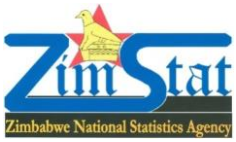

Zimbabwe Smallholder Agricultural Productivity Survey 2017 Report

September 2019 ***Price: 40.00***

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Acronyms

ALS	- Agricultural and Livestock Survey
APM	- Agriculture Productivity Module
CA	- Command Agriculture
CL	- Communal Lands
CSPro	- Census and Surveys Processing System
EA	- Enumeration Area
FAO	- Food and Agricultural Organization of the United Nations
FCS	- Food Consumption Score
GDP`	- Gross Domestic Product
GPS	- Global Positioning System
Ha	- Hectare
HDDS	- Household Dietary Diversity Score
LWOP	- Lease with Option to Purchase
MLAWCRR	- Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement
ORA	- Old Resettlement Areas
PICES	- Poverty, Income, Consumption and Expenditure Survey
PPS	- Probability Proportional to Size
PSU	- Primary Sampling Unit
RSYS	- Random Systematic Sampling
SAS	- Statistical Analysis System
SSCF	- Small Scale Commercial Farms
SYS	- Systematic Sampling
TFP	- Total Factor Productivity
ZIMSTAT	- Zimbabwe National Statistics Agency
ZIMVAC	- Zimbabwe Vulnerability Assessment Committee

Notations

.	Category not applicable
-	Magnitude zero
0	Percent insignificant value
NS	Not stated

Foreword

The Zimbabwe National Statistics Agency (ZIMSTAT) together with the Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement (MLAWCRR) conducted the Agricultural Productivity Module (APM) as part of the Poverty, Income, Consumption and Expenditure Survey (PICES) 2017. The APM survey was carried out with financial and technical assistance from the World Bank. The APM provides representative estimates at the national level. The APM survey collected detailed information on agricultural production of different types of smallholder farmers in Zimbabwe. These smallholders formed a subsample of households that were part of the PICES 2017 survey

The objective of the APM Survey was twofold: (1) to collect, analyse and disseminate high-quality household level data on agriculture and welfare by introducing an additional innovative module to a subsample of the PICES 2017 survey; and (2) to strengthen national capacity for the collection and analysis of policy relevant data. This was done through promoting institutional interaction between ZIMSTAT and MLAWCRR, with technical and financial support from the World Bank.

The PICES-APM is intended to complement the Agricultural and Livestock Survey (ALS) as well as other agricultural data collected by ZIMSTAT. Data from the APM also supplements data collected by the MLAWCRR through its surveillance activities. The APM survey collected data on multiple topics of relevance to smallholder farming including on food and nutrition security. The data can be used to assess constraints for raising smallholder productivity as well as for reducing vulnerability, complementing the annual survey of the Zimbabwe Vulnerability Assessment Committee (ZIMVAC). Since the APM module was part of PICES 2017, information on welfare indicators such as household poverty status, education, health, housing as well as other income sources will also be available for these households. This will make it possible to assess the linkage between smallholder agricultural productivity and poverty and also to assess the impact of policy measures (e.g. a change in agricultural subsidies) on household welfare, and inform the design of better policies and programmes aimed at improving the lives of rural smallholder households in Zimbabwe.

The smallholder households are involved in both agricultural production and consumption decision making. Understanding how these smallholder farmers make decisions therefore requires good data on household characteristics, consumption and food security as well as agricultural production. The combination of the APM with other modules in the PICES survey makes this possible by providing a unique dataset to assess agricultural productivity from a farm household decision-making perspective.

The Agricultural Productivity Module was guided by a subcommittee of the PICES Technical Committee chaired by the MLAWCRR. This report presents a first set of tabulations from the very rich survey dataset presenting some of the basic parameters of the smallholder farm sector.

ZIMSTAT is particularly grateful to the MLAWCRR for chairing the APM sub-committee and to the World Bank for providing financial and technical assistance. I would also want to thank the

respondents who provided information during the survey and the PICES technical team and field staff who were involved in making this exercise a success.

Taguma Mahonde
Director-General
Zimbabwe National Statistics Agency
September 2019

Executive Summary

Chapter 1: Introduction and Sampling Design

The importance of the APM has been highlighted in this Chapter. The data from the APM was used to analyze productivity in smallholder agricultural sector in Zimbabwe. The survey was conducted in Communal Lands, A1 Farms, Old Resettlement Farms and Small Scale Commercial Farms. The survey is representative for each of these four farm types and at national level. This report consists of ten chapters listed as follows:

- Introduction and Sample Design
- Household Characteristics and Plot Details
- Input Use
- Field Crop Harvest and Field Crop Disposition
- Livestock Production, Livestock Holdings and Animal Costs
- Agricultural Capital
- Command Agriculture
- Agricultural Credit and Extension Services
- Food and Nutrition Security
- Appendix Tables

The APM data was collected in two rounds, that is, post-planting and post-harvest, designed to coincide with major periods of the main agricultural season in the country. The post-planting data collection was conducted between April and June 2017 while the post-harvest data collection occurred between September and November 2017. The sizes of all farm plots were measured using Global Positioning System (GPS). A total sample of 2 528 households was selected for the APM Survey from the PICES 2017 households. A total of 2 338 households were successfully interviewed giving a 92.5 percent response rate.

Chapter 2: Household Characteristics and Plot Details

In this Chapter, it was highlighted that A1 Farms and Old Resettlement Areas had the highest average household size of 5.3 persons, followed by Communal Lands with 5.1 persons. About 64 percent of agriculture households in the smallholder agricultural sector were headed by males compared to 36 percent for females.

It was noted that 54 percent of persons responsible for decision making in the smallholder agricultural sector were females. Additionally, it was established that there were more female decision makers than male decision makers. It was also shown that A1 Farms had the highest percentage distribution of parcels with documentation (51.6 percent) while 80.1 percent of the parcels in Small Scale Commercial Farms had no documentation. Women accounted for at most 43.5 percent of persons involved in agricultural activities in all sectors.

Almost all households in the smallholder agricultural sector cultivated crops (98.7 percent) while 88.0 percent of the households kept livestock. Out of a total of 2 307 holdings in the smallholder sector the average arable area of land holding was 1.8 hectares, while average area under crop was 1.6 hectares.

The area under irrigation varied between 2.7 percent and 39.5 percent. The largest proportion of the area under smallholder irrigation, was located in A1 Farms (39.5 percent), followed by Old Resettlement Areas (36 percent) while Small Scale Commercial Farms had only 2.7 percent of the total irrigation area.

Chapter 3: Input Use

Chapter 3 has shown that the use of certified seeds was higher than use of uncertified seeds in the smallholder agricultural sector and for all types of crops. About 51.8 percent of the households in Communal Lands used purchased white maize seed. In Small Scale Commercial Farms 65.9 percent of the households used purchased white seed compared to 64.6 percent for households in A1 Farms and 63.9 percent for households in Old Resettlement Areas.

The proportion of farm households that used inorganic fertilizer was highest in Small Scale Commercial Farms (75.6 percent of farmers used some) and A1 farmers (70.8 percent). It was lowest in Communal Lands (55.2 percent). The use of organic fertilizer is lowest among A1 farmers (35.8 percent) followed by Communal Lands (48.1 percent).

Most of the inputs used by households were purchased by farm households themselves while Government supported input schemes also played a role. The proportion of farm inputs supported by government in terms of value was around US$ 50 per ha while the amount farm households bought themselves was around US$ 150 per ha. The average cost of using tractor services and animal tractor services for the smallholder sector was US$18.9 per hectare.

Chapter 4: Field Crop Harvest and Field Crop Disposition

The results in Chapter 4 reveal that, 13.3 percent of the households in Communal Lands sold their produce compared to 38.9 percent in Small Scale Commercial Farms. In A1 Farms 35.3 percent of households sold white maize compared to 32.9 percent in Small Scale Commercial Farms. Twenty nine percent of the households in Old Resettlement Areas sold white maize while 12 percent of the households in Communal Lands also sold white maize.

Nationally only soya beans had a yield exceeding 1000 kilogrammes per hectare while the yield of most crops were below 1000 kilogrammes. The yield for white maize in Communal Lands was 735 kilogrammes per hectare. The highest yield for the white maize was in Small Scale Commercial Farms with 1 443 kilogrammes per hectare, followed by 1 158 kilogrammes per hectare in A1 Farms. The yield for white maize for the Old Resettlement Areas was 931 kilogrammes per hectare which compares favourably with the national average yield for maize. In general, the yield for most crops was less than expected.

Chapter 5: Livestock Production, Livestock Holdings and Animal Costs

Chapter 5, indicates that for households owning cattle, the major diseases which affected large ruminants or cattle were black leg, foot and mouth and lumpy skin disease. The proportion of households which vaccinated large ruminants against black leg ranged from 40.2 percent among A1 Farms who owned these animals to 47.7 percent among farm households in Old Resettlement Areas. The proportion of households that vaccinated against lumpy skin disease ranged from 22.0 percent in Old Resettlement Areas to 47.4 percent in Small Scale Commercial Farms. It was further depicted that of the households which vaccinated their livestock, 27.4 percent vaccinated cattle against black leg while 23.9 percent vaccinated cattle against foot and mouth disease.

The proportion of farm households selling cattle milk during the first eight months of 2017 was lowest for Communal Lands (16.9 percent) while in the other farm household categories it varies between 27 and 34 percent. The average quantity of milk sold was highest for Old Resettlement Areas (218 litres for a total amount of US$ 285 on average). These figures were only half as high for A1 farmers and lowest for communal lands (29 litres). Poultry farmers sold on average 44 dozen eggs during this period for on average US$128.

