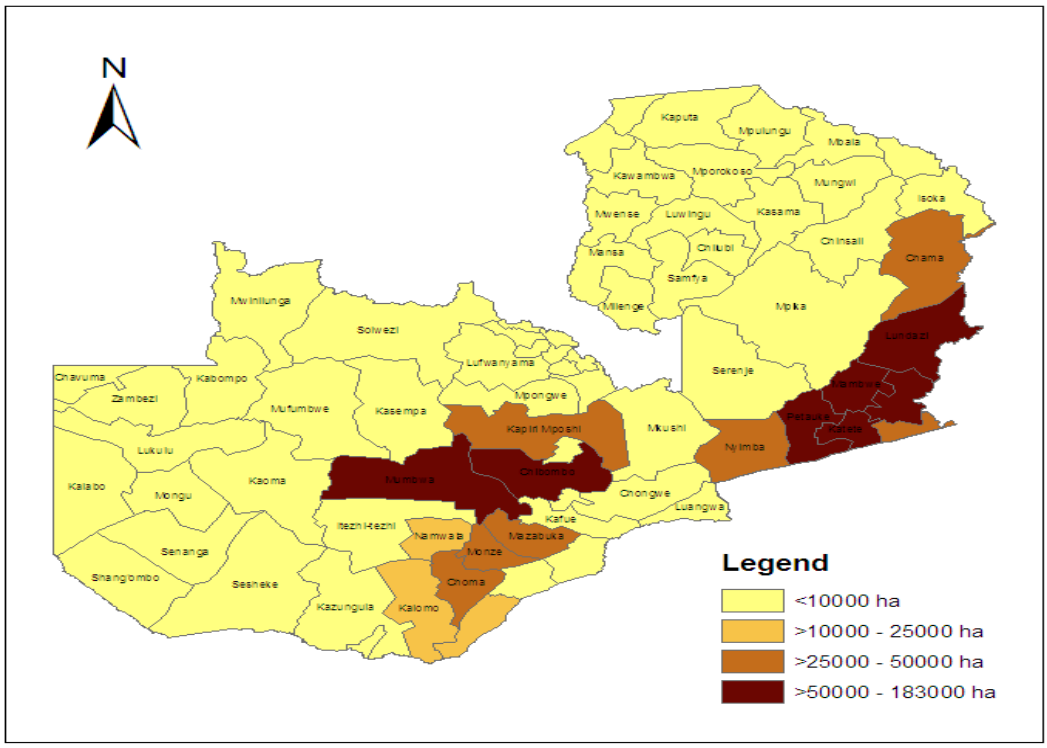
Source: CFS various years.

Table 31. Cotton: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	11,875	20,990	28,835	32,804	39,966	54,193	20,212	21,137	15,048	20,342
Copperbelt	0	0	0	14	32	44	77	25	11	8
Eastern	55,206	71,209	62,337	83,621	117,105	90,816	75,150	110,489	73,246	59,282
Luapula	0	0	0	0	0	0	0	0	0	0
Lusaka	933	2,305	345	1,393	2,435	2,173	1,305	924	430	174
Northern	0	0	0	0	64	0	287	90	159	12
Northwestern	0	0	0	84	0	37	17	0	0	0
Southern	6,921	20,431	7,689	23,241	33,020	29,508	9,123	15,305	13,803	4,864
Western	179	0	177	722	962	842	356	273	87	42
National	75,114	114,935	99,383	141,878	193,585	177,613	106,528	148,244	102,784	84,724

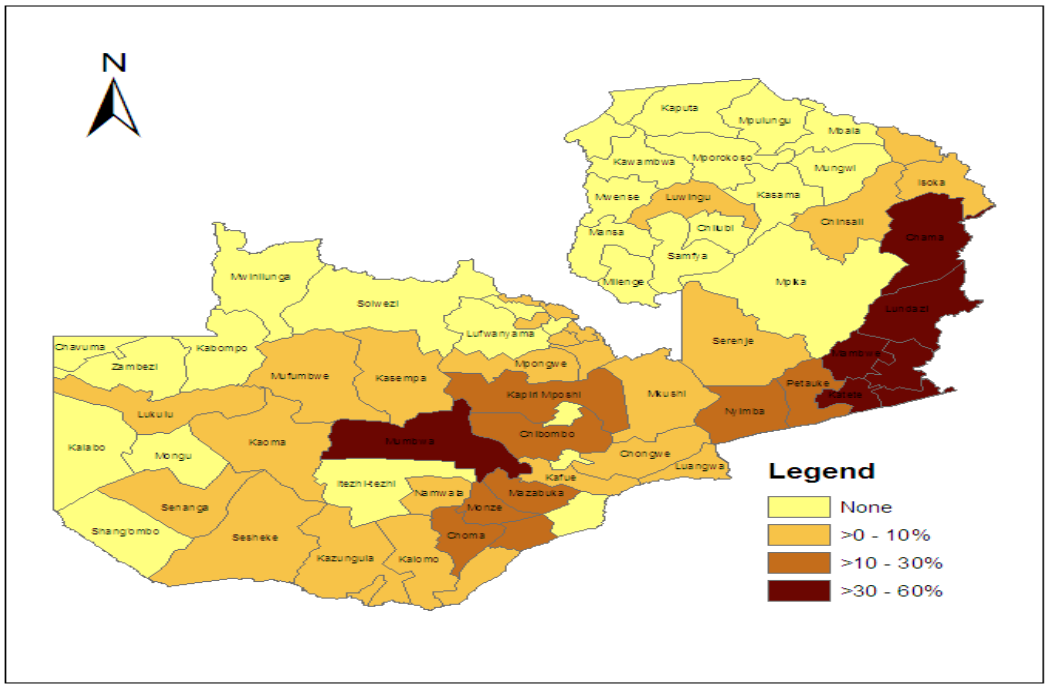
Source: CFS various years.

Map 30. Cotton Cultivation – Hectares 2009/10



Source: CFS 2009/10.

Map 31. Cotton Cultivation % Small-scale Farmer 2009/10



Source: CFS 2009/10.

VIII. EASTERN PROVINCE DATA

8.1. Population

a. In 2006, Eastern Province's population was 1,604,257, or 14% of the total population of Zambia (Table 32).

b. More so than any other province in the country Eastern Province is predominantly rural, with 92% (1,473,253) of the population living in rural households (Table 33).

c. In 2006, Eastern Province had 320,393 households, 92% (294,761) of which are rural.

8.2. Poverty and Nutrition Data

a. In Eastern Province, 64% of under-5 children exhibit signs of growth stunting, well above the national average of 54.2%. In terms of absolute numbers, Eastern province has the highest number of children exhibiting signs of growth stunting (115,885) (Table 34).

b. In Eastern Province, 65.4% of people are considered extremely poor, well above the national average of 50.6%. Due to its high population density, Eastern Province has the greatest number of extremely poor people (1,049,142) of all the provinces (Table 35).

Table 32. Population Distribution by Province Rural and Urban Areas Zambia

Province	Number of Persons	Percentage Share	Rural	Percentage Share	Urban	Percentage Share
Central	1,221,667	10	950,056	78	271,610	22
Copperbelt	1,782,799	15	370,736	21	1,412,064	79
Eastern	1,604,257	14	1,473,253	92	131,004	8
Luapula	929,310	8	814,599	88	114,711	12
Lusaka	1,640,853	14	254,224	15	1,386,629	85
Northern	1,482,946	13	1,242,473	84	240,474	16
Northwestern	709,095	6	602,116	85	106,979	15
Southern	1,453,112	12	1,139,136	78	313,976	22
Western	887,183	8	765,879	86	121,304	14
Total	**11,711,223**	**100.0**	**7,612,472**	**65**	**4,098,751**	**35**

Source: LCMS 2006.

Table 33. Distribution of Households by Province, Rural and Urban Areas, Zambia

Province	Number of Households	Percentage Share	Household distribution		Total
			Rural	Urban	
Central	225,915	10	76	24	100
Copperbelt	337,943	15	22	78	100
Eastern	320,393	14	92	8	100
Luapula	177,793	8	88	12	100
Lusaka	333,430	15	15	85	100
Northern	296,021	13	85	15	100
North-western	131,217	6	84	16	100
Southern	284,250	12	77	23	100
Western	176,250	8	88	12	100
Total	**2,283,211**	**100**	**65**	**35**	**100**

Source: LCMS 2006

Table 34. Incidence and Number of Children Under 5 Exhibiting Signs of Stunting, Underweight, and Wasting

	Stunted		Under weight		Wasted	
Province	% Under-5 children	# of children	% Under-5 children	# of children	% Under-5 children	# of children
Central	56.3%	67363	16.6%	19838	6.4%	7621
Copperbelt	53.2%	71651	15.2%	20456	5.3%	7199
Eastern	**64.0%**	**115885**	**18.4%**	**33296**	**3.5%**	**6371**
Luapula	56.1%	71578	29.1%	37136	6.6%	8437
Lusaka	47.6%	60861	17.9%	22835	4.8%	6129
Northern	64.5%	105895	23.1%	37913	5.3%	8673
North-western	49.1%	38691	23.0%	18170	13.2%	10396
Southern	46.2%	73471	17.9%	28403	6.8%	10889
Western	39.6%	36132	17.0%	15545	4.5%	4153
National	54.2%	641528	19.7%	233591	5.9%	69869

Source: LCMS 2006.

Table 35. Incidence and Number of People Living in Poverty

Province	**Poverty Status**					
	Extremely poor		Moderately Poor		Non Poor	
	% Population	# of People	% Population	# of People	% Population	# of People
Central	58.9%	719094	12.8%	156792	28.3%	345781
Copperbelt	27.1%	483008	14.8%	263523	58.1%	1035566
Eastern	**65.4%**	**1049142**	**13.6%**	**217868**	**21.0%**	**337247**
Luapula	60.4%	561750	12.4%	114910	27.2%	252650
Lusaka	16.5%	269925	12.5%	204745	71.0%	1164904
Northern	64.0%	948741	14.5%	214866	21.5%	319309
North-western	56.7%	399954	15.4%	108684	27.9%	196355
Southern	57.8%	837195	15.7%	227490	26.6%	384989
Western	73.3%	646779	10.3%	90936	16.4%	144259
Total	50.6%	5915588	13.7%	1599814	35.7%	4181060

Source: LCMS 2006.

8.3. Cropping and Production Data

a. In terms of the percent of farmers growing crops the four most important crops grown in Eastern Province (2009/10) are shown in Table 36.

b. Eastern Province is home to 71% of all sunflower growers in Zambia, 80% of all cotton growers, 55% of all tobacco growers, and 23% of all maize growers (Table 37 and Figure 53).

Table 36. Percent of Farmers in Eastern Province Growing Crops, 2009/10

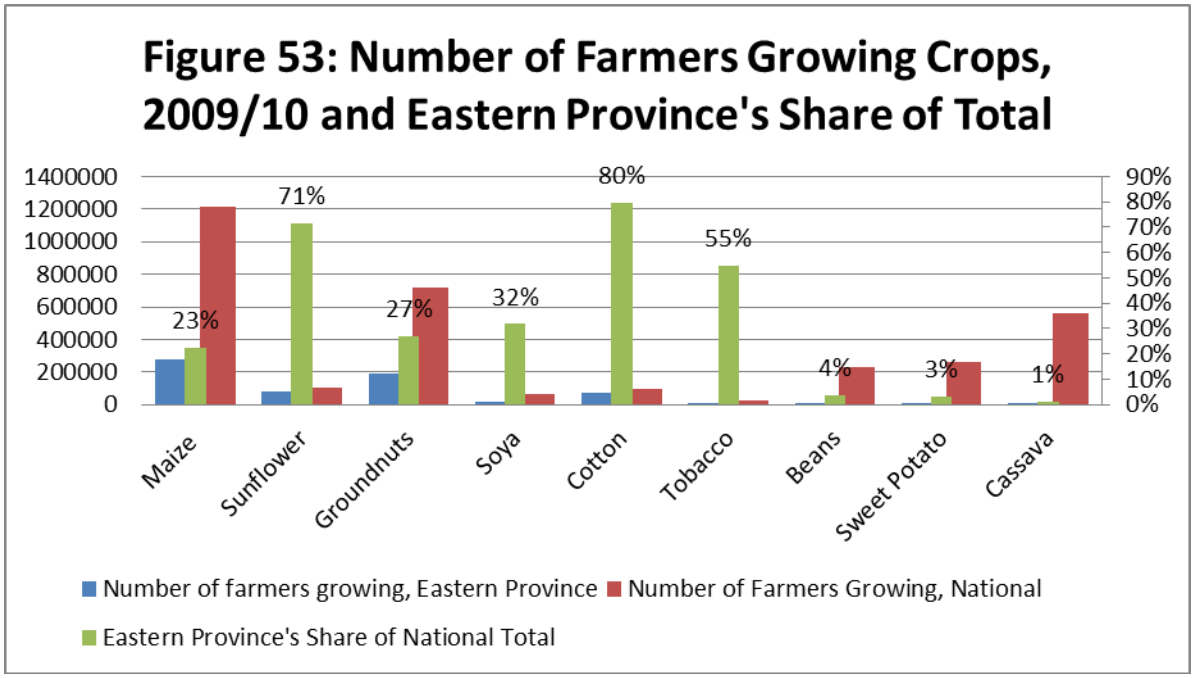
	% of Farmers Growing
Maize	98.49
Groundnuts	69.4
Sunflower	27.74
Cotton	26.96

Source: CFS 2009/10.