Chapter 6: Agricultural Capital

In general, the ownership of tractors, the major productive assets needed for agriculture production, is very low for households in the smallholder agricultural sector. The proportion of households owning tractors ranged from 0.1 percent in Communal Lands to 7.7 percent in Small Scale Commercial Farms. Use of tractors was most common in Small-Scale Commercial Farms (18.7 percent) followed by A1 Farms (10.0 percent). Use of animal traction varied between 89 percent among farm households in Old Resettlement Areas and 69 percent in Small Scale Commercial Farms.

Only 0.2 percent of A1 farmers had one. Ownership of animal drawn implements is highest (65 percent) for farmers in Old Resettlement Areas, while this is 48-56 percent for farmers in the other farm sectors. Using a water pump was most common among A1 farms and Small Scale Commercial Farms (7 percent used one).

Chapter 7: Command Agriculture

The inputs provided under the Command Agriculture Programme included fertilizers, herbicides, lime, diesel, pesticides, maize seed and wheat seed. It was noted that 8.0 percent of the households in A1 Farms received at least one input under the Command Agriculture programme compared to 7.7 percent for households in Small Scale Commercial Farms. Moreover, 6.2 percent of the households in Old Resettlement Areas received agricultural inputs under the Command Agriculture Programme compared to 1.9 percent or households in Communal Lands.

The most frequently received input under Command Agriculture was maize seed. The proportion of farm households receiving this input was highest among A1 farms with 7.8 percent receiving this input, and lowest among communal farmers 2.2 percent. The second most commonly received

input under command agriculture was Compound D fertilizer with proportions varying between 4.7 percent and 0.6 percent, depending on farm type.

The maize yield under Command Agriculture in Communal Lands was 1.7 tonnes per hectare compared to 3.0 tonnes per hectare in Small Scale Commercial Farms. The maize yield under the Command Agriculture Programme in A1 Farms was 1.8 tonnes per hectare while it was 2.0 tonnes per hectare in Old Resettlement Areas.

The proportion of farmers who had applied or intended to apply for Command Agriculture for the 2017/2018 season was highest among farmers in Old Resettlement Areas (26 percent compared to 8.2 percent who applied in the 2016/2016 season), followed by A1 farmers (19.4 percent compared to 10 percent in the previous season).

Chapter 8: Agricultural Credit and Extension Services

In this Chapter it was shown that slightly less than six percent of the households in the smallholder agricultural sector were able to access agricultural credit loans. The access to credit loans varied from 2.1 percent for households residing in Communal Lands to 5.8 percent for households residing in A1 Farms. The proportion of households receiving agricultural credit loans in Old Resettlement Areas was 5.4 percent compared to 4.4 percent for households residing in Small Scale Commercial Farms.

Slightly over half of the households who accessed agricultural credit received it from contract farming institutions while 16 percent received credit from friends and relatives. Banks and microfinance institutions gave 8 percent each of the agricultural loans to households. Saving Associations only provided 1 percent of agricultural loans to households.

The average amount borrowed per household in the A1 Farms was U$876 followed by US$600 in Small Scale Commercial Farms. The least average loan amounting to US$339 was accessed by households in Communal Lands. The average amount of money borrowed for Contract Farming ranged from US$700 in Small Scale Commercial Farms to US$1 085 in Old Resettlement Areas.

About 41 percent of the households applied for loan but were denied access to loans due to lack of collateral security, while 39 percent applied but were unsuccessful for other reasons. Sixteen percent of the households were not given loans because they lacked guarantors and so did not qualify for a loan. Only 2 percent of the households indicated that they had a bad credit history.

The proportion of farmers accessing government agricultural extension services varied between 69 percent among A1 farms to 78 percent among Old Resettlement Areas. They most commonly received advice was on new seed varieties and fertilizer use.

Chapter 9: Food and Nutrition Security

This Chapter presents findings on the food and nutrition security situation in the smallholder agricultural sector. In this Chapter it has been shown that the peak hunger period for the 2016/17

agricultural season was experienced from October 2016 to January 2017. Furthermore, the proportion of households who were food insecure in October 2016 was 42.9 percent and this proportion increased to 44.9 percent in January 2017. It was elucidated that the main causes of food insecurity included drought, inadequate household food stocks due to pest damage, low production and small land size.

In the Communal Lands, 56.8 percent of households indicated that they experienced food shortages, followed by 44.6 percent for Small Scale Commercial Farms. In Old Resettlement Areas 29.1 percent of households indicated that they experienced food shortage. The peak hunger period was experienced from November 2016 to January 2017 where between 57.5 percent and 59.9 percent respectively of the households indicated that they experienced food shortages.

It was highlighted that in Old Resettlement Areas 82.4 percent of the households had 'acceptable' food consumption patterns. Generally, 69.5 percent of the households in the smallholder agricultural sector had acceptable consumption patterns while 25.8 percent of the households had 'borderline' food consumption patterns. Only 4.7 percent of households in the smallholder sector had 'poor' food consumption patterns. The favourable food consumption scores were attributed to a good 2016/17 agricultural season.

The average number of meals per day consumed by children aged between 0-59 months was 5.7 per day, while household members of five years and above consumed an average of 2.4 meals per day. Households in the Old Resettlement Areas had the highest average number of meals consumed of 2.6 meals per day while Communal Lands had an average of 2.4 meals per day.

1. Introduction and Sample Design

1.1. Introduction

The Agricultural Productivity Module (APM), is a nationally representative survey on agricultural productivity in Zimbabwe. The survey covers four smallholder farming sectors namely Communal Lands (CL), Small Scale Commercial Farms (SSCF), Old Resettlement Areas (ORA) and A1 Farms. The APM data was collected in two rounds, that is, post-planting and post-harvest, designed to coincide with major periods of the main agricultural season in the country. The post-planting data collection was conducted between April and June 2017 while the post-harvest data collection occurred between September and November 2017. The APM was guided by a sub-technical committee, consisting of MLAWCRR, ZIMSTAT, the Food and Nutrition Council and the World Bank. In turn, the APM Technical Committee operated under the guidance of the PICES 2017 Technical Committee.

The APM is a survey of smallholder households. The data was collected from a subsample of the households that were interviewed in 2017 Poverty, Income, Consumption and Expenditure Survey (PICES). Information on household characteristics, education, housing, etc. for these households was collected in the main PICES data collection. The sample excluded the A2 farmers and other large-scale commercial farmers as (i) their managers and cultivators did not always live in the local area; and (ii) the large farm sizes of large scale commercial farms made them less suitable for plot size measurement.

1.2. Objectives

The broad objective of the APM Survey was twofold:

(1) To collect, analyse and disseminate high-quality household data on agriculture and welfare by introducing an additional innovative module to a subsample of the PICES 2017 survey; and

(2) To strengthen national statistical capacity for the collection and analysis of policy relevant data.

1.3. Background and Context of Agriculture in Zimbabwe

Zimbabwe has five agro-ecological regions or natural regions, which are distinguished by annual rainfall, temperature, agricultural productive potential of the soils, and vegetation. Intensity of farming activities varies across these natural regions. Region one (specialized and diversified intensive farming) receives more than 1 000 mm of rainfall per annum. The main agricultural activities include forestry, fruit production and intensive livestock rearing. It covers 7 000 km2 (less than 2 percent of total area of Zimbabwe). Region two (intensive farming) receives between 750-1 000 mm of rainfall per annum. It specializes in crop farming and intensive livestock rearing, and covers 58 600 km2 (15 percent of total area). Region three (semi-intensive farming) receives between 650-800 mm of rainfall per annum and specializes in livestock rearing, fodder and cash crops. It has marginal production of maize, tobacco, and cotton and covers 72 900 km2 (19 percent of total area). Region four (extensive farming) receives 450-650 mm of rainfall per annum. It specializes in extensive livestock breeding and the cultivation of drought-resistant crops. It covers 147 800 km2 (38 percent of total area). Finally, Region five (semi-extensive farming) receives too

low and erratic rains for even drought-resistant crops. It specializes in extensive cattle and game ranching and covers 104 400 km2 (27 percent of total area).

According to ZIMSTAT, agriculture contributed on average 9.9 percent of the Gross Domestic Product (GDP) between 2012 and 2016. The main commercial agricultural products in Zimbabwe are maize, tobacco, cotton, sugar, horticultural crops, beef, fish, poultry, groundnuts, wheat, and soya beans. About 70 percent of population derive their livelihood from agriculture and one third of the formal labour force is found in this sector. The greatest challenge of the agricultural sector in Zimbabwe is low productivity. Over the years, the agricultural sector performance has been severely hampered by lack of agricultural inputs, lack of finance, high input costs, and recurrent droughts. Zimbabwe's economic growth is for an important part underpinned by growth in the agricultural sector.

The agricultural sector is vulnerable to climate change and extreme weather conditions which further exacerbate low productivity. Zimbabwe's intermittent droughts are strongly correlated to the occurrence of El Niño events. Devastating droughts experienced over the past ten years included the 2011/12 and 2015/16 agricultural seasons which negatively impacted on agriculture production. In both cases, Government had to import cereals from neighbouring countries.

In addition, the agricultural sector has faced numerous challenges. Since the fast track land reform in the year 2000, crop and livestock production and productivity have significantly declined, reflecting inadequate management of precious farm resources. There is a shortage of financing in the agricultural sector, mainly due to high perceived risks. The other challenge is the high cost of borrowing, and a lack of formally recognized collateral among the new farmers. Furthermore, public expenditure on known key drivers of agricultural growth such as extension services, irrigation, research and development, and feeder roads, is limited.

However, due to good rainfall and stimulated by the introduction of input support scheme through the special maize and wheat programme (known as "Command Agriculture"), Zimbabwe produced a record maize harvest of over 2.4 million tonnes in the 2016/17 season. The special programme has been expanded to include wheat, livestock, soya beans, and cotton production.

Agriculture in Zimbabwe is divided into four major sectors namely:

Large Scale Commercial Farms (LSCF)

Large Scale Commercial Farms are those geographically located in the areas occupied by former white commercial farmers. This farming sector is generally well financed, capitalised and produces crops and livestock including horticulture on a large scale. The number and area of large-scale commercial farms has been decreasing during the past twenty-two years mainly due to the Government's land reform programme. Large Scale Commercial Farms were excluded from the survey because their information can be easily accessed from the Agriculture and Livestock surveys conducted by ZIMSTAT and agricultural data from MLAWCRR .

Small Scale Commercial Farms (SSCF)

Small Scale Commercial Farms were formerly called 'native purchase areas' during the period of minority rule which at the time were areas where African farmers could farm commercially. There are approximately 9 655 Small Scale Commercial Farms in Zimbabwe with an average size of 148

hectares. Small Scale Commercial Farms occupy 4 percent of all land. An individual farmer was given a farm to undertake crop and livestock production. Recently, the number of households in the farm has increased since the families are increasing in numbers. Farmers in this sector have title deeds as form of ownership of land. It was a lease with option to purchase- deed of grant.

Old Resettlement Schemes (ORA)

These came into existence following the Government's early land redistribution programme. From 1982 to 1998, the government bought land from Large Scale Commercial Farms on willing buyer willing seller basis and resettled farmers from Communal Lands. The farmers were resettled on an individual family basis or as co-operatives. Five models were used in resettling the farmers and these are as follows:

Model A: The individual family holding is five hectares plus a common grazing land for livestock. The homesteads are in villages and fields are in designated areas.

Model B: Members of a co-operative were given an area to operate as a unit. Some of the co-operatives are now defunct and the members now operate on an individual basis. Thus, there are two Model Bs namely B1 - still a co-operative and B2 - individualised.

Model C: Farmers from Communal Lands were given additional land in the neighbouring large scale commercial area where they operate as a co-operative. This model was operational in two districts of Manicaland province but no longer exist.

Model D: Farmers were resettled in cattle ranching areas. This model was mainly found in Matabeleland South province but no longer exist.

Model E: (Self-Contained Units): Farmers were resettled similar to the Small Scale Commercial Farms where an individual has a farm where crop and livestock production is carried out within the farm unit. The average farm size is 50 hectares.

A1 and A2 Farms

The government implemented the accelerated land reform programme in the early 2000s. In this programme, farms were acquired from Large Scale Commercial Farms and farmers from Communal Lands (CL) and urban areas were resettled into two accelerated resettlement models namely A1 and A2 Farms.

A1 Farms: This model is where an individual family farm consists of at least six hectares (depending on natural regions) plus a common grazing land for livestock. The homesteads are in villages and farmers have fields at a designated area. This sector includes self-contained A1 Farms. Under this model farm offer letters are issued to farmers.

A2 Farms: This is the commercial model of the accelerated land reform programme where farmers are resettled in such a way that an individual has a farm where crop and livestock production is carried out within the farm. The farm sizes depend on natural regions. Under this model farmers are given offer letters and 99 years lease agreements. The lease respect both genders as it can be issued to both spouses jointly or to women in their own right. A2 farms were excluded from the APM survey as the survey concentrated on the agricultural smallholder sector of Zimbabwe.

The accelerated resettlement models maintain the boundaries of the former Large Scale Commercial Farms whilst the Old Resettlement Areas are composed of a number of the former Large Scale Commercial Farms.

Communal Lands (CL)

Farmers live in villages and have areas for cropping and common grazing lands. Agricultural production is mainly for subsistence with the surplus being sold to the market. The population in the Communal Lands makes up to about 51 percent of Zimbabwe's population. The sector occupies 42 percent of total land area.

1.4. Agricultural Productivity

Agricultural productivity is measured as the ratio of agricultural outputs to agricultural inputs. While the production of individual products is usually measured by weight, the varying density makes measuring overall agricultural output difficult. Therefore, output is usually measured as the market value of the final output. This output value may be compared against many different types of inputs such as labour and land (yield). These are called partial measures of productivity.

Agricultural productivity may also be measured by total factor productivity (TFP) which compares an index of agricultural inputs to an index of outputs. This measure of agricultural productivity was established to remedy the shortcomings of the partial measures of productivity; notably, it is often hard to identify the other factors that caused them to change. Changes in TFP are usually attributed to technological improvements

1.5. The APM Sample Design

As mentioned, the APM survey households were a sub sample chosen from the PICES households. The 2017 PICES sample was drawn from the 2012 population census frame. The census frame is a complete list of all census EAs created for the 2012 population census. In total there were 18 890 rural EAs in the 2012 population census frame. The average EA size was about 100 households for both urban and rural areas. The EA size is an adequate size for being a primary sampling unit (PSU) with a sample take of 14 households per EA for the 2017 PICES. The size of the EAs and the availability of sketch maps and other materials to delimitate their geographic boundaries made census EAs an ideal unit for use as the frame for the first stage of the selection of the PICES and APM sample. Table 1.1 to Table 1.3 show the distribution of enumeration areas, households and population by urban and rural areas.

Table 1.1: Distribution of EAs in 2012 Zimbabwe Census Frame by Province, Urban and Rural Stratum

Province	Urban	Rural	Total
Bulawayo	1 682	-	1 682
Manicaland	673	3 340	4 013
Mashonaland Central	162	2 451	2 613
Mashonaland East	463	2 843	3 306
Mashonaland West	839	2 298	3 137
Matabeleland North	165	1 343	1 508
Matabeleland South	218	1 280	1 498
Midlands	981	2 230	3 211
Masvingo	372	2 907	3 279
Harare	4 920	198	5 118
Total	**10 475**	**18 890**	**29 365**

Table 1.2: Distribution of Households in 2012 Zimbabwe Census Frame by Province, Urban and Rural Stratum

Province	Urban	Rural	Total
Bulawayo	165 332	-	165 332
Manicaland	72 809	341 345	414 154
Mashonaland Central	15 904	244 161	260 065
Mashonaland East	45 763	277 871	323 634
Mashonaland West	84 546	230 769	315 315
Matabeleland North	18 616	142 999	161 615
Matabeleland South	21 187	126 764	147 951
Midlands	97 268	221 602	318 870
Masvingo	37 364	293 692	331 056
Harare	509 799	28 564	538 363
Total	**1 068 588**	**1 907 767**	**2 976 355**

Table 1.3: Distribution of Population in 2012 Zimbabwe Census Frame by Province, Urban and Rural Stratum

Province	Urban	Rural	Total
Bulawayo	649 835	-	649 835
Manicaland	269 784	1 433 139	1 702 923
Mashonaland Central	64 186	1 087 550	1 151 736
Mashonaland East	179 210	1 129 572	1 308 782
Mashonaland West	337 691	1 004 323	1 342 014
Matabeleland North	63 643	621 763	685 406
Matabeleland South	82 623	574 569	657 192
Midlands	376 605	1 041 162	1 417 767
Masvingo	135 134	1 317 084	1 452 218
Harare	1 938 469	109 818	2 048 287
Total	**4 097 180**	**8 318 980**	**12 416 160**

The APM sample of households was drawn from the PICES 2017 Survey whose data collection period was from January 2017 to December 2017. The PICES 2017 was based on a sample of 32,256 households which provides representative estimates at province and district levels. The PICES survey was a 12 month survey with 2 688 households interviewed each month. The APM consisted of two interview rounds, post planting and post harvesting. The first round took place after planting during March-May 2017 while the second round took place from September to November 2017.

To select the APM subsample a two-stage sample design was used. The first stage involved the selection of enumeration areas from the PICES EAs that were in the March, April, and May 2017 sample. The EAs were selected using the Probability Proportional to Size (PPS) sampling method. The measure of size was the number of households enumerated during the 2012 population census. The PPS procedure assigns each sampling unit a specific chance to be selected in the sample before the sampling begins, and the chance is proportional to its measure of size.

The second stage involved the selection of households from a sample of PICES households using random systematic sampling method. Systematic sampling (SYS) is the selection of sampling units at a fixed interval from a list, starting from a randomly determined point. Selection is systematic because selection of the first sampling unit determines the selection of the remaining sampling units. The sample design strategy allowed for representativeness at national level as well as for Communal Lands, Small Scale Commercial Farms, A1 Farms, and Old Resettlement Areas.

1.6. Selection of Households

The households were selected using Random Systematic Sampling (RSYS) method for EAs in APM Survey. A sample of 8 households per EA was selected from Communal Lands and Resettlement Areas and a census of all PICES households (i.e. 14 households) was taken for EAs in the A1 Farms and the Small Scale Commercial Farms (SSCF). A reserve of four extra households was selected per EA for replacement purposes, in case a selected household in the Communal Lands and Old Resettlement Areas was not an agricultural household.

1.7. Sample Size

A total of 2 552 households were sampled for the APM survey as shown in Table 1.4. See Tables 1.4 and 1.6. The sample size was arrived at after careful considerations on available financial resources and time as advised by a World Bank sampling expert.

Table 1.4: Allocation Plan of EAs and Households over the Sampling Strata

Land Use Sector	Number of PICES EAs in March, April and May	Number of EAs Selected for APM	Households per EA selected for APM	Total number of APM Households
CL	349	160	8	1 280
SSCF	9	9	14	126
A1, A2, LSCF	35	35	14	490
ORA (A1, A2)	82	82	8	656
Urban	100	-	-	-
Other urban	1	-	-	-
Total	**576**	**286**		**2 552**

The APM survey focused on rural smallholder households engaged in agricultural activities. Thus urban and related EAs and households were not covered. As mentioned, A2 Farms and Large Scale Commercial Farms were not included in the APM survey but the EAs and households were included in the PICES 2017 survey.

1.8. Sample Coverage

Table1.5 shows the distribution of EAs and households covered in the APM survey by province.