Table 37. Number of Farmers Growing Crops, 2009/10

	Eastern	National	Eastern Province's Share of National
Maize	274572	1212327	23%
Sunflower	77322	108326	71%
Groundnuts	193474	720688	27%
Soya	19891	62463	32%
Cotton	75173	94278	80%
Tobacco	12077	22044	55%
Beans	8925	227610	4%
Sweet Potato	8066	261055	3%
Cassava	6333	562249	1%

Source: CFS 2009/10.



Source: CFS 2009/10.

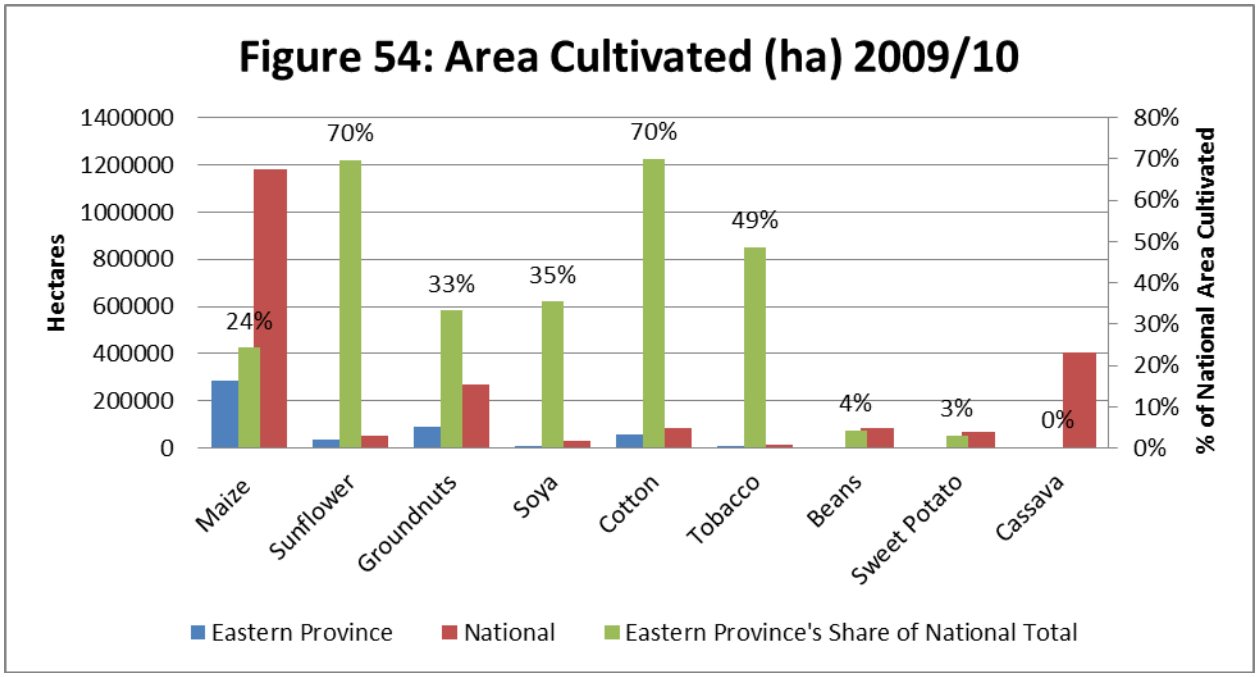
c. In terms of area cultivated with particular crops, Eastern Province accounts for 70% of all of Zambia's land that was cultivated with sunflowers in 2009/10, 70% of all cotton land, 49% of all tobacco, and 24% of all maize (Table 38 and Figure 54).

d. Eastern Province contributes a significant share of the total national production for many crops. For example 73% of the total sunflower production in Zambia came from Eastern, 30% of all groundnuts, 69% of all cotton, and 22% of all maize (Table 39 and Figure 55).

Table 38. Area Cultivated 2009/10

	Eastern	National	Eastern Province's Share of National Total
Maize	286811	1182217	24%
Sunflower	37433	53691	70%
Groundnuts	89036	267578	33%
Soya	10228	28871	35%
Cotton	59282	84724	70%
Tobacco	6932	14290	49%
Beans	3634	83735	4%
Sweet Potato	2091	69794	3%
Cassava	1499	403217	0%

Source: CFS 2009/10.

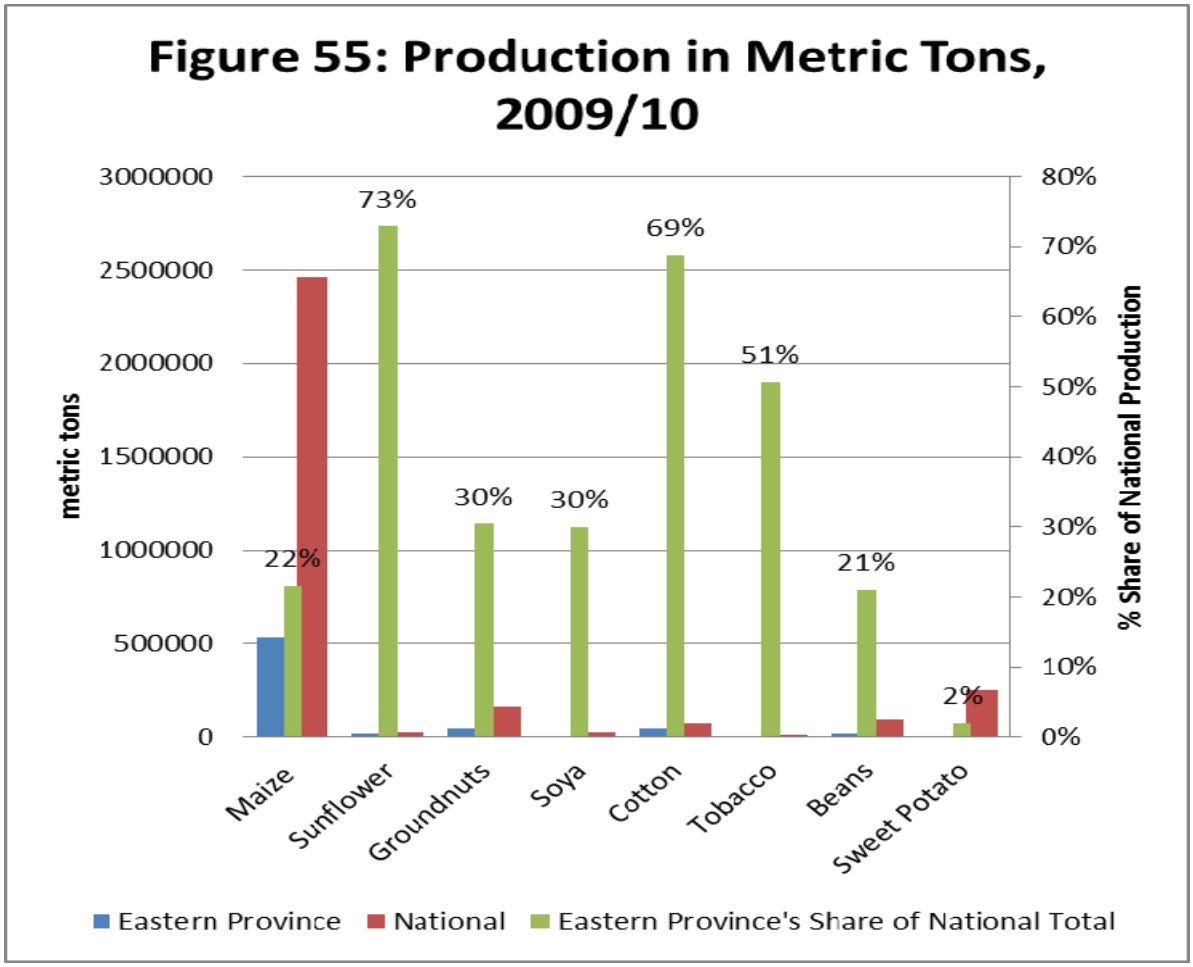


Source: CFS 2009/10.

Table 39. Production in Metric Tons, 2009/10

	Eastern	National	Eastern Province's Share of National Total
Maize	531810	2463523	22%
Sunflower	18315	25126	73%
Groundnuts	49854	163738	30%
Soya	7847	26165	30%
Cotton	49568	72068	69%
Tobacco	7469	14763	51%
Beans	20085	95333	21%
Sweet Potato	5077	250347	2%

Source: CFS 2009/10.



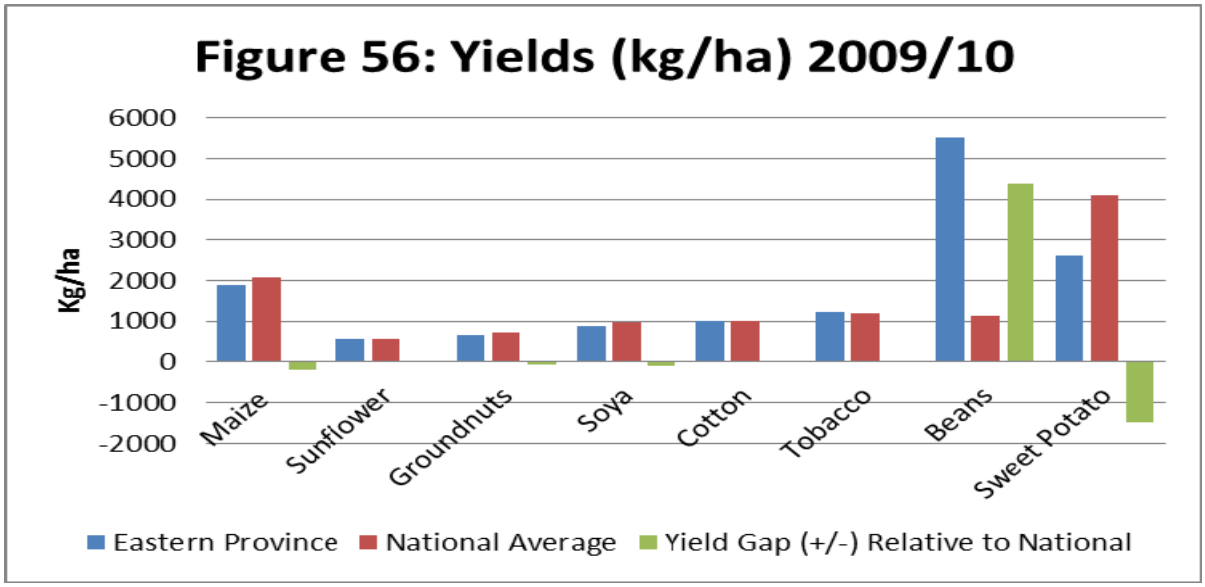
Source: CFS 2009/10

e. Crop Yields in Eastern Province tend to be at or below national averages. The one exception is beans, which has crop yields that far exceed national and even global averages. Discussions with crop scientists suggest that these high yields result from Eastern province farmers obtaining two harvests of beans per year (Table 40 and Figure 56).

Table 40. Yield (Kg/ha), 2009/10

	Eastern Province	National	Yield Gap (+/-) Relative to National (kg/ha)
Maize	1878	2082	-204
Sunflower	582	557	25
Groundnuts	670	731	-61
Soya	889	976	-87
Cotton	999	992	7
Tobacco	1238	1207	31
Beans	5527	1139	4388
Sweet Potato	2622	4105	-1483

Source: CFS 2009/10.



Source: 2009/10.

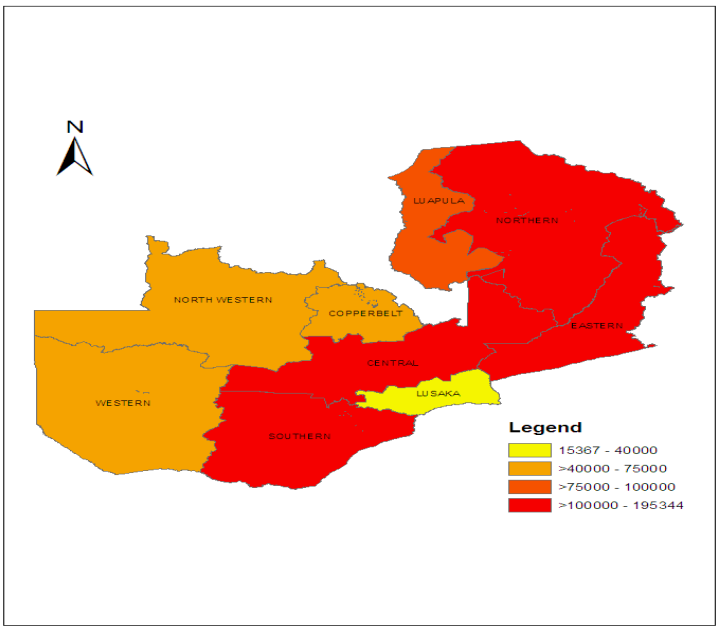
8.4. Farm Structure and Size

a. 22.56% of all farms in Eastern Province are less than 1 ha in size.

b. Eastern Province accounts for 15% of all small (<1 ha) farms in Zambia (Map 32).

c. Relative to other high production provinces, Eastern Province has very few (68) large-scale farms (>20 ha). (Table 41).

Map 32. Number of Households with One Hectare of Land or Less



Source: CFS 2009/10.

Table 41. Number of Large Scale Farmers by Province

Province	Central	534
	Copperbelt	142
	Eastern	68
	Luapula	67
	Lusaka	164
	Northern	89
	Northwestern	12
	Southern	411
	Western	42
	Total	1530

8.5. Input Use and Access

a. In 2009/10 42.54% of smallholders in Eastern province used fertilizer on their crops, above the national average of 38.79% but below other major production areas, such as Central and Copperbelt Provinces (Table 42).

b. However, the use of hybrid maize seeds is quite low in Eastern Province relative to national figures. For example in 2009/10 28.81% of farmers in Eastern used hybrid maize seeds compared to a national average of 38.21% (Table 42).

Table 42. Percent Smallholders Using Fertilizer

	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	35.59	48.01	39.17	42.12	39.20	47.00	56.53	50.41	66.18
Copperbelt	31.73	33.97	36.61	39.06	42.52	46.54	46.14	44.61	58.06
Eastern	**22.01**	**28.31**	**30.11**	**32.16**	**30.64**	**26.74**	**31.25**	**29.01**	**42.54**
Luapula	10.20	14.29	12.79	7.57	11.28	14.38	12.16	14.00	16.45
Lusaka	34.16	51.60	65.75	64.40	55.57	49.27	52.09	48.20	69.07
Northern	18.74	22.42	21.09	20.32	21.41	35.87	31.44	30.93	37.34
Northwestern	11.79	10.73	18.08	11.56	18.49	21.73	18.59	18.26	30.34
Southern	26.30	40.50	38.64	27.93	25.96	33.42	36.78	33.47	41.33
Western	2.98	9.48	4.88	4.49	5.58	5.05	3.09	3.96	7.62
National	19.99	26.78	26.27	24.54	24.94	29.29	30.24	28.86	38.79

Source: CFS various years.

Table 43. Percent of Farmers Using Hybrid Maize Seed

	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	44.09	43.37	54.36	60.35	50.76	64.78	56.38	70.32
Copperbelt	32.42	35.81	40.67	39.99	45.93	47.13	52.95	55.44
Eastern	15.36	12.58	14.85	17.68	17.84	18.57	19.19	28.81
Luapula	9.98	8.95	6.56	8.86	10.05	8.54	11.36	14.56
Lusaka	66.13	56.49	65.00	62.72	61.74	65.95	62.29	68.22
Northern	12.63	12.32	15.51	17.02	24.72	26.33	27.06	31.40
Northwestern	9.59	11.04	11.59	14.50	23.74	18.71	20.68	27.82
Southern	75.21	47.39	58.30	49.61	62.71	72.05	57.59	54.72
Western	25.12	24.76	17.43	18.58	20.88	26.70	19.56	21.87
National	27.69	23.63	26.78	27.83	31.33	34.87	32.57	38.21

Source: CFS various years.

8.6. Crop Sales Data

When including data from large-scale farms, Eastern Province is expected to contribute 12% of all maize sales in Zambia in 2009/10, 24% of all groundnut sales, 3% of sunflower sales, and 15% of all cotton sales (Table 44).

Table 44. Expected Sales (Including Large-scale Farming Sector)

Province	Maize		Groundnuts		Soyabean		Sunflower		Cotton	
	Sale (mt)	% of total sales	Sale (mt)	% of total sales	Sale (mt)	% of total sales	Sale (mt)	% of total sales	Sale (mt)	% of total sales
Central	440,277	33%	9,762	17%	33,778	40%	584	51%	146	35%
Copperbelt	131,196	10%	3,649	6%	11,513	13%	-	0%	-	0%
Eastern	165,992	12%	13,778	24%	40	0%	34	3%	61	15%
Luapula	34,858	3%	5,023	9%	1	0%	-	0%	-	0%
Lusaka	62,733	5%	371	1%	20,423	24%	222	19%	166	40%
Northern	172,342	13%	15,977	27%	8	0%	1	0%	-	0%
Northwestern	64,430	5%	2,663	5%	321	0%	-	0%	-	0%
Southern	263,202	19%	6,399	11%	19,301	23%	306	27%	40	10%
Western	16,982	1%	963	2%	-	0%	-	0%	-	0%
Total	1,352,012	100%	58,585	100%	85,387	100%	1,147	100%	413	100%

Source: CFS 2009/10.

IX. COUNTRY READINESS

This section outlines the medium and long-term policy goals and frameworks guiding agricultural investments in Zambia

9.1. Zambia's Long-Term Development Agenda Is Outlined in the Vision 2030 Document

a. Vision 2030 is a long-term economic development strategy, which is operationalized through medium term five year National Development Plans.

b. The Vision highlights three scenarios outlining development options, namely the baseline, the preferred, and the optimistic. The socio-economic development objectives enshrined in the Preferred Scenario are: to attain and sustain annual real growth of 6% (2006-2010), 8% (2011-2015), 9% (2016-2020), and 10% between 2021 and 2030; to attain and maintain a moderate inflation rate of 5%; to reduce national poverty head count to less than 20% of the population; to reduce income inequalities measured by a Gini coefficient of less than 40; to provide secure access to safe potable water sources and improved sanitation facilities to 100% of the population in both urban and rural areas; to attain education for all; and, to provide equitable access to quality health care to all by 2030.

c. Given that the majority of Zambians depend on the agricultural sector for their livelihoods, GRZ, through the Vision 2030, has identified the agricultural sector as key in leading the country's overall economic development strategy.

9.2. Current National Development Plan: Fifth National Development Plan

a. Agriculture Sector Goals:
   i. Attain 90% HH food security by 2015;
   ii. Increase agriculture's contribution to FOREX earnings from 3-5% to 10-20%;
   iii. Increase agricultural export output at an annual rate of 20%;
   iv. Grow agriculture from 1% to 7-10% per annum from 2006 onwards;
   v. Increase agriculture's contribution to GDP from 18-20% to 25%;
   vi. Facilitate the role of private sector; and
   vii. Increase incomes for those in agriculture.

9.2.1. The Sixth National Development Plan

The Sixth National Development Plan (SNDP) is currently being formulated and will take effect in December 2010. The SNDP's agricultural section will enshrine the CAADP principles outlined in the National CAADP compact (which has been formulated but not yet signed).

In Zambia's CAADP Compact, three challenges to agriculture as an engine of economic and social development are identified:

- Low investment in the agricultural sector by government and the private sector, despite the sector's support to the livelihoods of over 60% of the population;
- Low production and productivity, especially among smallholder farmers due to low input use and low levels of technology; and

- Failure to fully recognize that chronic hunger and malnutrition are a critical threat to Zambia's long-term development and its 2030 vision.

To address these challenges, the GRZ has outlined specific investment programs, which fall under the four CAADP pillars.

Pillar 1: Extending the area under sustainable land management and reliable water control systems through:

a) Agricultural Productivity Improvement Programme.
    - Crop and soil productivity enhancement;
    - Irrigation;
    - Livestock production; and
    - Agricultural finance innovations – i.e. leasing, futures markets, insurance, etc.

Pillar 2: Improving rural infrastructure and trade-related capacities for market access:

a) Agricultural Marketing Development Program.
    - Agricultural market information;
    - Agricultural marketing and trade - Promote structured markets, price discovery and transparency through support to ZAMACE;
    - Private sector capacity building;
    - Rural market infrastructure development - feeder roads, private sector, public access storage;
    - Private sector agro-dealer promotion; and
    - Restructuring of Fertilizer Support Program - E-voucher pilot and build out, more effective targeting.
b) Agricultural Investment Promotion Program:
    - Electronic voucher for farm input subsidy programs;
    - Investment identification and promotion (including value chain analysis);
    - Investment fund (public/private capital investment);
    - Farm block development;
    - Irrigation development;
    - Out-grower promotion; and
    - Agro-processing promotion.

Pillar 3: Increasing food supply, reducing hunger, and improving responses to food emergency crises:

a) Food and Nutrition Security Program.
    - Social protection and safety nets - investigate and implement alternative delivery mechanisms that crowd in private sector;
    - Food security pack;
    - Early warning;
    - Agricultural information and statistics;
    - Nutrition research and education;
    - Livestock; and
    - Fisheries.

Pillar 4: Improving agricultural research, technology dissemination, and adoption:

a) Research and Extension Enhancement Program.
    - Consultation-based research and extension agenda;
    - Research and extension infrastructure improvements;
    - Human resources development;

- Support to private sector research; and
- Information communication technology.

9.3. Several Supporting Policies Have Been Promulgated in Order to Support the Functioning of Zambia's Agricultural Markets

9.3.1. Agricultural Credit Act

- Appoint agency to regulate warehouse receipt system (WRS).
- Improve inventory credit by issuing transferable receipts.

9.3.2. Agricultural Marketing Act, Which Seeks to:

- Provide for a comprehensive & trade enhancing agricultural marketing legislation;
- Realign Government regulatory and market support functions;
- Identify new strategic roles of the FRA;
- Harmonize and consolidate existing agricultural marketing related Acts;
- Provide for a comprehensive & trade enhancing agricultural marketing legislation;
- Realign Government regulatory and market support functions;
- Identify new strategic roles of the FRA; and
- Harmonize and consolidate existing agricultural marketing related Acts.

ADDITIONAL TABLES FOR REFERENCE

Percent of Small and Medium Scale Farmers Growing Maize by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	94.70	91.44	93.79	92.56	96.16	95.70	94.81	96.05	93.70	95.11
Copperbelt	91.38	89.07	96.93	94.74	96.41	98.64	92.41	92.47	93.15	94.59
Eastern	99.67	99.08	98.81	97.93	98.40	96.95	97.96	97.76	98.20	98.49
Luapula	41.30	29.78	40.72	43.02	34.23	36.65	42.09	43.62	53.80	46.75
Lusaka	99.95	100.00	100.00	96.20	99.11	99.47	94.30	96.03	94.99	98.72
Northern	52.59	49.52	55.91	58.01	57.47	57.70	60.45	63.27	66.86	64.46
Northwestern	77.87	77.07	72.47	83.62	83.96	81.22	78.31	77.20	81.68	81.60
Southern	96.30	97.97	97.14	90.01	93.55	91.83	89.09	94.77	89.33	87.58
Western	89.49	85.65	86.35	87.80	86.66	79.19	89.66	91.77	87.88	84.07
National	80.00	77.44	80.29	80.54	80.49	79.42	80.66	82.34	83.32	81.72

Percent of Small and Medium Scale Farmers Growing Sorghum by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	13.63	15.64	11.83	9.84	10.66	6.52	5.84	4.28	5.54	3.36
Copperbelt	24.82	30.52	9.60	9.40	9.98	4.08	5.32	2.78	5.26	2.57
Eastern	2.89	1.75	2.90	3.70	2.74	3.27	4.13	2.91	2.76	2.84
Luapula	2.85	2.08	2.76	3.38	2.43	2.00	1.71	1.20	2.48	2.05
Lusaka	1.56	1.09	2.66	3.47	6.28	2.84	2.40	2.77	1.83	.81
Northern	18.08	9.78	7.01	6.78	2.52	2.75	.63	1.27	.94	2.92
Northwestern	19.48	19.06	14.33	13.45	14.33	11.18	7.34	7.81	5.72	6.25
Southern	9.10	7.55	16.10	14.99	12.97	12.98	7.75	7.48	10.71	9.29
Western	18.73	18.81	13.12	21.84	26.20	20.82	11.65	7.10	9.78	8.51
National	11.83	10.29	8.65	9.39	8.85	7.20	4.98	4.01	4.87	4.41

Percent of Small and Medium Scale Farmers Growing Rice by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.70	.56	.26	1.23	1.43	.00	.73	.10	.87	.42
Copperbelt	.44	.33	.04	.02	.03	.08	.03	.06	.11	.07
Eastern	6.41	5.41	.76	5.85	5.49	5.48	4.62	3.67	3.35	4.77
Luapula	2.29	1.94	2.21	1.92	2.01	2.21	2.98	2.97	3.30	2.14
Lusaka	.00	.00	.00	.00	.11	.10	1.86	.47	.73	.65
Northern	7.85	7.86	5.64	7.09	6.05	4.29	6.55	6.53	10.82	10.03
Northwestern	.00	1.15	.00	.66	.28	.27	.31	1.19	2.04	.53
Southern	.00	.00	.00	.00	.00	.02	.00	.00	.03	.00
Western	12.80	11.62	5.67	4.33	9.77	3.48	9.59	9.97	14.17	15.14
National	4.54	4.21	2.06	3.31	3.64	2.49	3.59	3.41	4.61	4.49

Percent of Small and Medium Scale Farmers Growing Millet by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	16.94	16.61	10.48	6.55	5.42	7.67	5.02	6.16	8.07	5.00
Copperbelt	3.43	3.94	1.10	.34	.84	1.64	.79	.61	1.72	1.48
Eastern	7.09	5.23	2.35	2.41	2.55	2.93	4.29	1.82	1.85	1.94
Luapula	16.66	13.05	7.59	6.13	6.63	4.20	5.86	3.64	3.04	3.94
Lusaka	.00	1.25	.50	1.19	.00	.41	.03	.11	.85	.16
Northern	55.71	54.71	48.24	42.36	38.94	38.04	34.64	32.42	40.94	35.04
Northwestern	4.69	6.26	4.15	5.10	2.58	2.69	2.12	1.72	2.40	2.01
Southern	3.38	5.42	4.44	7.37	8.99	10.30	4.99	3.71	3.64	3.60
Western	30.09	26.50	19.09	22.98	19.75	23.15	19.30	13.41	12.31	16.17
National	19.75	18.65	14.07	13.43	12.41	12.88	11.23	9.42	10.74	9.92