Table 1.5: Distribution of EAs Covered in the APM after Survey Implementation

	Number of EAs by Sector				
Province	**CL**	**ORA**	**A1 Farms**	**SSCF**	**Total**
Manicaland	19	18	1	-	38
Mashonaland Central	24	3	8	1	36
Mashonaland East	22	13	4	1	40
Mashonaland West	9	10	11	1	31
Matebeleland North	17	8	3	3	31
Matebeleland South	20	9	2	1	32
Midlands	23	9	3	-	35
Masvingo	23	9	4	1	37
Total	**157**	**79**	**36**	**8**	**280**

The final sample coverage after survey implementation is depicted in Table 1.6.

Table 1.6: Distribution of EAs, Households and Response Rates by Province after Survey Implementation

Province	Number of EAs	Number of Sampled Households	Number of Households Successfully Interviewed	Response Rates
Manicaland	38	302	301	99.7
Mashonaland Central	36	344	292	84.9
Mashonaland East	40	350	339	96.9
Mashonaland West	31	338	304	89.9
Matabeleland North	31	284	262	92.3
Matabeleland South	32	280	269	96.1
Midlands	35	304	260	85.5
Masvingo	37	326	311	95.4
Total Sample	**280**	**2 528**	**2 338**	**92.5**

1.9. Survey Instruments

Data were collected through interviews using paper questionnaires. Data on plot area measurement and coordinates of households' dwellings were collected using Global Positioning System (GPS) instruments. Training workshops were conducted in Gweru in two phases as follows:

Phase 1: APM First Round

(i) Training of Trainers Workshop from 23 to 25 February 2017.
(ii) Training of Enumerators Workshop from February 28 to 4 March 2017.

Phase 2: APM Second Round

(i) The Second-Round Training of Trainers from 17 to 21 August 2017.
(ii) The Second-Round Training of Enumerators from 23 to 28 August 2017.

The Training of Trainers' workshop was conducted with the objective of training Head Office Supervisors and Provincial Supervisors who would in turn train enumerators on APM survey concepts and definitions and how to conduct the whole APM survey.

The main objectives of the training of enumerators' workshop were to:

- Train enumerators on how to administer the APM questionnaires to the selected households
- Understand the survey instruments
- Pre-test the survey instruments

The training workshop consisted of both theoretical and practical instructions which included interviewing techniques and field procedures. A detailed review of questions in the questionnaires,

mock interviews between training participants, class exercises, field practice, and exams were the main components of the training of enumerators' workshop.

1.10. Data Collection

Post planting data collection was carried out from 28 March to 17 June 2017 by eight mobile teams with one team per province. All provinces were selected except Harare and Bulawayo which are the main urban provinces of Zimbabwe. Each mobile team comprised of a team leader, a data entry person, a driver and 5 enumerators. Each team would move to an EA, interview all selected households in that EA including plot measurements, and move to another EA until all the EAs and households in the assigned province were covered. The data collected was entered on laptops whilst in the field. Second entry and verification of APM data was done at the Head Office. The second-round data collection was conducted from 10 September to 9 November 2017, using the same approach.

A Non Standard Unit Survey (NSUM) was conducted during the APM Survey period in 2017. Non-standard units obtained from the survey were used to convert output to standard units using conversion factors from the market survey. This was done with the use of the quantities of maize measured from markets during the Non Standard Measurement Survey 2017 round one and two.

An important aspect of data collection was to ensure that all households in the survey were covered. The following efforts were made towards minimising non-response:

a) **Activities Before Data Collection included**:

- The survey was announced through electronic and print media
- Sensitization was done at all the country's administrative offices and local level leadership
- Preparation of proper identification particulars for the field teams.

b) **Activities During Data Collection consisted of**:

- Identifying sampled households and competent respondents before administering the questionnaire.
- Checking for completeness and consistency of questionnaires before leaving the households.
- Continuous monitoring and evaluation of the data collection process through the three levels of supervision: that is, Head Office Supervisors, Provincial Supervisors and Team Leaders.
- Maintaining good flow of communication among all levels of staff.
- Good presentation and communication practices, including keeping of appointments made with respondents by field staff.
- Assuring confidentiality of information collected.
- Timeously resolving problems that arise during data collection.

c**) Data Entry and Verification**

The first data entry process was done in the field

- A total of eight data entry clerks were trained on how to capture APM data.
- The data entry clerks also participated in the training of enumerators' workshop so that they get an appreciation of the questionnaire.
- Each data entry clerk was attached to a provincial APM team.
- The data entry template had inbuilt checks i.e. valid-value, valid-range, consistency, and missing-value alerts on each electronically captured field.
- In the event that inconsistencies were identified during fieldwork, data entry would be immediately rectified while enumerators were in the field.
- The second data entry and data verification were done separately after the data collection period had been completed.

1.11. Summary

The purpose and the design of the APM has been highlighted in this Chapter. The data from the APM serve to analyse productivity in smallholder agricultural sector in Zimbabwe. The survey is representative for Communal Lands, A1 Farms, Old Resettlement Farms and Small Scale Commercial Farms. A total sample of 2 528 households were selected for the APM Survey from the PICES 2017 households. A total of 2 338 households were successfully interviewed giving a 92.5 percent response rate.

2. Household Characteristics and Plot Details

2.1 Introduction

This Chapter starts by giving a brief description of land holding in Zimbabwe so as to give the tables in this report some perspective. Apart from discussing land holding issues, this chapter also presents characteristics of the households which were chosen for the APM survey. It provides information on the number of households in each of the agricultural sectors covered by the survey; average household size; characteristics of the household head, household composition, parcel and plot details.

In this survey, *a private household was defined as a person or group of persons who usually live or stay and eat together whether or not they were related by blood or marriage.* Household members who were temporarily absent from the household during the interview time but would be returning to the household soon were counted as usual members of the household.

The head of the household was defined *as a member of the household, either male or female, who was the main decision maker in running of the household activities and was regarded as such by members of the household.* Before presenting the survey findings on household characteristics and plot details, it is important to know the definition of parcel and plot in the Zimbabwean context.

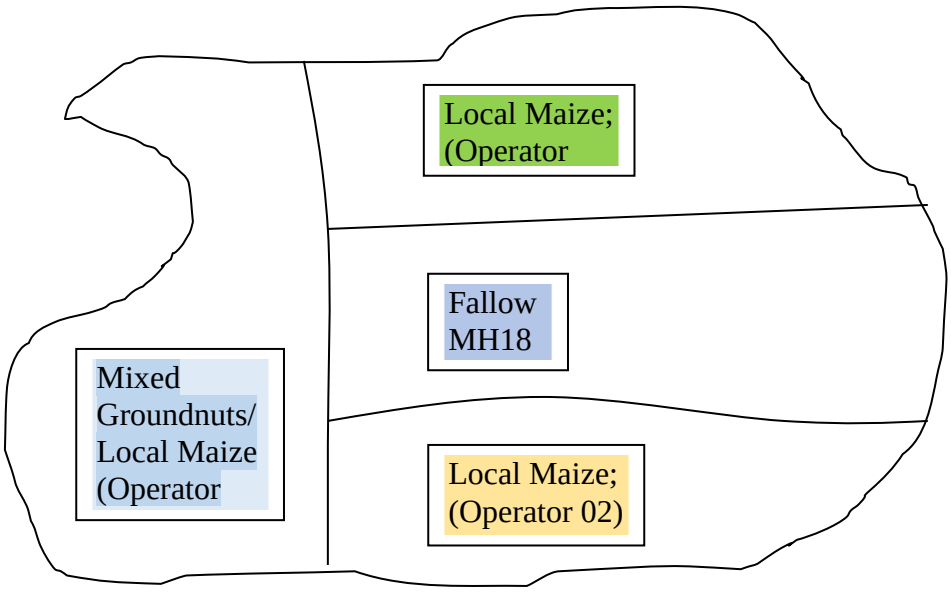
2.2 Definition and Examples of Parcels and Plots

In this agricultural productivity module survey, it was essential to identify **parcels** and **plots** that were owned or cultivated by the sampled households. In order to correctly identify these pieces of land and to link the information collected from **parcels** and **plots** during the post-planting interview with that of the information obtained during the post harvesting interview, it was important to distinguish between a **parcel** and a **plot**.

A **parcel** is a continuous piece of land that is **not** split by a river or a path wide enough to fit an ox-cart or vehicle. **A parcel** can be made up of **one** or **more** plots. A **plot** is a continuous piece of land on which a unique crop or a mixture of crops is grown, under a uniform, consistent crop management system. It **must** be a continuous piece of land and **must not** be split by a path of more than one metre in width. Plot boundaries are defined according to the crops grown and the operator.

The farmer(s) and the enumerator needed to have the same understanding regarding the definition of **parcel** and **plot** before the interview began. As there is an inherent tendency to use the word **parcel** to refer to **plot** it was important for the farmer to understand the distinction between **parcel** and **plot**. Below are some examples that are useful for distinguishing the difference between parcels and plots.

Figure 2.1: Example of One Parcel that is Divided into Four Plots



2.3 Household Characteristics

Table 2.1 shows the number of households, mean and median household sizes by sector. A1 Farms and Old Resettlement Areas had the highest average household size of 5.3 persons, followed by Communal Lands with 5.1 persons. The median household size for each sector varies between 4 and 5 persons per household.

Table 2.1: Number of Households and Mean and Median Household Size by Sector

Sector	Number of Households in the sample	Mean	Median
Communal Lands	1 186	5.1	5
Small Scale Commercial Farms	91	4.9	4
A1 Farms	457	5.3	5
Old Resettlement Areas	604	5.3	5
Total in Sample	**2 338**		

Figure 2.2 shows the percent distribution of head household by sex of household head and sector. About 64 percent of the households in the total smallholder agricultural sector were headed by males while 36 percent were headed by females. In A1 Farms, 26 percent of the agriculture households were headed by females compared to 37 percent in Old Resettlement Areas, which is lower than the other farm types. In the Communal Lands and Small-Scale Commercial Farms, 60 percent of the households were headed by males while 40 percent were headed by females.