Percent of Small and Medium Scale Farmers Growing Sunflower by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	5.21	6.99	3.27	6.85	4.28	5.06	3.07	2.03	3.39	2.65
Copperbelt	.19	.73	.02	.60	.78	.20	.09	.14	.47	.21
Eastern	16.68	13.30	12.07	19.07	19.90	27.06	17.92	22.16	35.50	27.74
Luapula	1.40	.63	.24	.52	.24	.22	.08	.07	.21	.11
Lusaka	3.18	.84	.00	1.19	.31	1.39	.67	.42	.68	1.21
Northern	7.89	5.18	3.67	4.90	5.79	4.94	3.76	3.03	3.61	6.27
Northwestern	1.52	.93	.06	.29	1.06	.55	.24	.13	.32	.21
Southern	7.16	7.81	4.59	5.69	4.67	4.37	2.76	1.90	5.24	4.34
Western	.00	.16	.00	.00	.04	.00	.01	.08	.04	.08
National	6.62	5.58	4.02	6.22	6.14	7.37	4.83	5.25	8.85	7.30

Percent of Small and Medium Scale Farmers Growing Groundnuts by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	38.86	33.13	32.53	14.41	24.09	20.41	34.76	32.71	44.75	44.56
Copperbelt	42.09	35.56	32.72	19.87	35.12	28.63	27.05	28.19	42.64	48.53
Eastern	71.92	73.72	62.17	53.83	69.81	46.62	52.29	56.05	63.95	69.40
Luapula	67.95	55.33	53.95	40.78	48.68	46.78	47.45	45.45	50.77	53.51
Lusaka	31.42	17.90	25.54	20.25	31.72	23.66	23.63	26.49	24.52	27.54
Northern	63.44	63.41	66.42	59.58	61.74	63.09	51.88	46.32	56.42	59.61
NorthWestern	17.32	18.70	17.94	17.58	21.02	19.66	17.53	18.73	18.40	18.85
Southern	46.10	41.23	17.72	24.93	31.74	42.78	38.65	32.43	33.37	45.91
Western	18.81	18.81	12.46	12.76	10.18	7.51	11.13	13.36	12.31	19.54
National	50.32	47.41	41.46	35.06	42.54	37.90	38.25	37.19	43.75	48.58

Percent of Small and Medium Scale Farmers Growing Soyabean by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	2.48	2.91	4.43	11.66	14.72	7.60	7.62	2.31	4.81	6.30
Copperbelt	1.89	1.99	2.06	2.70	3.30	1.68	2.12	1.04	2.36	4.34
Eastern	6.00	3.84	4.15	6.35	10.25	9.10	7.56	4.69	7.50	7.13
Luapula	1.00	.64	.42	1.12	.68	1.06	1.62	.97	1.65	1.02
Lusaka	.00	.68	1.25	2.25	9.49	1.94	.87	.49	1.09	.60
Northern	4.24	2.72	5.63	5.86	9.72	9.90	5.76	4.18	4.98	8.20
NorthWestern	1.35	.38	.49	.57	1.20	1.03	1.15	1.36	2.03	2.24
Southern	.19	.06	.99	1.08	.39	.21	.23	.54	.60	.39
Western	.23	.00	.00	.04	.00	.18	.06	.07	.04	.18
National	2.65	1.83	2.68	4.14	6.11	4.83	3.83	2.28	3.50	4.21

Percent of Small and Medium Scale Farmers Growing Cotton by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	8.27	14.33	17.52	20.69	25.42	26.85	8.94	11.97	8.76	8.00
Copperbelt	.00	.00	.00	.05	.11	.03	.09	.06	.02	.03
Eastern	29.08	37.11	35.23	41.49	52.31	45.41	35.77	40.12	33.10	26.96
Luapula	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Lusaka	3.78	8.33	1.30	3.40	7.72	5.00	3.54	1.72	1.03	.83
Northern	.00	.00	.00	.00	.06	.00	.12	.12	.12	.01
NorthWestern	.00	.00	.00	.27	.00	.13	.01	.00	.00	.00
Southern	5.32	12.29	5.45	15.45	19.49	17.08	4.58	6.93	6.41	2.26
Western	.15	.00	.13	.61	.71	1.01	.20	.18	.08	.07
National	7.56	10.81	9.73	12.47	15.70	14.25	8.55	9.93	8.49	6.36

Percent of Small and Medium Scale Farmers Growing Irish Potatoes by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	1.52	.53	.00	.00	.02	.04	.03	.22	.30	.28
Copperbelt	1.20	.50	.00	.00	.69	.80	.29	.31	.19	.64
Eastern	.90	.10	.00	.00	.67	.43	.01	.40	.14	.25
Luapula	.38	.00	.00	.00	.00	.00	.00	.04	.01	.02
Lusaka	.00	.00	.00	.00	.74	.00	.06	.79	.17	.03
Northern	1.74	.23	.00	.00	.10	.10	.14	.07	.15	.14
NorthWestern	3.98	2.52	.00	.00	.06	.95	1.35	.70	.65	.92
Southern	.47	.00	.00	.00	.00	.02	.01	.17	.25	.09
Western	.00	.00	.00	.00	.00	.04	.00	.00	.00	.03
National	1.16	.35	.00	.00	.22	.24	.16	.24	.19	.24

Percent of Small and Medium Scale Farmers Growing Tobacco by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.60	.82	.14	.73	2.43	.87	.60	1.35	2.18	2.22
Copperbelt	.00	.00	.00	.00	.00	.00	.00	.03	.02	.32
Eastern	4.42	4.13	3.90	7.97	9.63	4.12	.94	2.26	4.66	4.33
Luapula	.00	.00	.00	.00	.00	.00	.00	.00	.02	.06
Lusaka	.00	.00	.00	.00	.10	.00	.00	.00	.58	.00
Northern	.00	.00	.00	.30	.13	.08	.00	.48	.51	.91
NorthWestern	.00	.00	.00	.00	.47	.00	.00	.00	.00	.00
Southern	.00	.19	.73	.32	.75	.62	.13	.00	.60	.85
Western	.15	.18	.00	.48	1.04	1.38	.61	1.33	1.81	1.08
National	.99	.97	.89	1.78	2.41	1.14	.33	.82	1.54	1.49

Percent of Small and Medium Scale Farmers Growing Beans by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	15.08	14.09	14.59	7.45	9.60	13.78	10.78	8.54	14.50	12.37
Copperbelt	11.10	11.92	12.45	8.42	12.49	11.89	7.30	7.73	17.76	14.28
Eastern	10.60	6.03	3.26	3.15	3.78	3.66	1.79	2.23	4.97	3.20
Luapula	21.96	11.06	6.67	13.09	13.03	8.68	11.21	11.21	15.12	13.51
Lusaka	3.19	3.39	6.20	6.16	7.49	6.38	5.17	5.65	3.79	7.97
Northern	56.22	47.09	39.28	35.87	36.90	38.77	40.61	42.66	46.61	47.96
NorthWestern	19.93	24.05	14.22	28.31	18.47	28.73	9.52	17.70	21.98	19.92
Southern	2.06	9.46	8.90	6.86	2.55	2.03	2.30	1.01	1.70	2.38
Western	4.22	5.02	.70	6.07	2.35	.04	.91	.94	1.12	2.26
National	19.71	17.02	13.16	13.89	13.00	13.76	11.92	12.69	15.57	15.34

Percent of Small and Medium Scale Farmers Growing Cowpeas by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	2.55	.00	3.00	.54	1.25	2.93	1.47	1.77	2.47	1.79
Copperbelt	2.17	.00	2.73	.04	.56	.35	.08	.09	1.50	.50
Eastern	9.41	.00	.03	.65	.03	.44	.58	.61	.48	.65
Luapula	1.32	.00	.14	.35	.00	.10	.08	.04	.54	.43
Lusaka	8.44	.00	.09	2.45	2.39	5.19	2.14	.80	3.14	.19
Northern	3.29	.00	.65	5.81	.48	.26	1.17	.51	1.13	.57
NorthWestern	.00	.00	.48	.89	1.76	.30	.05	.69	.33	.09
Southern	6.82	.00	8.82	12.12	10.28	13.10	3.42	4.33	12.97	6.16
Western	3.34	.00	1.63	2.34	1.60	1.60	1.52	.89	1.57	2.47
National	4.46	.00	1.91	3.14	1.90	2.44	1.15	1.13	2.77	1.59

Percent of Small and Medium Scale Farmers Growing Velvet Beans by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.00	.00	.00	.00	.19	.00	.00	.00	.02	.02
Copperbelt	.00	.00	.00	.00	.14	.00	.00	.00	.00	.00
Eastern	.00	.00	.00	.00	.00	.00	.01	.00	.01	.00
Luapula	.00	.00	.00	.00	.00	.00	.00	.09	.01	.00
Lusaka	.00	.00	.00	.00	.04	.15	.00	.00	.00	1.11
Northern	.00	.00	.00	.00	.00	.50	.00	.00	.00	.06
NorthWestern	.00	.00	.00	.00	.00	.00	.04	.00	.00	.00
Southern	.00	.00	.00	.00	.02	.00	.00	.00	.34	.20
Western	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00
National	.00	.00	.00	.00	.03	.10	.01	.01	.05	.07

Percent of Small and Medium Scale Farmers Growing Coffee by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.00	.00	.00	.00	.33	.00	.03	.00	.00	.00
Copperbelt	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02
Eastern	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Luapula	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Lusaka	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Northern	.00	.00	.00	.00	.00	.14	.00	.00	.00	.00
NorthWestern	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Southern	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Western	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
National	.00	.00	.00	.00	.04	.02	.00	.00	.00	.00

Percent of Small and Medium Scale Farmers Growing Sweet Potatoes by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	56.51	32.40	32.91	16.33	18.84	30.65	25.85	21.38	28.35	28.52
Copperbelt	62.53	52.10	53.96	25.43	36.54	33.41	23.41	23.48	39.49	39.56
Eastern	43.29	13.27	6.33	2.04	2.20	4.34	4.16	4.29	4.51	2.89
Luapula	56.58	16.43	18.33	9.78	11.82	4.85	13.17	18.67	22.84	18.77
Lusaka	43.48	13.43	11.65	10.35	5.20	12.46	7.48	5.42	22.38	13.02
Northern	62.04	34.27	20.64	22.55	17.25	14.00	13.78	16.00	18.10	22.07
NorthWestern	49.07	33.33	21.42	21.97	18.82	6.33	11.71	15.82	18.38	12.10
Southern	37.64	13.75	6.88	6.88	4.13	16.49	3.06	5.79	21.94	22.46
Western	18.25	7.07	6.48	6.76	1.50	3.48	2.02	2.69	5.20	6.47
National	47.80	22.70	17.33	12.60	11.55	12.67	10.95	12.15	17.78	17.60

Percent of Small and Medium Scale Farmers Growing Cassava by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	25.87	23.94	22.61	14.14	12.89	14.27	15.07	14.76	14.73	12.93
Copperbelt	30.56	29.72	25.29	18.73	17.32	19.15	12.54	12.25	15.64	11.14
Eastern	14.66	9.48	9.58	4.03	4.67	4.39	3.91	3.98	3.40	2.27
Luapula	97.75	98.60	96.85	95.22	97.62	97.74	95.27	95.16	93.63	92.19
Lusaka	.00	1.09	11.44	8.74	5.75	5.63	6.83	5.63	4.92	4.23
Northern	91.86	92.73	89.85	87.83	88.42	89.80	77.66	75.58	78.27	80.13
NorthWestern	76.01	77.59	76.42	66.33	71.78	66.10	65.94	67.31	72.32	67.95
Southern	1.62	1.93	8.07	1.17	.29	1.01	.33	.78	.86	1.62
Western	64.21	63.30	63.35	49.15	43.28	45.93	44.13	37.67	49.02	51.43
National	49.14	47.79	47.29	41.16	41.03	41.32	38.21	37.22	38.11	37.90

Percent of Small and Medium Scale Farmers Growing Cassava by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.00	.00	1.09	1.48	.99	.33	.85	.49	.12	.26
Copperbelt	.00	.00	.17	.05	.18	.31	.06	.00	.09	.06
Eastern	.00	.00	.68	.03	.00	.13	.00	.00	.00	.00
Luapula	.00	.00	.00	.15	.14	.07	.10	.06	.06	.04
Lusaka	.00	.00	.00	.68	.24	.00	.00	.00	.00	.00
Northern	.00	.00	.06	.18	.08	.03	.00	.04	.00	.15
NorthWestern	.00	.00	.00	.15	.16	.12	.02	.03	.03	.03
Southern	.00	.00	.00	.04	.04	.03	.12	.03	.03	.00
Western	.00	.00	.13	.17	.31	.46	.04	.00	.00	.00
National	.00	.00	.29	.28	.21	.16	.14	.08	.03	.07

Number of Small and Medium Scale Farmers Growing Maize by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	110,153	112,677	125,880	131,845	142,771	150,757	159,004	170,347	158,001	167,999
Copperbelt	55,932	55,919	65,571	73,617	76,642	79,054	81,453	82,694	80,662	95,607
Eastern	224,368	231,946	238,467	243,996	251,154	255,482	268,042	276,015	283,638	274,572
Luapula	52,097	38,385	55,358	60,792	49,659	54,684	66,016	70,875	89,811	80,063
Lusaka	30,627	30,861	33,951	35,012	37,218	38,042	38,477	40,941	39,649	41,316
Northern	106,807	103,861	118,546	134,084	136,947	141,408	157,108	171,049	168,132	169,500
NorthWestern	69,895	72,671	72,079	87,286	90,543	91,534	93,963	97,077	89,587	89,603
Southern	120,396	133,345	140,834	138,256	148,669	151,498	156,349	173,943	178,044	173,294
Western	109,205	107,029	115,508	122,285	124,552	117,520	140,365	149,731	128,763	120,374
National	879,480	886,695	966,194	1,027,172	1,058,155	1,079,979	1,160,778	1,232,673	1,216,287	1,212,327

Number of Small and Medium Scale Farmers Growing Sorghum by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	15,851	19,270	15,880	14,021	15,823	10,267	9,788	7,586	9,336	5,927
Copperbelt	15,189	19,158	6,493	7,303	7,937	3,270	4,691	2,489	4,559	2,598
Eastern	6,508	4,108	6,987	9,211	6,987	8,627	11,308	8,221	7,976	7,909
Luapula	3,591	2,676	3,752	4,782	3,523	2,988	2,685	1,952	4,138	3,508
Lusaka	477	338	903	1,264	2,360	1,087	979	1,181	763	340
Northern	36,717	20,508	14,871	15,677	6,006	6,751	1,625	3,431	2,373	7,688
NorthWestern	17,484	17,977	14,256	14,041	15,456	12,593	8,813	9,827	6,275	6,864
Southern	11,375	10,272	23,338	23,029	20,613	21,420	13,601	13,723	21,337	18,382
Western	22,851	23,507	17,554	30,423	37,654	30,892	18,234	11,585	14,327	12,182
National	130,043	117,814	104,034	119,750	116,359	97,896	71,724	59,994	71,083	65,399

Number of Small and Medium Scale Farmers Growing Rice by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	815	696	355	1,758	2,119	0	1,230	183	1,475	743
Copperbelt	270	207	29	19	28	65	28	53	92	75
Eastern	14,426	12,654	1,842	14,569	14,023	14,435	12,629	10,361	9,669	13,293
Luapula	2,884	2,503	2,999	2,708	2,917	3,300	4,675	4,822	5,516	3,661
Lusaka	0	0	0	0	39	38	760	202	305	274
Northern	15,944	16,484	11,965	16,389	14,425	10,509	17,019	17,666	27,212	26,368
NorthWestern	0	1,088	0	691	301	299	373	1,496	2,234	579
Southern	0	0	0	0	0	40	0	0	50	0
Western	15,623	14,517	7,586	6,037	14,044	5,166	15,018	16,263	20,759	21,678
National	49,963	48,149	24,777	42,172	47,896	33,852	51,733	51,046	67,314	66,672

Number of Small and Medium Scale Farmers Growing Millet by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	19,706	20,468	14,065	9,330	8,043	12,087	8,417	10,931	13,613	8,838
Copperbelt	2,102	2,473	741	264	669	1,310	695	550	1,492	1,498
Eastern	15,952	12,241	5,681	6,016	6,498	7,720	11,733	5,127	5,333	5,418
Luapula	21,014	16,822	10,313	8,666	9,618	6,270	9,193	5,910	5,081	6,750
Lusaka	0	387	168	434	0	158	13	48	354	67
Northern	113,141	114,751	102,280	97,915	92,799	93,231	90,034	87,664	102,960	92,136
NorthWestern	4,212	5,899	4,123	5,326	2,780	3,027	2,543	2,169	2,637	2,211
Southern	4,222	7,371	6,440	11,325	14,294	16,995	8,756	6,811	7,249	7,129
Western	36,715	33,120	25,540	32,001	28,384	34,353	30,214	21,872	18,045	23,148
National	217,063	213,533	169,351	171,278	163,086	175,151	161,598	141,082	156,764	147,195

Number of Small and Medium Scale Farmers Growing Sunflower by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	6,055	8,614	4,393	9,756	6,350	7,978	5,146	3,596	5,717	4,682
Copperbelt	116	458	16	470	623	164	78	125	404	214
Eastern	37,558	31,125	29,122	47,514	50,800	71,310	49,038	62,573	102,532	77,322
Luapula	1,771	806	331	738	354	333	128	115	350	187
Lusaka	974	261	0	434	118	533	272	177	283	504
Northern	16,021	10,859	7,777	11,327	13,797	12,109	9,766	8,189	9,089	16,491
NorthWestern	1,364	875	61	302	1,144	620	294	158	355	233
Southern	8,952	10,630	6,656	8,740	7,415	7,215	4,841	3,479	10,435	8,582
Western	0	204	0	0	62	0	8	124	53	111
National	72,810	63,832	48,357	79,281	80,664	100,263	69,571	78,535	129,218	108,326

Number of Small and Medium Scale Farmers Growing Groundnuts by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	45,198	40,831	43,660	20,530	35,758	32,144	58,304	58,013	75,450	78,715
Copperbelt	25,761	22,328	22,131	15,443	27,919	22,943	23,842	25,211	36,921	49,049
Eastern	161,895	172,581	150,039	134,127	178,178	122,860	143,067	158,255	184,714	193,474
Luapula	85,712	71,318	73,355	57,631	70,616	69,798	74,428	73,844	84,751	91,629
Lusaka	9,629	5,524	8,670	7,368	11,910	9,048	9,640	11,293	10,235	11,526
Northern	128,839	132,986	140,818	137,714	147,121	154,618	134,852	125,232	141,886	156,756
NorthWestern	15,544	17,636	17,847	18,354	22,665	22,153	21,031	23,557	20,182	20,704
Southern	57,640	56,114	25,688	38,286	50,442	70,579	67,824	59,526	66,503	90,855
Western	22,954	23,500	16,668	17,771	14,627	11,149	17,430	21,798	18,032	27,980
National	553,173	542,817	498,876	447,224	559,236	515,294	550,418	556,730	638,673	720,688

Number of Small and Medium Scale Farmers Growing Soyabean by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	2,890	3,585	5,952	16,601	21,856	11,968	12,780	4,100	8,113	11,135
Copperbelt	1,159	1,250	1,395	2,099	2,620	1,345	1,871	926	2,044	4,386
Eastern	13,518	8,987	10,021	15,833	26,160	23,982	20,680	13,237	21,664	19,891
Luapula	1,259	826	574	1,590	993	1,588	2,543	1,571	2,762	1,745
Lusaka	0	210	425	817	3,563	742	356	208	456	251
Northern	8,611	5,696	11,941	13,543	23,154	24,273	14,967	11,305	12,525	21,571
NorthWestern	1,209	360	490	591	1,297	1,156	1,381	1,705	2,226	2,462
Southern	237	83	1,434	1,654	616	350	410	997	1,191	766
Western	279	0	0	56	0	261	92	106	58	258
National	29,161	20,997	32,232	52,785	80,258	65,665	55,079	34,156	51,037	62,463

Number of Small and Medium Scale Farmers Growing Cotton by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	9,619	17,655	23,521	29,470	37,739	42,300	14,998	21,231	14,770	14,127
Copperbelt	0	0	0	41	87	28	79	54	21	32
Eastern	65,453	86,874	85,027	103,378	133,528	119,670	97,862	113,271	95,603	75,173
Luapula	0	0	0	0	0	0	0	0	0	0
Lusaka	1,159	2,571	442	1,239	2,900	1,911	1,446	731	428	345
Northern	0	0	0	0	140	0	313	320	292	31
NorthWestern	0	0	0	286	0	147	17	0	0	0
Southern	6,656	16,726	7,902	23,723	30,973	28,184	8,043	12,721	12,768	4,466
Western	179	0	177	845	1,026	1,493	309	295	117	103
National	83,065	123,826	117,069	158,982	206,392	193,731	123,066	148,623	123,998	94,278

Number of Small and Medium Scale Farmers Growing Irish Potatoes by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	1,765	652	0	0	25	58	51	396	504	497
Copperbelt	735	313	0	0	549	639	259	280	161	642
Eastern	2,017	230	0	0	1,723	1,132	30	1,122	415	690
Luapula	485	0	0	0	0	0	0	63	16	29
Lusaka	0	0	0	0	279	0	23	338	71	14
Northern	3,540	492	0	0	244	249	362	179	376	380
NorthWestern	3,571	2,372	0	0	68	1,072	1,616	885	715	1,016
Southern	585	0	0	0	0	32	13	313	500	184
Western	0	0	0	0	0	57	0	0	0	38
National	12,697	4,058	0	0	2,888	3,239	2,354	3,575	2,757	3,489

Number of Small and Medium Scale Farmers Growing Tobacco by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	698	1,009	192	1,033	3,610	1,370	1,012	2,394	3,668	3,917
Copperbelt	0	0	0	0	0	0	0	31	20	325
Eastern	9,955	9,658	9,406	19,864	24,582	10,868	2,582	6,380	13,448	12,077
Luapula	0	0	0	0	0	0	0	0	33	102
Lusaka	0	0	0	0	37	0	0	0	241	0
Northern	0	0	0	693	315	207	0	1,300	1,275	2,397
NorthWestern	0	0	0	0	507	0	0	0	0	0
Southern	0	264	1,061	495	1,200	1,024	236	8	1,201	1,673
Western	179	226	0	668	1,496	2,041	962	2,171	2,645	1,553
National	10,831	11,157	10,659	22,753	31,748	15,511	4,792	12,285	22,531	22,044

Number of Small and Medium Scale Farmers Growing Beans by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	17,538	17,357	19,578	10,612	14,253	21,710	18,072	15,153	24,442	21,850
Copperbelt	6,791	7,485	8,426	6,539	9,931	9,532	6,439	6,911	15,377	14,429
Eastern	23,857	14,113	7,879	7,838	9,656	9,649	4,904	6,284	14,350	8,925
Luapula	27,696	14,250	9,075	18,497	18,904	12,958	17,581	18,207	25,238	23,142
Lusaka	978	1,045	2,106	2,243	2,813	2,440	2,108	2,411	1,582	3,337
Northern	114,172	98,770	83,289	82,904	87,940	95,004	105,541	115,342	117,207	126,114
NorthWestern	17,888	22,680	14,138	29,554	19,922	32,375	11,425	22,260	24,105	21,869
Southern	2,581	12,871	12,904	10,537	4,055	3,354	4,032	1,848	3,398	4,706
Western	5,146	6,279	930	8,456	3,375	61	1,431	1,537	1,636	3,237
National	216,649	194,851	158,323	177,181	170,848	187,082	171,533	189,952	227,334	227,610

Number of Small and Medium Scale Farmers Growing Cowpeas by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	2,970	0	4,023	768	1,852	4,608	2,459	3,137	4,157	3,167
Copperbelt	1,325	0	1,850	33	447	284	67	82	1,296	503
Eastern	21,189	0	65	1,627	84	1,150	1,595	1,733	1,399	1,822
Luapula	1,664	0	197	498	0	155	123	64	903	734
Lusaka	2,588	0	30	891	897	1,984	874	340	1,312	78
Northern	6,689	0	1,381	13,441	1,145	626	3,029	1,368	2,850	1,488
NorthWestern	0	0	474	932	1,902	338	65	874	367	103
Southern	8,524	0	12,781	18,622	16,329	21,604	6,006	7,939	25,855	12,190
Western	4,081	0	2,187	3,258	2,296	2,371	2,382	1,447	2,307	3,542
National	49,030	0	22,986	40,069	24,952	33,121	16,602	16,985	40,445	23,627

Number of Small and Medium Scale Farmers Growing Velvet Beans by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	0	0	282	0	0	0	41	38
Copperbelt	0	0	0	0	111	0	0	0	0	0
Eastern	0	0	0	0	0	0	22	0	24	0
Luapula	0	0	0	0	0	0	0	146	16	0
Lusaka	0	0	0	0	16	59	0	0	0	463
Northern	0	0	0	0	0	1,214	7	0	0	168
NorthWestern	0	0	0	0	0	0	50	0	0	0
Southern	0	0	0	0	30	0	0	5	679	391
Western	0	0	0	0	0	27	0	0	0	0
National	0	0	0	0	439	1,301	79	152	760	1,061

Number of Small and Medium Scale Farmers Growing Coffee by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	0	0	496	0	45	0	0	0
Copperbelt	0	0	0	0	0	0	0	0	0	19
Eastern	0	0	0	0	0	0	0	0	0	0
Luapula	0	0	0	0	0	0	0	0	0	0
Lusaka	0	0	0	0	0	0	0	0	0	0
Northern	0	0	0	0	0	334	0	0	0	0
NorthWestern	0	0	0	0	0	0	0	0	0	0
Southern	0	0	0	0	0	0	0	0	0	0
Western	0	0	0	0	0	0	0	0	0	0
National	0	0	0	0	496	334	45	0	0	19

Number of Small and Medium Scale Farmers Growing Sweet Potatoes by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	65,732	39,921	44,171	23,254	27,970	48,278	43,358	37,910	47,800	50,370
Copperbelt	38,270	32,708	36,505	19,762	29,049	26,778	20,639	21,002	34,192	39,986
Eastern	97,454	31,074	15,268	5,092	5,626	11,427	11,389	12,115	13,014	8,066
Luapula	71,373	21,178	24,922	13,815	17,146	7,237	20,664	30,336	38,128	32,144
Lusaka	13,324	4,144	3,955	3,768	1,951	4,766	3,053	2,313	9,340	5,451
Northern	125,993	71,885	43,754	52,116	41,099	34,303	35,815	43,266	45,515	58,037
NorthWestern	44,042	31,427	21,304	22,934	20,295	7,129	14,047	19,889	20,159	13,292
Southern	47,059	18,708	9,968	10,575	6,569	27,213	5,376	10,629	43,732	44,446
Western	22,273	8,836	8,672	9,412	2,162	5,169	3,168	4,393	7,614	9,264
National	525,521	259,882	208,521	160,727	151,866	172,299	157,508	181,852	259,494	261,055