Figure 2.2: Percent Distribution of Household Head by Sex and Sector

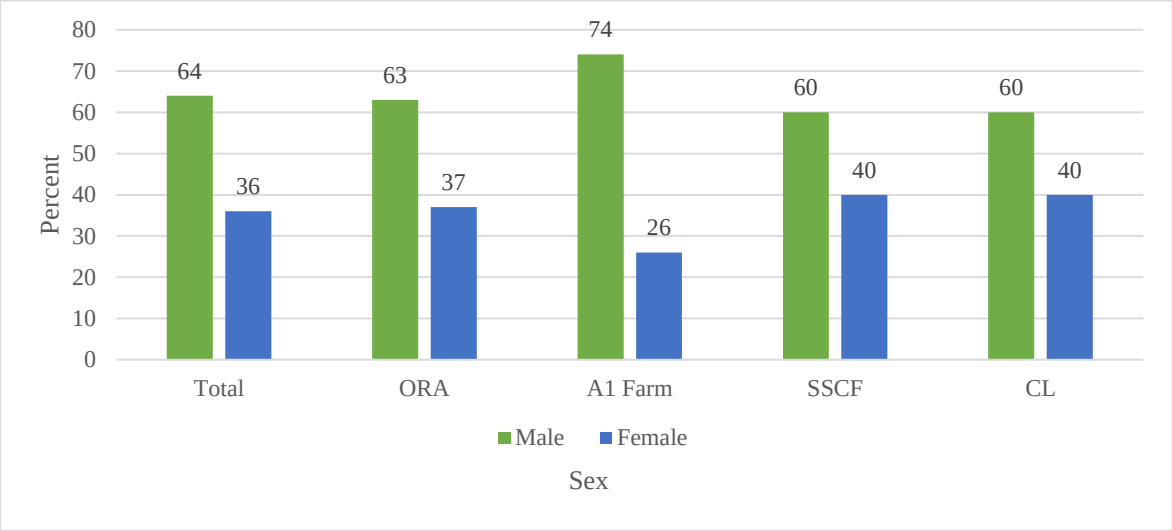


Table 2.2 shows the percent distribution of household head by age group and sector. It is shown that the 40-44 age group had the highest proportion of household head in all the sectors except for Small Scale Commercial Farms. In the 40-44 age group, the proportion of household head ranged from 10.9 percent in the Old Resettlement Areas to 13.4 percent in A1 Farms. In the Small Scale Commercial Farms the highest proportion of household head constituting 14.3 percent was in the 45-49 age group.

Table 2.2: Percent Distribution of Household Head by Age Group and Sector

Age Group	CL		SSCF		A1 Farms		ORA		Sample	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
15-19	8	0.7	-	-	2	0.4	1	0.2	11	0.5
20-24	38	3.2	5	5.5	21	4.6	18	3.0	82	3.5
25-29	55	4.6	10	11.0	36	7.9	48	7.9	149	6.4
30-34	124	10.5	3	3.3	46	10.1	61	10.1	234	10.0
35-39	136	11.5	3	3.3	56	12.3	65	10.8	260	11.1
40-44	159	13.4	11	12.1	66	14.4	66	10.9	302	12.9
45-49	109	9.2	13	14.3	51	11.2	51	8.4	224	9.6
50-54	87	7.3	8	8.8	38	8.3	47	7.8	180	7.7
55-59	88	7.4	8	8.8	37	8.1	41	6.8	174	7.4
60-64	99	8.3	10	11.0	33	7.2	63	10.4	205	8.8
65-69	100	8.4	5	5.5	32	7.0	55	9.1	192	8.2
70-74	78	6.6	6	6.6	17	3.7	30	5.0	131	5.6
75+	105	8.9	9	9.9	22	4.8	58	9.6	194	8.3
Total	**1 186**	**100.0**	**91**	**100.0**	**457**	**100.0**	**604**	**100.0**	**2 338**	**100.0**

2.4 Average and Median Age of Household Head by Sector

The mean age of the head of household was around 50 years for all sectors except in A1 Farms which had a younger mean age of the household head of 47 years as shown in Figure 2.3. The median age of the household head ranged from 45 years in A1 Farms to 50 years in Small Scale Commercial Farms.

Figure 2.3: Mean and Median Age of Household Head by Sector

N.B. Number of household heads CL =1 186 SSCF =91: A1 Farms =457; ORA =604 Total =2 338

Table 2.3 shows the reasons for not participating in agriculture for people 15 years and above. In Communal Lands 16.9 percent of people did not participate in agriculture because work was not needed compared to 42.6 percent in Small Scale Commercial Farms. About 12.3 percent of the people in Communal Lands and 12.4 percent of the people in Old Resettlement Areas did not participate in agriculture because they were going to school. Furthermore, 15.1 percent of the people in A1 Farms and 20.1 percent of the people in Old Resettlement Areas did not participate in agriculture as they were busy with other work.

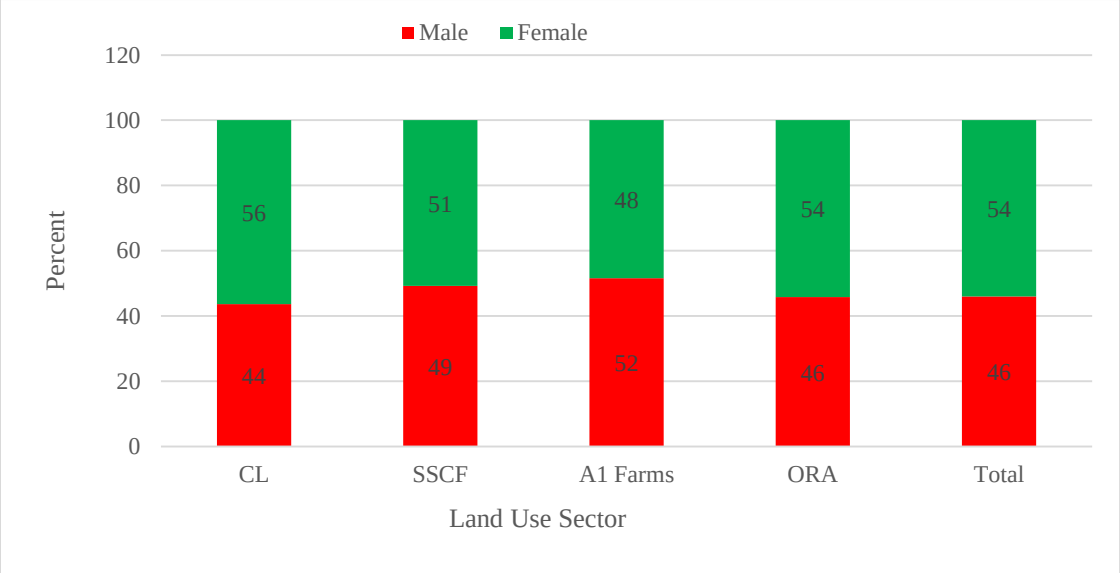
Table 2.3: Percent Distribution of Reasons for not Participating in Agriculture by Sector for persons15 years and above.

Reason	CL	SSCF	A1 Farms	ORA
Sick	18.6	6.4	12.2	17.2
Disabled	6.5	4.3	6.5	3.6
Injured	0.5	-	1.4	-
At school	12.3	6.4	13.7	12.4
Away from home	13.8	6.4	14.4	21.9
Too old	11.4	12.8	7.9	13.6
Work not needed	16.9	42.6	21.6	10.1
Busy with other work	15.3	17.0	15.1	20.1
Too young	1.0	2.1	0.7	0.6
At boarding school	0.5	-	0.7	-
Other	3.1	2.1	5.8	0.6
Total	**100.0**	**100.0**	**100.0**	**100.0**

2.5 Decision Making

Figure 2.4 shows the percent distribution of decision makers managing plots by sex and sector. The majority - 54 percent - of those responsible for decision making in the smallholder agricultural sector were females. In A1 Farms, this figure was lower (48 percent).

Figure 2.4: Percent Distribution of Plots Decision Makers Managing Plots by Sex and Sector

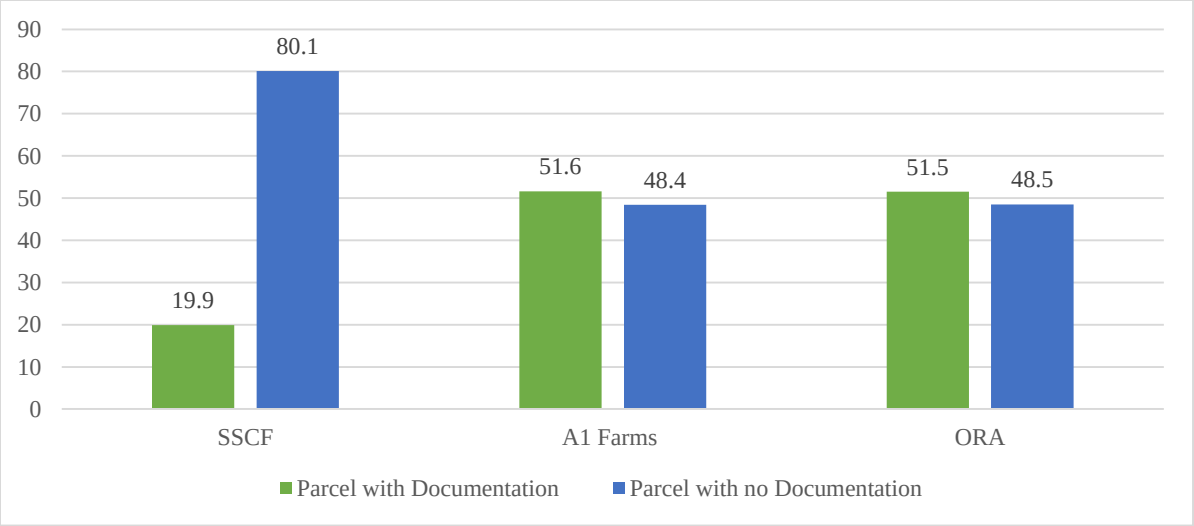


N.B. Persons in Sample CL=1 722; SSCF=122; A1 Farms =686, ORA =933, Total=3 463

Figure 2.5 shows the percentage distribution of parcels with and without documentation by sector. It was shown that A1 Farms had the highest percentage distribution of parcels with documentation

(51.6 percent) while 80.1 percent of the parcels in the Small Scale Commercial Farms had no documentation.