Number of Small and Medium Scale Farmers Growing Cassava by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	30,085	29,500	30,349	20,144	19,137	22,485	25,274	26,178	24,838	22,832
Copperbelt	18,704	18,656	17,106	14,552	13,773	15,351	11,054	10,953	13,546	11,257
Eastern	32,991	22,191	23,109	10,035	11,920	11,569	10,708	11,234	9,829	6,333
Luapula	123,302	127,094	131,675	134,558	141,617	145,834	149,431	154,613	156,293	157,885
Lusaka	0	338	3,885	3,179	2,160	2,155	2,787	2,401	2,052	1,771
Northern	186,551	194,493	190,507	203,015	210,702	220,075	201,860	204,327	196,812	210,706
NorthWestern	68,224	73,160	76,006	69,242	77,405	74,488	79,126	84,641	79,323	74,618
Southern	2,019	2,628	11,707	1,800	456	1,662	573	1,435	1,715	3,208
Western	78,361	79,106	84,745	68,448	62,207	68,163	69,090	61,468	71,822	73,640
National	540,237	547,167	569,089	524,973	539,376	561,782	549,903	557,249	556,231	562,249

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Number of Small and Medium Scale Farmers Growing Paprika by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	1,459	2,108	1,474	516	1,425	867	199	460
Copperbelt	0	0	118	38	144	246	56	0	82	60
Eastern	0	0	1,640	85	0	353	0	0	0	0
Luapula	0	0	0	215	196	108	153	90	107	74
Lusaka	0	0	0	248	90	0	0	0	0	0
Northern	0	0	124	411	197	65	9	109	0	406
NorthWestern	0	0	0	160	173	131	26	43	35	28
Southern	0	0	0	57	69	50	215	61	54	0
Western	0	0	177	232	452	675	63	0	0	0
National	0	0	3,518	3,554	2,795	2,143	1,947	1,170	477	1,027

Maize: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	131,476	116,440	124,516	134,456	126,977	154,500	192,315	226,567	167,132	204,174
Copperbelt	49,127	54,122	62,081	60,151	58,441	66,965	74,891	72,176	73,746	89,592
Eastern	211,437	206,045	208,621	194,930	200,506	219,000	232,658	249,730	288,934	286,811
Luapula	15,544	11,182	11,586	18,879	14,189	19,849	19,812	23,352	27,844	30,022
Lusaka	33,218	33,579	31,926	28,502	31,563	35,284	34,275	39,399	30,523	38,068
Northern	54,162	50,511	59,823	64,401	66,547	82,095	101,667	108,474	102,750	114,129
NorthWestern	36,817	40,194	41,565	46,148	47,986	59,403	70,980	66,569	59,868	66,200
Southern	149,808	203,142	137,914	156,702	175,492	165,003	210,944	251,310	237,293	265,275
Western	62,271	64,011	67,638	76,599	79,366	61,372	101,809	138,643	89,860	87,948
National	743,858	779,226	745,670	780,768	801,067	863,472	1,039,350	1,176,221	1,077,950	1,182,217

Sorghum: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	8,743	8,739	6,729	5,349	5,536	4,613	3,896	4,077	3,611	3,035
Copperbelt	8,575	14,054	2,782	3,175	3,552	1,056	1,442	1,113	1,681	1,037
Eastern	1,984	1,283	3,108	2,865	2,201	2,429	3,918	2,273	2,585	2,307
Luapula	1,200	603	3,945	1,791	1,467	986	1,710	1,349	1,987	1,895
Lusaka	222	76	177	395	543	269	229	562	159	195
Northern	12,058	6,382	3,788	4,372	1,244	2,117	415	836	697	3,019
NorthWestern	10,453	10,585	8,813	7,497	8,851	6,965	4,278	4,912	2,928	3,204
Southern	7,220	5,798	12,112	12,834	17,462	12,124	9,946	9,990	20,125	14,278
Western	8,634	10,166	7,049	21,914	19,093	14,268	9,348	6,438	6,592	4,576
National	59,088	57,686	48,502	60,193	59,947	44,826	35,183	31,551	40,365	33,546

Rice: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	149	384	109	291	463	0	253	89	262	152
Copperbelt	27	52	4	14	5	11	7	7	30	27
Eastern	2,510	3,013	644	3,980	3,827	3,867	3,699	3,175	3,021	4,249
Luapula	1,190	637	432	593	696	1,007	1,247	1,320	1,353	1,043
Lusaka	0	0	0	0	10	8	154	53	99	76
Northern	8,703	8,481	5,884	6,101	6,478	5,938	10,469	12,017	14,110	15,308
NorthWestern	0	234	0	373	210	54	163	746	863	484
Southern	0	0	0	0	0	3	0	0	13	0
Western	7,342	6,438	4,053	3,025	7,260	1,911	7,751	12,264	11,282	14,503
National	19,921	19,238	11,127	14,377	18,949	12,799	23,743	29,671	31,032	35,841

Millet: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	7,765	9,385	5,063	3,699	2,645	3,664	3,020	4,624	5,373	4,142
Copperbelt	482	536	177	75	207	285	178	275	402	507
Eastern	4,329	3,330	1,512	1,687	1,803	1,999	4,130	1,385	1,753	1,668
Luapula	6,986	5,122	2,815	1,873	2,752	1,978	2,287	1,479	1,147	1,746
Lusaka	0	151	105	99	0	44	4	12	25	12
Northern	49,682	48,388	42,143	35,770	36,020	33,353	36,175	32,193	38,762	31,513
NorthWestern	1,041	1,441	796	1,696	964	845	787	532	770	343
Southern	1,848	3,976	4,140	5,710	8,917	9,731	5,019	3,720	4,792	3,980
Western	13,994	19,949	11,296	22,173	14,780	17,819	17,368	12,904	8,532	12,868
National	86,127	92,278	68,048	72,782	68,088	69,717	68,968	57,124	61,556	56,780

Sunflower: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	4,963	9,235	3,892	9,513	3,531	5,924	4,991	2,694	4,953	4,641
Copperbelt	58	92	6	192	130	96	13	65	60	118
Eastern	21,855	14,524	12,794	19,972	18,651	27,663	19,957	30,715	51,135	37,433
Luapula	330	107	21	107	55	51	17	8	38	42
Lusaka	855	219	0	146	99	249	252	92	130	411
Northern	5,660	3,574	2,274	2,282	3,557	2,889	3,703	2,241	2,471	5,194
NorthWestern	306	213	30	50	301	113	56	22	54	36
Southern	7,480	9,306	3,908	5,675	5,323	6,170	5,284	4,034	11,704	5,731
Western	0	82	0	0	25	0	3	47	18	86
National	41,507	37,350	22,926	37,937	31,671	43,156	34,276	39,917	70,564	53,691

Groundnuts: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	17,451	15,309	19,024	8,009	10,862	10,586	29,263	24,687	29,465	34,130
Copperbelt	6,679	6,018	5,950	4,087	7,098	5,755	8,431	7,353	10,385	14,746
Eastern	62,329	66,365	65,767	49,289	62,233	38,893	46,476	60,146	74,602	89,036
Luapula	21,112	17,415	18,695	13,248	14,469	18,568	16,228	17,542	20,193	21,196
Lusaka	2,948	1,982	2,589	2,059	3,392	2,608	2,249	3,343	2,300	3,462
Northern	34,487	34,668	46,234	38,038	38,485	40,478	39,759	38,294	46,461	49,603
NorthWestern	3,722	5,521	6,993	6,946	8,098	8,606	6,436	6,528	6,440	6,459
Southern	26,288	28,986	8,680	14,989	22,415	29,257	30,015	23,847	19,940	37,924
Western	8,426	6,687	4,593	5,297	4,140	2,978	5,175	7,661	5,538	11,021
National	183,442	182,951	178,525	141,962	171,193	157,729	184,034	189,399	215,324	267,578

Soyabean: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	1,380	1,841	3,137	7,547	13,239	9,113	15,515	2,705	6,971	10,312
Copperbelt	196	314	262	538	1,056	414	686	242	362	1,117
Eastern	6,616	3,921	4,767	8,432	13,997	13,675	9,790	6,656	9,792	10,228
Luapula	121	50	75	192	125	279	323	160	335	210
Lusaka	0	178	141	626	1,739	576	262	81	218	175
Northern	2,163	1,351	4,459	3,255	7,941	7,090	4,274	3,006	3,648	5,712
NorthWestern	230	64	234	84	301	307	471	348	632	601
Southern	59	26	689	1,332	256	129	161	323	640	455
Western	49	0	0	14	0	87	44	65	20	62
National	10,814	7,744	13,765	22,020	38,655	31,669	31,527	13,585	22,618	28,871

Cotton: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	11,875	20,990	28,835	32,804	39,966	54,193	20,212	21,137	15,048	20,342
Copperbelt	0	0	0	14	32	44	77	25	11	8
Eastern	55,206	71,209	62,337	83,621	117,105	90,816	75,150	110,489	73,246	59,282
Luapula	0	0	0	0	0	0	0	0	0	0
Lusaka	933	2,305	345	1,393	2,435	2,173	1,305	924	430	174
Northern	0	0	0	0	64	0	287	90	159	12
NorthWestern	0	0	0	84	0	37	17	0	0	0
Southern	6,921	20,431	7,689	23,241	33,020	29,508	9,123	15,305	13,803	4,864
Western	179	0	177	722	962	842	356	273	87	42
National	75,114	114,935	99,383	141,878	193,585	177,613	106,528	148,244	102,784	84,724

Irish Potatoes: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	501	251	0	0	12	7	47	111	90	55
Copperbelt	168	74	0	0	58	148	79	65	40	104
Eastern	284	40	0	0	232	368	8	305	88	287
Luapula	41	0	0	0	0	0	0	8	1	2
Lusaka	0	0	0	0	69	0	5	70	26	12
Northern	583	166	0	0	184	54	108	61	111	59
NorthWestern	1,241	549	0	0	9	236	471	407	70	124
Southern	115	0	0	0	0	8	2	39	142	28
Western	0	0	0	0	0	14	0	0	0	5
National	2,933	1,079	0	0	564	835	718	1,065	568	674

Tobacco: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	559	1,263	56	702	1,881	714	584	1,318	2,742	2,756
Copperbelt	0	0	0	0	0	0	0	6	1	64
Eastern	4,811	5,191	4,127	9,133	11,545	5,687	1,259	3,205	7,192	6,932
Luapula	0	0	0	0	0	0	0	0	2	7
Lusaka	0	0	0	0	186	0	0	0	60	0
Northern	0	0	0	386	174	56	0	424	444	1,016
NorthWestern	0	0	0	0	37	0	0	0	0	0
Southern	0	188	1,194	567	1,141	580	213	12	1,227	1,205
Western	89	135	0	336	1,082	2,329	706	1,279	2,124	2,310
National	5,459	6,777	5,377	11,123	16,046	9,366	2,761	6,244	13,792	14,290

Beans: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	7,071	6,702	6,597	3,558	4,650	6,393	6,200	4,869	8,535	8,117
Copperbelt	1,549	1,653	1,918	1,332	2,648	1,928	1,957	1,736	3,239	3,430
Eastern	6,574	3,600	2,704	2,505	2,515	2,260	1,799	2,314	4,067	3,634
Luapula	5,163	3,291	1,859	3,733	4,331	3,014	3,411	4,089	5,204	5,057
Lusaka	308	171	677	751	814	585	762	695	362	1,900
Northern	42,041	33,282	29,882	32,161	36,237	40,136	50,784	59,338	54,497	53,423
NorthWestern	4,258	6,272	4,193	9,208	6,997	13,092	4,627	5,968	5,664	5,678
Southern	739	4,198	4,491	4,039	1,452	830	1,428	596	824	1,631
Western	2,593	1,700	188	3,086	835	25	649	973	267	865
National	70,295	60,870	52,509	60,372	60,480	68,263	71,616	80,577	82,659	83,735

Cowpeas: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	1,449	0	1,561	200	628	943	1,042	854	920	1,068
Copperbelt	221	0	298	39	101	59	12	10	177	70
Eastern	5,302	0	32	353	21	172	236	649	259	274
Luapula	264	0	12	52	0	48	15	6	107	69
Lusaka	3,781	0	30	175	204	566	162	71	221	8
Northern	742	0	137	4,601	167	178	769	174	450	264
NorthWestern	0	0	105	124	182	126	26	169	58	12
Southern	2,344	0	4,506	4,601	4,329	5,253	1,998	2,354	10,054	3,199
Western	1,115	0	577	1,299	624	658	917	396	510	1,341
National	15,218	0	7,260	11,442	6,256	8,003	5,177	4,684	12,757	6,304

Velvet Beans: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	0	0	67	0	0	0	34	47
Copperbelt	0	0	0	0	28	0	0	0	0	0
Eastern	0	0	0	0	0	0	44	0	2	0
Luapula	0	0	0	0	0	0	0	9	3	0
Lusaka	0	0	0	0	2	9	0	0	0	375
Northern	0	0	0	0	0	762	1	0	0	32
NorthWestern	0	0	0	0	0	0	12	0	0	0
Southern	0	0	0	0	12	0	0	1	315	161
Western	0	0	0	0	0	21	0	0	0	0
National	0	0	0	0	109	792	58	11	355	615

Coffee: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	0	0	30	0	45	0	0	0
Copperbelt	0	0	0	0	0	0	0	0	0	9
Eastern	0	0	0	0	0	0	0	0	0	0
Luapula	0	0	0	0	0	0	0	0	0	0
Lusaka	0	0	0	0	0	0	0	0	0	0
Northern	0	0	0	0	0	21	0	0	0	0
NorthWestern	0	0	0	0	0	0	0	0	0	0
Southern	0	0	0	0	0	0	0	0	0	0
Western	0	0	0	0	0	0	0	0	0	0
National	0	0	0	0	30	21	45	0	0	9