Figure 2.5: Percent Distribution of Parcels with Ownership Documentation by Sector Excluding Communal Lands



N.B. CL are not included as the parcels do not have documentation. Number of parcels in sample SSCF =161, A1 Farm =795 ORA =1 161

Table 2.4: shows the percent distribution of parcel documentation and ownership by type of documentation and sector. The Communal Lands parcels were owned customarily through village heads and chiefs hence they had no documentation. In Small Scale Commercial Farms 80.1 percent of the households had no documentation compared to 48.4 percent in A1 Farms and 48.5 percent in Old Resettlement Areas.

Table 2.4: Percent Distribution of Parcel Documentation and Ownership by Type of Documentation and Sector: Including Communal Lands

Type of Documentation	CL	SSCF	A1 Farms	ORA
LWOP	-	3.1	-	-
Title Deeds	-	16.2	-	0.2
A1 Offer Letter	-	-	37.0	0.8
A1 Settlement Permit	-	-	14.6	0.7
Permit	-	0.6	-	43.2
Other	-	-	-	6.7
No Document	-	80.1	48.4	48.5
CL Parcel	100.0	-	-	-
Total	100.0	100.0	100.0	100.0
Number of Households	**2 076**	**161**	**795**	**1 161**

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 2.6 shows the percentage of women involved in agricultural activities by sector. Women accounted for at most 43.5 percent of persons involved in agricultural activities in all sectors. Members 15 years and above who were involved in agriculture ranged from 76.0 percent in Small Scale Commercial Farms to 84.7 percent in Old Resettlement Areas.

Figure 2.6: Percent of Women Involved in Agricultural Activities by Sector

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 2.7 shows that 49.0 percent of the members of the household members were involved in agriculture in Communal Lands while 4.1 percent of the households members were involved in agriculture in Small Scale Commercial Farms.

Figure 2.7: Percent Household Members Involved in Agricultural Activities by Sector

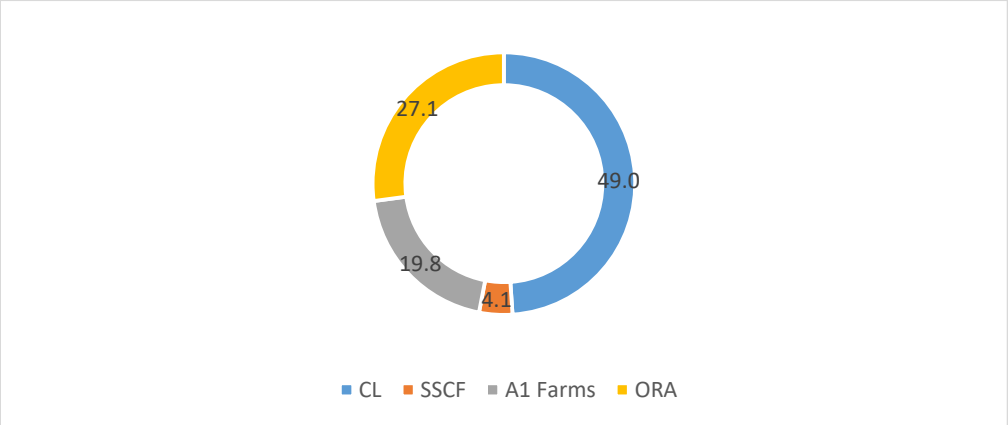


Table 2.7: shows the number and percentage of households cultivating crops and keeping livestock. Almost all households in the smallholder agricultural sector cultivated crops (98.7 percent) while 88.0 percent of the households kept livestock. Old Resettlement Areas had the highest percentage of households who kept livestock 92.6 percent while households in Small Scale Commercial Farms had the least percentage of households who kept livestock (76.9 percent).

Table 2.5: Number and Percentage of Households Cultivating Crops and Keeping Livestock

Land Use Sector	Number of households who cultivated crops	Number of households kept Livestock	Percent Households who cultivated crops	Percent households kept Livestock
CL	1 168	1 018	98.5	85.8
SSCF	86	70	94.5	76.9
A1 Farms	454	411	99.3	89.9
ORA	599	559	99.2	92.6
Sample Total	2 307	2 058	98.7	88.0

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 2.8 shows average area of land holding and area under crop in hectares by sector. The average land holding size as reported by farmers in the smallholder sector was 1.8 hectares. A1 Farms had the largest land holding size of 2.5 hectares followed by Old Resettlement Areas with 2.1 hectares. The least land holding size of 1.5 hectares was in Communal Lands. The average area under crops was highest in A1 Farms with 2.1 hectares followed by Old Resettlement Areas with 1.8 hectares. The difference between area under crop and land holding constituting 0.6 hectares was largest in Small Scale Commercial Areas which indicated reduced land use compared to other sectors.

Figure 2.8: Average Area *of Land Holding and Area Under Crop (Hectares) by Sector*

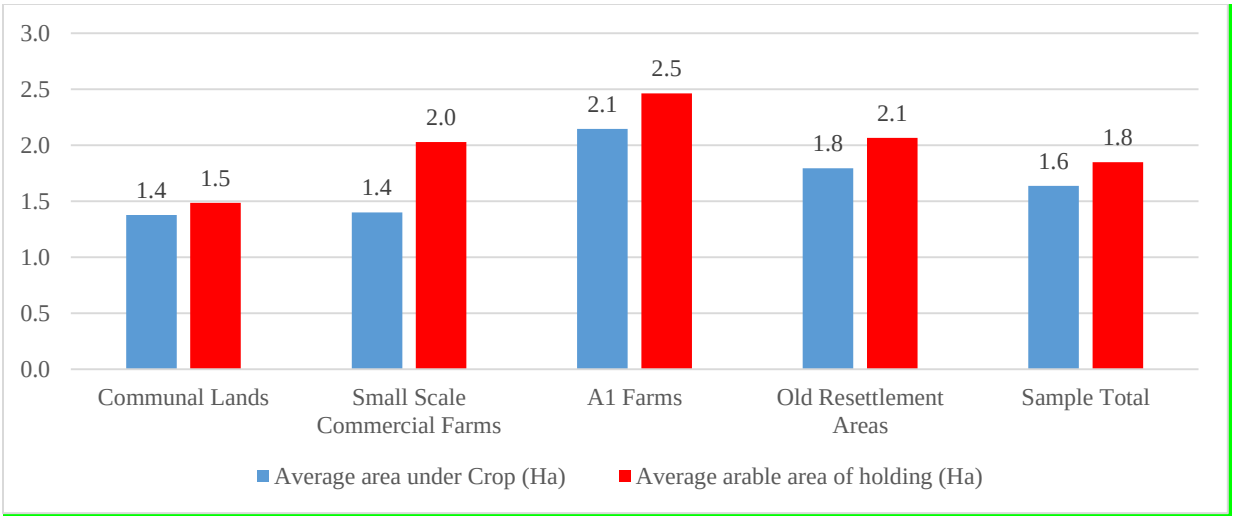
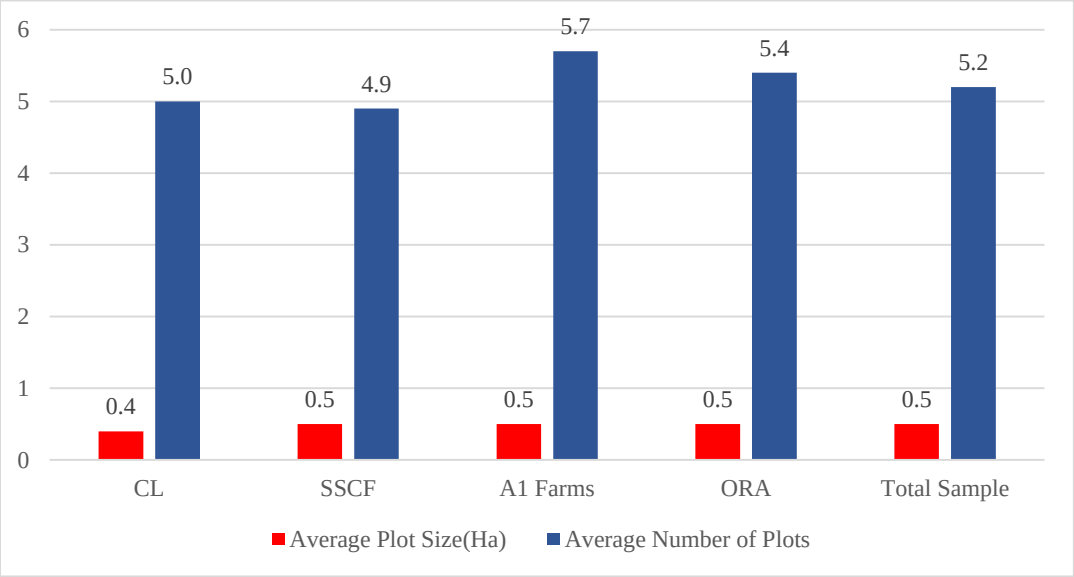


Figure 2.9 shows average plot size (hectares) and average number of arable plots per household by sector. The average number of plots in the smallholder agricultural sector was 5.2 plots per household. The average number of plots ranged from 4.9 plots per household in Small Scale Commercial Farms to 5.7 plots in A1 Farms. The average plot size for the smallholder sectors was 0.5 hectares. A1 Farms and Old Resettlement Areas had the highest average plot size of 0.5 hectares each, while the Communal Land Sector had the least plot size of 0.4 hectares.

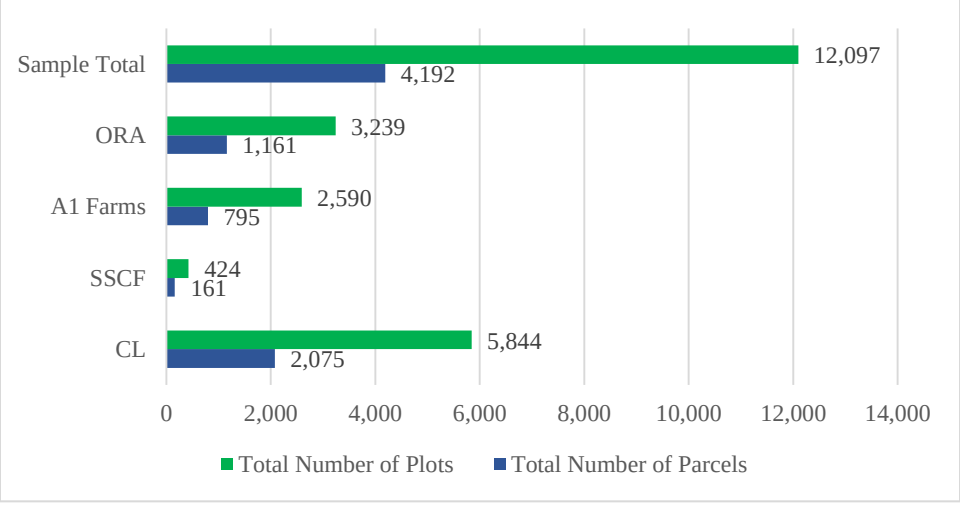
Figure 2.9: Average Plot Size (Hectares) and Average Number of Arable Plots by Sector



NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 2.10 shows the number of arable parcels and plots by sector in the sample. The definition of a parcel and a plot were elucidated in the introductory section of this Chapter on household characteristics and plot details. Figure 2.10 further shows that Communal Lands had the largest number of parcels 2 075 and plots 5 848 respectively. Small Scale Commercial Farms had the least number of parcels and plots being 161and 424 respectively.

Figure 2.10: Total Number of Arable Parcels and Plots by Sector in the sample



NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 2.6 shows the number of plots by main use and sector. In total the number of cultivated plots in the sample was 11 308 plots while the number of plots left fallow was 712. In addition, the

number of plots rented or sharecropped out in the sample was 77. The number of cultivated plots in the sample was highest in Communal Lands with 5 474 plots followed by Old Resettlement Areas 3 009, A1 Farms 2 426 and Small Scale Commercial Farms 399 plots.

Table 2.6: Number of Plots by Main Use and Sector

Land Use Sector	Number of Plots Cultivated	Number of Plots Left Fallow	Number of Plots Rented Out/Sharecropped Out*	Total Plots in Sample
CL	5 474	327	43	5 844
SSCF	399	24	1	424
A1 Farms	2 426	145	19	2 590
ORA	3 009	216	14	3 239
Sample Total	**11 308**	**712**	**77**	**12 097**

N.B. * Number of plots rented out share cropped includes given out for free, forest, woodlot, pasture and other.
NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 2.7 shows the average number of years plots were left fallow by sector. Small Scale Commercial Farms and Communal Lands had the highest number of years plots left fallow of 2 years while A1 Farms had the smallest number of years plots left fallow for 1.5 years.

Table 2.7: Mean Years Plots Left Fallow by Sector

Sector	Mean Years	Number of Fallow Plots in the Sample
Communal Lands	2.0	326
Small Scale Commercial Farms	2.0	24
A1 Farms	1.5	144
Old Resettlement Areas	1.9	215

Table 2.8 shows the percent distribution of capacity of land-use by households classified by source and sector. In Communal Lands, 64.5 percent of households were using agricultural plot granted or allocated by local or community leaders. About 27.5 percent of the households in Communal Lands reported that the land was owned by household through purchase or family inheritance. In A1 Farms, 53.5 percent of the households were given right to use land by the Government. In Old Resettlement Areas 50.8 percent of the households were given right to use land by the Government.

Table 2.8: Percent Distribution of Capacity of Use of Land by Households Classified by Source and Sector

Capacity in Use	CL	SSCF	A1 Farms	ORA	Number of Plots in Sector
Owned by household*	27.5	83.0	23.5	29.9	3 538
Granted/allocated by local/community leaders	64.5	0.2	5.2	8.8	4 192
Provided by government	1.1	4.2	53.5	50.8	3 112
Rented short-term	0.5	1.9	1.6	0.4	96
Sharecropping	0.1	-	-	0.4	20
Borrowed for free	5.0	3.8	10.0	5.3	741
Moved in without permission	0.2	-	3.3	3.0	194
Other	1.0	6.8	2.8	1.4	204
Total	**100.0**	**100.0**	**100.0**	**100.0**	**12 097**

N.B. *Owned by household Means purchased with or without title, family inheritance, gift, bride price, family allocated.

2.6 Irrigation

Figure 2.11 shows the distribution of the total area under irrigation by sector. Out of the total area under irrigation 39.5 percent of the area under irrigation was in A1 Farms, 36.0 percent was in Old Resettlement Areas while Small Scale Commercial Farms had only 2.7 percent.

Figure 2.11: Percent Area Under Irrigation in the Sample

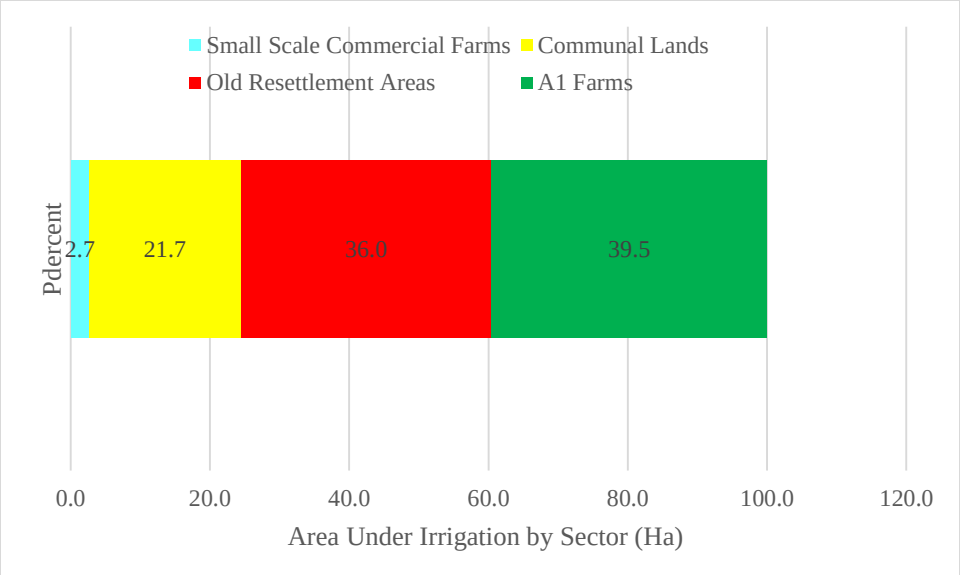


Figure 2.12 shows the distribution of the number of plots under irrigation by sector. Out of the total number of plots under irrigation 39.1 percent of the plots under irrigation were in Old Resettlement Areas, 38.5 percent were in Communal Lands while Small Scale Commercial Farms had only 3.4 percent.

Figure 2.12: Percent Total Number of Plots Under Irrigation in the Sample

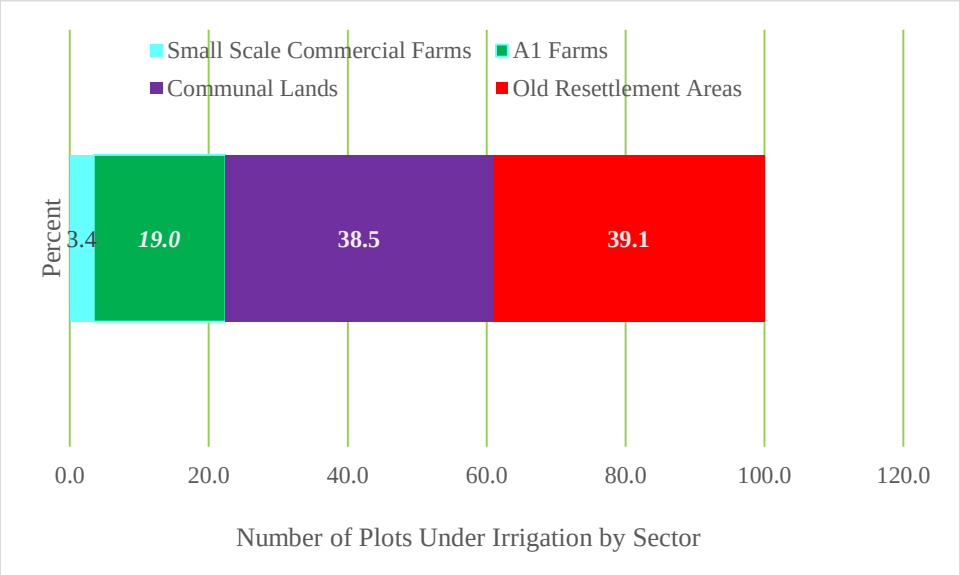


Table 2.9 shows the percent number of plots and area under irrigation by sector. The percent area under irrigation ranged from 1.3 hectares in Communal Lands to 2.9 hectares in A1 Farms. The proportion of plots irrigated ranged from 3.7 percent in A1 Farms to 8.0 percent in Old Resettlement Areas. In total 588 plots were irrigated.