Sweet Potatoes: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	19,218	12,043	12,372	7,681	6,962	12,397	14,519	11,726	14,598	19,097
Copperbelt	8,653	8,606	11,429	4,750	7,314	6,155	6,038	4,948	8,280	11,110
Eastern	12,647	6,174	4,316	1,090	863	2,420	2,588	2,590	3,220	2,091
Luapula	10,183	2,812	3,449	2,648	2,303	1,078	2,876	4,844	5,631	4,624
Lusaka	2,815	755	654	753	483	1,137	557	645	1,553	1,470
Northern	23,485	10,344	8,282	10,181	6,665	6,061	8,538	9,293	11,622	13,365
NorthWestern	9,243	5,570	4,613	4,715	3,227	1,355	2,886	3,179	3,280	2,303
Southern	15,178	6,441	2,688	3,219	1,581	6,242	1,614	3,678	14,007	13,350
Western	3,454	1,429	1,808	1,941	626	1,180	887	1,219	1,778	2,384
National	104,876	54,175	49,611	36,977	30,024	38,025	40,504	42,120	63,970	69,794

Cassava: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	18,775	13,970	14,032	10,640	11,019	10,048	11,786	17,226	13,211	14,667
Copperbelt	8,048	6,123	5,118	5,197	4,551	4,662	3,806	3,952	3,669	3,076
Eastern	8,656	6,095	6,750	2,588	2,650	3,242	2,367	2,151	2,477	1,499
Luapula	118,322	122,650	103,310	117,316	121,185	121,039	110,496	133,586	109,756	125,633
Lusaka	0	62	1,440	1,589	757	859	795	1,021	602	343
Northern	204,112	224,577	130,163	155,442	173,766	177,971	143,508	139,810	160,724	151,029
NorthWestern	43,878	55,257	49,737	42,247	46,259	41,264	47,032	52,482	54,501	54,105
Southern	581	1,067	2,964	598	227	392	193	447	574	682
Western	47,390	62,628	51,878	36,515	39,169	39,190	44,335	39,278	47,418	52,183
National	449,763	492,431	365,393	372,132	399,582	398,667	364,317	389,953	392,933	403,217

Paprika: Area Cultivated by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	438	732	435	134	882	256	94	145
Copperbelt	0	0	15	4	31	75	25	0	13	6
Eastern	0	0	433	21	0	57	0	0	0	0
Luapula	0	0	0	38	37	21	19	15	7	6
Lusaka	0	0	0	35	29	0	0	0	0	0
Northern	0	0	15	67	30	4	1	17	0	59
NorthWestern	0	0	0	16	11	8	4	11	2	2
Southern	0	0	0	23	26	10	63	23	14	0
Western	0	0	44	170	128	159	24	0	0	0
National	0	0	945	1,107	728	469	1,017	322	130	218

Maize: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	174,081	122,038	226,991	375,242	96,855	281,153	382,366	355,426	289,283	526,315
Copperbelt	63,634	59,483	88,827	109,804	66,493	122,391	121,890	129,358	124,095	182,016
Eastern	267,199	245,271	263,190	285,726	163,380	306,319	247,226	336,785	392,068	531,810
Luapula	21,357	18,004	19,520	27,849	23,026	42,635	30,944	45,427	56,270	67,919
Lusaka	34,521	14,084	43,197	53,215	16,025	54,703	57,436	32,951	45,377	89,586
Northern	65,859	62,777	101,632	120,246	105,540	141,442	187,263	230,609	257,199	306,330
NorthWestern	43,591	43,480	62,964	73,072	54,350	98,057	88,456	99,832	98,447	129,237
Southern	242,572	79,548	121,179	258,069	93,807	249,428	259,222	115,568	339,641	541,507
Western	39,418	24,953	42,816	61,618	28,434	38,167	45,993	46,223	54,738	88,804
National	952,232	669,640	970,317	1,364,841	647,909	1,334,296	1,420,798	1,392,180	1,657,117	2,463,523

Sorghum: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	5,601	6,325	4,109	5,979	2,593	2,199	1,575	1,366	2,728	2,406
Copperbelt	6,307	9,935	1,719	2,362	2,460	592	629	486	806	829
Eastern	1,824	866	1,982	1,460	556	1,390	1,695	1,271	1,986	2,409
Luapula	1,055	653	2,029	1,519	809	912	1,282	1,214	1,866	1,421
Lusaka	112	91	130	161	56	116	22	120	38	354
Northern	8,213	5,190	2,081	2,909	947	1,482	206	670	576	2,416
NorthWestern	8,445	8,575	6,768	8,088	7,253	4,390	2,549	3,051	2,586	2,237
Southern	3,648	753	3,276	4,032	1,519	2,917	3,087	3,028	8,352	10,340
Western	4,725	3,887	2,564	5,999	4,849	3,741	2,626	2,089	2,690	3,043
National	39,929	36,275	24,658	32,509	21,042	17,739	13,671	13,295	21,629	25,455

Rice: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	293	249	80	359	79	0	314	7	259	57
Copperbelt	18	56	2	8	0	13	4	6	34	37
Eastern	2,881	3,889	586	2,377	2,576	4,121	2,940	2,935	5,120	5,779
Luapula	1,930	900	450	570	1,027	1,488	1,236	2,295	3,311	1,885
Lusaka	0	0	0	0	3	3	15	17	156	115
Northern	15,772	9,545	7,208	5,769	5,867	6,980	13,606	18,157	20,992	28,653
NorthWestern	0	81	0	362	182	100	119	704	945	723
Southern	0	0	0	0	0	1	0	0	25	.
Western	12,409	3,804	1,307	1,844	2,272	1,665	5,348	6,121	11,088	14,407
National	33,305	18,524	9,632	11,290	12,005	14,370	23,582	30,243	41,929	51,656

Millet: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	5,829	5,219	2,914	1,972	781	2,306	1,704	2,135	3,399	2,255
Copperbelt	376	270	130	38	63	294	117	284	430	389
Eastern	1,933	1,678	923	725	669	1,420	1,738	722	641	1,321
Luapula	7,575	4,161	2,104	2,034	2,082	1,432	1,320	2,035	753	1,702
Lusaka	0	50	52	28	0	19	1	0	9	0
Northern	45,478	38,013	31,758	36,422	28,870	28,542	14,529	34,479	38,082	34,495
NorthWestern	790	1,160	525	1,154	390	642	546	405	917	418
Southern	807	320	915	1,927	1,324	1,809	1,415	874	2,259	1,936
Western	5,885	4,533	3,103	6,117	1,748	4,415	4,486	3,317	2,445	5,476
National	68,673	55,403	42,424	50,417	35,927	40,879	25,857	44,253	48,936	47,992

Sunflower: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	3,626	4,742	1,616	5,322	762	2,109	1,657	757	1,540	1,879
Copperbelt	51	52	4	89	123	16	6	6	22	119
Eastern	15,132	7,478	5,423	7,826	5,330	11,590	6,869	12,271	24,597	18,315
Luapula	182	36	9	31	36	19	8	4	18	15
Lusaka	322	39	0	61	17	69	51	57	100	175
Northern	3,812	1,814	1,010	722	1,680	1,283	1,073	1,033	1,262	2,100
NorthWestern	168	134	12	28	113	65	23	33	34	14
Southern	4,892	2,723	1,253	2,249	575	1,444	1,011	541	4,884	2,458
Western	0	32	0	0	3	0	1	21	10	51
National	28,186	17,050	9,327	16,329	8,639	16,596	10,699	14,724	32,466	25,126

Groundnuts: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	12,466	4,705	11,851	3,127	3,666	4,622	12,171	13,846	15,785	19,687
Copperbelt	4,991	3,290	3,407	2,594	3,785	3,048	3,264	4,430	6,420	9,471
Eastern	50,657	21,282	38,077	29,770	20,676	15,395	16,058	25,222	35,939	49,854
Luapula	15,128	8,369	9,935	8,903	10,624	9,493	7,326	11,321	12,535	13,776
Lusaka	1,541	807	1,191	996	449	1,113	719	792	1,581	1,719
Northern	25,203	14,899	28,172	22,504	28,004	21,686	16,222	33,027	30,055	34,858
NorthWestern	4,331	3,124	4,825	5,639	6,770	4,914	2,892	4,155	4,476	5,229
Southern	14,470	1,879	1,966	6,396	5,535	7,630	7,810	3,768	10,369	23,024
Western	2,658	1,684	1,575	1,816	1,690	1,361	1,549	1,615	2,713	6,120
National	131,445	60,038	100,998	81,745	81,198	69,262	68,012	98,176	119,872	163,738

Soyabean: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	954	1,387	2,151	4,574	5,315	5,871	8,785	1,431	4,809	10,629
Copperbelt	69	355	183	357	1,204	277	391	174	388	1,195
Eastern	3,639	2,258	2,615	5,112	13,446	10,844	5,996	5,138	6,695	7,847
Luapula	82	39	47	85	112	152	196	159	252	166
Lusaka	0	38	52	319	676	455	163	27	149	107
Northern	1,166	1,015	2,491	1,338	5,602	5,118	2,497	1,898	2,640	5,095
NorthWestern	104	40	145	37	250	146	293	263	549	613
Southern	7	15	78	646	66	53	67	41	392	474
Western	14	0	0	1	0	37	29	17	11	39
National	6,034	5,147	7,762	12,469	26,671	22,953	18,416	9,149	15,884	26,165

Cotton: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	9,924	15,752	28,936	26,030	25,678	69,548	10,921	9,760	9,295	17,218
Copperbelt	0	0	0	9	53	23	9	27	7	6
Eastern	46,433	60,674	57,672	90,244	77,232	76,759	47,739	76,368	65,707	49,568
Luapula	0	0	0	0	0	0	0	0	0	.
Lusaka	36,573	1,696	219	997	2,333	2,131	777	325	293	241
Northern	0	0	0	0	29	0	277	81	148	4
NorthWestern	0	0	0	16	0	32	5	0	0	.
Southern	6,529	6,014	6,982	29,780	15,491	21,814	4,245	4,692	10,734	5,004
Western	107	0	255	235	528	418	139	334	94	29
National	99,567	84,136	94,063	147,310	121,344	170,724	64,110	91,588	86,277	72,068

Irish Potatoes: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	2,886	163	0	0	8	1	30	134	103	70
Copperbelt	351	28	0	0	49	328	71	166	69	389
Eastern	834	61	0	0	460	448	3	639	231	881
Luapula	144	0	0	0	0	0	0	11	3	3
Lusaka	0	0	0	0	33	0	15	248	63	9
Northern	865	198	0	0	71	84	106	114	437	86
NorthWestern	2,423	610	0	0	32	893	699	1,268	247	609
Southern	116	0	0	0	0	56	6	15	158	16
Western	0	0	0	0	0	35	0	0	0	7
National	7,619	1,060	0	0	652	1,844	930	2,595	1,311	2,071

Tobacco: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	771	1,207	53	553	1,563	567	378	1,084	2,780	3,664
Copperbelt	0	0	0	0	0	0	0	4	0	29
Eastern	5,079	5,244	3,945	8,523	8,437	5,621	1,108	4,291	8,396	7,469
Luapula	0	0	0	0	0	0	0	0	1	9
Lusaka	0	0	0	0	172	0	0	0	48	0
Northern	0	0	0	260	161	58	0	188	324	698
NorthWestern	0	0	0	0	7	0	0	0	0	0
Southern	0	112	1,036	920	1,008	571	104	16	679	1,133
Western	36	68	0	777	1,932	2,615	736	3,975	2,990	1,762
National	5,885	6,631	5,034	11,033	13,280	9,431	2,325	9,558	15,219	14,763

Beans: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	5,885	6,718	4,362	9,530	1,819	5,195	4,113	3,823	6,290	17,017
Copperbelt	738	875	807	519	879	1,263	554	903	2,305	3,630
Eastern	17,178	8,967	6,156	8,905	6,103	12,572	7,860	13,878	26,534	20,085
Luapula	2,678	1,949	880	2,109	2,248	1,851	2,744	3,057	5,899	3,441
Lusaka	420	114	221	336	152	339	266	315	268	1,592
Northern	29,739	19,985	18,562	13,140	19,680	19,704	25,901	49,894	32,076	40,655
NorthWestern	2,705	3,696	2,643	4,572	4,332	8,100	1,869	4,113	3,772	4,536
Southern	5,154	3,466	2,779	4,187	676	2,053	1,601	646	5,744	3,505
Western	494	295	44	749	223	59	306	414	510	874
National	64,991	46,066	36,454	44,047	36,112	51,135	45,215	77,042	83,397	95,333

Cowpeas: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	318	0	616	90	293	347	449	883	644	499
Copperbelt	147	0	83	9	144	48	2	1	143	94
Eastern	1,656	0	12	201	5	105	27	528	174	96
Luapula	62	0	4	20	0	2	14	6	42	38
Lusaka	200	0	4	86	54	116	50	24	82	4
Northern	569	0	55	2,067	27	36	259	141	190	204
NorthWestern	0	0	57	70	106	31	27	61	34	3
Southern	991	0	1,351	1,306	582	1,659	399	389	5,720	1,110
Western	317	0	276	381	89	242	218	134	273	604
National	4,260	0	2,457	4,230	1,299	2,587	1,444	2,165	7,301	2,652

Coffee: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	0	0	0	0	27	0	0	0
Copperbelt	0	0	0	0	0	0	0	0	0	2
Eastern	0	0	0	0	0	0	0	0	0	0
Luapula	0	0	0	0	0	0	0	0	0	0
Lusaka	0	0	0	0	0	0	0	0	0	0
Northern	0	0	0	0	0	20	0	0	0	0
NorthWestern	0	0	0	0	0	0	0	0	0	0
Southern	0	0	0	0	0	0	0	0	0	0
Western	0	0	0	0	0	0	0	0	0	0
National	0	0	0	0	0	20	27	0	0	2

Sweet Potatoes: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	58,505	17,271	39,333	23,825	12,794	40,577	38,446	38,783	48,196	75,050
Copperbelt	27,710	14,952	36,558	14,139	21,381	22,639	18,512	18,214	32,334	53,954
Eastern	45,017	11,710	11,203	2,850	1,621	8,005	7,604	7,745	10,543	5,077
Luapula	21,862	7,296	9,955	4,898	7,072	3,312	6,791	18,488	16,910	15,779
Lusaka	10,803	1,052	1,634	2,201	270	3,049	1,439	1,667	5,132	7,050
Northern	70,289	23,593	22,226	26,846	22,184	17,534	18,814	29,847	38,275	49,102
NorthWestern	24,593	8,570	17,563	8,827	7,627	3,650	8,987	14,114	14,858	12,281
Southern	27,454	3,081	3,599	3,763	1,261	10,695	2,613	3,330	28,914	27,175
Western	5,402	1,510	3,346	4,653	2,172	2,731	1,704	2,357	4,328	4,879
National	291,633	89,036	145,417	92,002	76,381	112,192	104,911	134,544	199,490	250,347

Paprika: Production in Metric Tons by Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	0	0	203	913	278	54	290	335	18	22
Copperbelt	0	0	6	1	7	36	10	0	6	9
Eastern	0	0	127	11	0	10	0	0	0	0
Luapula	0	0	0	9	20	12	7	10	2	2
Lusaka	0	0	0	18	5	0	0	0	0	0
Northern	0	0	3	2	3	1	1	4	0	15
NorthWestern	0	0	0	3	0	4	1	4	2	1
Southern	0	0	0	9	0	1	14	0	1	0
Western	0	0	13	51	60	42	18	0	0	0
National	0	0	352	1,017	374	161	341	353	28	49

Maize: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	1,366	1,008	1,889	2,923	736	1,657	1,826	1,588	1,683	2,496
Copperbelt	1,299	1,001	1,424	1,828	1,257	1,940	1,741	1,881	1,768	2,289
Eastern	1,324	1,168	1,259	1,498	900	1,394	1,075	1,291	1,333	1,878
Luapula	1,360	1,679	1,409	1,491	1,651	1,738	1,374	1,796	1,807	2,118
Lusaka	1,113	520	1,332	1,828	541	1,439	1,501	784	1,459	2,255
Northern	1,349	1,324	1,708	1,969	1,717	1,771	1,859	2,167	2,570	2,798
NorthWestern	1,216	1,157	1,549	1,589	1,171	1,413	1,133	1,357	1,473	1,869
Southern	1,653	407	846	1,625	587	1,455	1,283	533	1,385	1,915
Western	786	513	739	1,009	422	662	527	388	661	1,111
National	1,295	961	1,318	1,744	951	1,469	1,328	1,294	1,564	2,082

Sorghum: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	698	695	696	1,172	380	540	373	452	812	776
Copperbelt	911	859	618	928	729	660	509	666	538	942
Eastern	914	792	663	639	382	487	485	653	838	1,150
Luapula	766	1,002	608	1,042	554	911	737	1,182	941	813
Lusaka	516	1,125	851	459	119	504	77	291	315	759
Northern	810	930	575	919	811	698	542	808	979	1,128
NorthWestern	835	847	832	1,266	829	659	606	628	871	765
Southern	592	171	336	376	143	319	337	328	561	763
Western	634	454	396	448	342	346	315	300	485	697
National	764	703	557	744	429	467	420	501	669	851

Rice: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	1,570	1,325	1,251	940	340	.	1,345	258	988	434
Copperbelt	854	1,084	481	555	240	1,873	548	786	1,422	2,241
Eastern	1,343	1,223	727	760	702	1,271	883	1,001	1,838	1,572
Luapula	1,768	1,387	1,056	984	1,480	1,351	1,182	1,854	2,445	1,974
Lusaka	.	.	.	.	433	536	109	465	1,682	1,650
Northern	2,263	1,190	1,045	1,389	1,106	1,541	1,050	1,624	1,589	2,027
NorthWestern	.	351	.	960	858	1,390	1,221	1,193	1,269	1,355
Southern	.	.	.	.	.	480	.	.	1,965	.
Western	1,778	645	410	710	454	905	652	577	951	1,348
National	1,798	1,027	830	1,022	783	1,307	900	1,163	1,475	1,690

Millet: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	779	536	629	519	347	653	599	619	686	602
Copperbelt	959	555	804	639	452	981	703	1,059	859	1,549
Eastern	420	518	742	462	426	653	441	581	450	966
Luapula	1,067	825	837	1,128	758	714	596	1,449	741	1,060
Lusaka	.	416	638	257	.	365	383	27	319	17
Northern	1,031	843	780	1,305	933	942	453	1,307	1,200	1,271
NorthWestern	874	754	597	765	431	844	710	1,016	1,505	1,513
Southern	467	113	285	474	198	204	317	292	621	786
Western	552	315	304	302	165	303	330	350	379	518
National	871	680	675	961	665	702	443	1,030	993	1,075

Sunflower: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	799	498	518	743	265	369	351	397	405	515
Copperbelt	883	430	741	605	1,201	213	439	150	500	597
Eastern	660	487	431	408	350	437	376	484	542	582
Luapula	600	317	444	318	608	447	380	428	510	283
Lusaka	410	179	.	478	266	317	273	945	872	497
Northern	705	474	564	426	516	462	333	568	677	502
NorthWestern	802	625	389	759	484	634	342	1,847	545	411
Southern	664	274	362	477	89	260	208	122	544	479
Western	.	396	.	.	185	.	412	286	508	665
National	680	449	451	462	358	422	356	475	546	557

Groundnuts: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	798	306	683	671	420	443	440	618	623	661
Copperbelt	736	545	606	678	686	568	444	742	750	723
Eastern	860	330	593	662	377	435	366	457	518	670
Luapula	793	491	553	693	818	533	489	715	697	698
Lusaka	507	449	544	510	147	407	321	397	903	582
Northern	970	448	614	753	835	606	424	834	743	832
NorthWestern	945	585	795	859	930	593	472	868	790	900
Southern	662	67	250	473	274	309	298	202	704	768
Western	481	274	371	487	500	453	311	300	539	714
National	824	367	583	677	582	495	401	589	652	731

Soyabean: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	617	730	704	706	480	600	545	677	832	1,027
Copperbelt	343	997	604	630	982	570	584	762	1,064	1,146
Eastern	492	656	508	735	823	792	620	788	742	889
Luapula	738	786	603	383	1,119	462	653	1,075	828	844
Lusaka	.	214	349	593	439	717	378	522	801	612
Northern	4,317	675	616	480	653	693	624	735	839	1,010
NorthWestern	446	655	672	441	681	523	626	742	1,204	965
Southern	120	360	124	178	275	208	370	151	1,074	1,038
Western	417	.	.	100	.	325	649	296	554	568
National	1,633	694	573	622	665	697	601	746	826	976

Cotton: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	950	835	1,316	961	755	1,289	534	586	702	950
Copperbelt	.	.	.	704	1,720	367	253	1,280	593	1,626
Eastern	873	859	1,023	1,179	741	843	659	877	977	999
Luapula	.	.	.	.	.	.	.	.	.	.
Lusaka	23,656	762	728	812	1,080	1,070	599	494	977	1,351
Northern	.	.	.	.	603	.	976	773	1,004	305
NorthWestern	.	.	.	222	.	867	268	.	.	.
Southern	1,168	353	1,176	1,187	511	764	480	338	854	1,002
Western	600	.	1,440	393	464	452	387	1,225	1,081	686
National	1,223	785	1,092	1,131	713	928	631	788	932	992

Irish Potatoes: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	4,125	1,740	.	.	624	120	698	1,911	1,859	2,584
Copperbelt	1,954	656	.	.	870	3,647	1,323	2,614	2,105	3,610
Eastern	2,052	1,630	.	.	1,869	1,208	408	2,011	3,133	3,649
Luapula	3,561	.	.	.	.	.	.	1,428	3,264	1,632
Lusaka	.	.	.	.	623	.	3,274	5,830	2,272	756
Northern	2,964	1,133	.	.	363	1,507	685	2,394	4,754	1,628
NorthWestern	2,355	991	.	.	3,712	3,913	1,525	3,469	3,999	5,067
Southern	1,126	.	.	.	.	6,934	3,940	383	1,438	858
Western	.	.	.	.	.	2,448	.	.	.	1,520
National	2,689	1,139	.	.	1,464	2,667	1,371	2,635	2,993	3,563

Tobacco: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	1,408	956	954	1,093	904	889	644	847	1,439	1,581
Copperbelt	.	.	.	.	.	.	.	564	775	1,683
Eastern	1,232	911	1,014	1,040	757	1,031	970	1,818	1,222	1,238
Luapula	.	.	.	.	.	.	.	.	400	1,330
Lusaka	.	.	.	.	922	.	.	.	800	.
Northern	.	.	.	727	1,159	794	.	663	864	682
NorthWestern	.	.	.	.	800	.	.	.	.	.
Southern	.	535	983	1,510	1,266	1,039	634	1,333	604	861
Western	400	500	.	2,382	1,883	1,393	1,112	3,793	1,726	1,109
National	1,230	898	1,010	1,082	852	1,063	913	1,852	1,257	1,207

Beans: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	832	1,002	661	2,678	391	813	663	785	737	2,096
Copperbelt	476	529	421	390	332	655	283	520	712	1,058
Eastern	2,613	2,491	2,277	3,555	2,427	5,563	4,369	5,997	6,524	5,527
Luapula	519	592	473	565	519	614	804	748	1,134	680
Lusaka	1,364	667	326	447	187	579	349	453	740	838
Northern	707	600	621	409	543	491	510	841	589	761
NorthWestern	635	589	630	497	619	619	404	689	666	799
Southern	6,974	826	619	1,037	466	2,473	1,121	1,084	6,971	2,149
Western	191	174	234	243	267	2,360	471	425	1,910	1,010
National	925	757	694	730	597	749	631	956	1,009	1,139

Cowpeas: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	333	.	435	439	716	591	445	1,093	840	651
Copperbelt	587	.	322	193	1,328	782	340	72	766	1,939
Eastern	352	.	360	643	216	561	117	498	728	387
Luapula	360	.	288	402	.	40	880	1,168	393	537
Lusaka	232	.	120	500	252	236	273	346	654	218
Northern	4,762	.	409	556	493	532	371	972	430	1,036
NorthWestern	.	.	440	590	590	266	1,397	472	608	270
Southern	429	.	308	339	250	343	192	195	795	453
Western	391	.	414	398	189	370	300	370	664	608
National	969	.	350	441	342	386	285	489	748	567

Coffee: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.	.	.	.	.	.	600	.	.	.
Copperbelt	.	.	.	.	.	.	.	.	.	200
Eastern	.	.	.	.	.	.	.	.	.	.
Luapula	.	.	.	.	.	.	.	.	.	.
Lusaka	.	.	.	.	.	.	.	.	.	.
Northern	.	.	.	.	.	960	.	.	.	.
NorthWestern	.	.	.	.	.	.	.	.	.	.
Southern	.	.	.	.	.	.	.	.	.	.
Western	.	.	.	.	.	.	.	.	.	.
National	.	.	.	.	.	960	600	.	.	200

Sweet Potatoes: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	3,811	1,545	3,920	3,023	2,211	3,048	2,856	3,813	3,710	4,221
Copperbelt	4,042	1,976	3,426	3,730	3,857	4,097	3,392	4,441	5,379	5,461
Eastern	7,667	1,907	2,807	2,555	2,415	3,217	2,949	2,834	4,129	2,622
Luapula	3,018	3,251	3,527	3,263	3,976	3,522	2,573	4,203	3,368	3,729
Lusaka	3,831	1,533	2,956	3,892	555	3,031	2,693	2,459	4,309	4,643
Northern	9,797	2,587	3,059	3,566	3,962	3,291	2,662	4,579	3,744	4,217
NorthWestern	3,166	1,979	3,860	2,483	2,790	3,358	3,290	5,223	5,202	6,163
Southern	2,371	495	1,730	1,783	1,220	1,988	1,672	1,254	2,572	2,825
Western	3,498	1,190	1,596	2,914	3,368	2,609	1,882	2,387	2,332	2,435
National	5,681	2,034	3,299	3,146	3,216	3,122	2,827	4,020	3,812	4,105

Paprika: Average Yields per Hectare Planted for Small and Medium Scale Farmers by Province

Province	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Central	.	.	635	1,163	451	348	376	1,404	181	160
Copperbelt	.	.	400	326	464	467	351	.	445	1,407
Eastern	.	.	342	505	.	113	.	.	.	.
Luapula	.	.	.	178	551	502	416	516	222	263
Lusaka	.	.	.	457	201	.	.	.	.	.
Northern	.	.	200	31	71	185	600	400	.	258
NorthWestern	.	.	.	329	.	521	237	400	800	384
Southern	.	.	.	370	13	150	189	0	80	.
Western	.	.	300	297	603	249	987	.	.	.
National	.	.	459	792	438	300	376	1,162	269	278

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