Table 2.9: Percent Number of Plots and Area under Irrigation

Sector	Percent Plots Irrigated	Percent Area Irrigated	Total Area (ha) Irrigated in sample	Total Number of Plots Irrigated in the sample
Communal Lands	4.9	1.3	21.0	258
Small Scale Commercial Farms	5.8	1.5	1.8	22
A1 Farms	3.7	2.9	27.1	86
Old Resettlement Areas	8.0	2.7	28.4	222
Total Number of Plots Irrigated				**588**

Table 2.10 shows percent distribution of plots under irrigation by major source of irrigation water and sector. It is shown that 34.9 percent of plots in A1 Farms under irrigation sourced water from flood irrigation while 23.3 percent of the plots were irrigated from motor pumps. Most of the plots in the smallholder agricultural sector were irrigated from other sources. In Communal Lands 61.6 percent of the plots were irrigated from other sources compared to 45.5 percent of the plots in Small Scale Commercial Farms.

Table 2.10: Percent Distribution of Plots by Major Source of Irrigation Water and Sector

Sector	Divert Stream	Hand Pump	Motor Pump	Gravity	Sprinkler/ Centre Pivot	Drip Irrigation	Flood Irrigation	Other	Number of Plots with Irrigation in Sample
CL	3.1	4.7	5.4	11.6	3.5	0.4	17.1	61.6	258
SSCF	-	-	31.8	4.6	-	-	18.2	45.5	22
A1	4.7	7	23.3	14	8.1	-	34.9	22.1	86
ORA	9	0.5	18.5	16.7	8.6	0.9	18.9	45.1	222
Total									**588**

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 2.11 shows the percent distribution of main irrigation system on plot by type of system and sector. This table refers to a single response since the question referred to the main irrigation system. In the Communal Lands, the main irrigation system was flood irrigation constituting 32.1 percent compared to 37.9 percent for flood irrigation in A1 Farms. In Old Resettlement Areas the main irrigation system was motor pump which constituted 30.1 percent compared to 58.3 percent in Small Scale Commercial Farms for motor pump irrigation.

Table 2.11: Percent Distribution of Main Irrigation System on Plot by Type of System and Sector

Type of Irrigation System	CL	SSCF	A1 Farms	ORA	Total
Divert Stream	3.7	-	3.0	14.0	7.5
Hand Pump	4.5	-	4.5	0.7	2.9
Motor Pump	9.0	58.3	28.8	30.1	22.7
Gravity	19.4	8.3	10.6	22.1	18.4
Sprinkler/ Centre Pivot	3.7	-	10.6	5.1	5.5
Drip Irrigation	0.7	-	-	0.7	0.6
Flood Irrigation	32.1	33.3	37.9	25.0	30.5
Other	26.9	-	4.5	2.2	12.1
Total	100.0	100.0	100.0	100.0	100.0
No. of Plots with Irrigation in the Sample	**134**	**12**	**66**	**136**	**348**

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

2.7 Summary

A1 Farms and Old Resettlement Areas had the highest average household size of 5.3 persons, followed by Communal Lands with 5.1 persons. About 64 percent of agriculture households in the smallholder agricultural sector were headed by males compared to 36 percent for females.

It was noted that 54 percent of persons responsible for decision making in the smallholder agricultural sector were females. Additionally, it was established that there were more female decision makers than male decision makers. It was also shown that A1 Farms had the highest percentage distribution of parcels with documentation (51.6 percent) while 80.1 percent of the parcels in Small Scale Commercial Farms had no documentation. Women accounted for at most 43.5 percent of persons involved in agricultural activities in all sectors.

Almost all households in the smallholder agricultural sector cultivated crops (98.7 percent) while 88.0 percent of the households kept livestock. The average arable area of land holding was 1.8 hectares, while the average area under crop was 1.6 hectares.

As far as irrigation was concerned the percent area under irrigation ranged from 1.3 hectares in Communal Lands to 2.9 hectares in A1 Farms.

3. Input Use

3.1 Acquisition and Cost

This Chapter presents information on inputs used during the agricultural season 2016/2017 and also looks at how the inputs were acquired for example through Government input support programmes, free acquisition or purchase of inputs. Own-production was also considered for organic fertilizer. It should be noted that the information on inputs was collected at plot level for each input.

3.2 Certified and Uncertified Seeds

Table 3.1 shows the distribution of certified/not certified seeds by sector. The type of seed included information on whether it was certified or not certified. It was noted that the use of certified seeds was higher than use of uncertified seeds in the smallholder sectors and in all types of crops. In general, households in Communal Lands used the highest proportion of certified seeds for most crops, compared to Small Scale Commercial Farms, A1 Farms and Old Resettlement Farms. Nearly all white maize seeds and all yellow maize seeds used are certified. The largest proportion (48 percent) of white maize certified seed among smallholders (constituting 48.0 percent) is used in Communal Lands, followed by 25.9 percent in A1 Farm and 18.5 percent in Small Scale Commercial Farms. This counts for all four smallholder groups. The largest proportion of uncertified seeds is found among small grain crops and mostly in Communal Lands where these crops are most commonly planted.

Table 3.1: Percent Distribution of Certified/Not Certified Seeds by Sector

Crops	CL		SSCF		A1 Farms		ORA		
	Certified	Not Certified	Certified	Not Certified	Certified	Not Certified	Certified	Not Certified	Total
White Maize	48.0	1.6	18.5	0.8	25.9	1.0	3.9	0.3	100.0
Yellow Maize	38.5	-	15.4	-	46.2	-	-	-	100.0
Red Sorghum	53.1	12.5	6.3	-	21.9	3.1	3.1	-	100.0
White Sorghum	63.3	5.1	7.1	2.0	21.4	-	1.0	-	100.0
Pearl millet	43.8	25.0	21.9	-	6.3	3.1	-	-	100.0
Finger millet	60.0	-	40.0	-	-	-	-	-	100.0
Tobacco	13.7	-	46.0	0.4	35.4	-	4.4	-	100.0
Cotton	55.4	-	14.6	-	28.5	-	1.5	-	100.0
Groundnuts	33.8	10.3	20.6	4.4	23.5	5.9	1.5	-	100.0
Sunflowers	21.4	7.1	28.6	14.3	14.3	14.3	-	-	100.0
Soya beans	33.3	-	44.4	11.1	11.1	-	-	-	100.0

N.B. Pearl millet is mhunga or nyawuti, Finger millet is rapoko/ rukweza. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 3.2 depicts the proportion of households that used a particular type of certified seeds by crop and sector. For many crops the use of certified seed is similar for all four smallholder groups. Proportions of certified seeds use are highest for cotton, white maize, and tobacco. For cotton and tobacco nearly all farm households (94-100 percent) use certified seeds, while for white maize it varies between 73.3 percent and 76.5 percent for A1 Farms and Small Scale Commercial Farms respectively. However, for yellow maize and small grains, groundnuts, beans and sunflower the proportion of households using certified seeds is small.

Table 3.2: Percent Proportion of Households using Certified Seeds by Crop and Sector

Crop Type	CL	SSCF	A1 Farms	ORA
White Maize	73.5	76.5	73.3	75.9
Yellow Maize	12.8	-	20.0	37.5
Red Sorghum	14.2	33.3	5.4	18.9
White Sorghum	19.2	20.0	10.4	21.1
Pearl millet	5.4	-	11.9	3.4
Finger millet	2.1	-	7.1	-
Tobacco	93.9	90.9	95.4	98.8
Cotton	98.6	100.0	91.7	97.1
Groundnuts	4.3	4.6	6.4	6.1
Sunflowers	3.7	-	10.8	3.1
Soya beans	10.0	-	17.2	9.1
Roundnut	4.4	-	1.9	3.4
Sugar beans	6.6	-	20.6	8.6
Cowpeas	13.3	4.0	11.0	18.8

N.B. Pearl millet is mhunga or nyawuti); Finger millet is rapoko or rukweza; Roundnut is nyimo or ndlubu. Cow peas is nyemba. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

3.3 Purchased Seeds

Table 3.3 depicts the percent distribution of households using purchased seed by crop type and sector. About 51.8 percent of the households in Communal Lands used purchased white maize seed. In Small Scale Commercial Farms 65.9 percent of the households used purchased white seed compared to 64.6 percent for households in A1 Farms and 63.9 percent for households in Old Resettlement Areas. The use of purchased small grain crops varied across sectors with 66.7 percent of red sorghum reported in Small Scale Commercial Farms while only 2.8 percent of finger millet was purchased in Communal Lands. At least 80 percent of the tobacco seed was purchased across sectors.

Table 3.3: Percent Proportion of Households Using Purchased Seed by Type of Crop and Sector

Crop Type	Cl	SSCF	A1 Farms	ORA
White Maize	51.8	65.9	64.6	63.9
Yellow Maize	20.9	-	13.3	12.5
Red Sorghum	10.8	66.7	13.5	13.5
White Sorghum	10.1	20.0	20.3	12.4
Pearl millet	4.9	-	11.7	9.5
Finger millet	2.8	8.3	7.1	10.5
Tobacco	80.0	81.8	91.7	88.0
Cotton	10.8	-	12	13.2
Groundnuts	23.1	6.8	26.8	22.2
Sunflowers	4.8	-	13.5	4.6
Soya beans	16.1	-	34.5	16.7
Roundnut	23.1	10.7	27.1	26.2
Sweet Potatoes	6.6	8.3	10.0	3.7
Sugar beans	37.2	14.3	40.9	33.7
Cowpeas	16.0	7.7	24.3	22.4

N.B. Pearl millet is mhunga or nyawuti); Finger millet is rapoko or rukweza; Roundnut is nyimo or ndlubu. Cow peas is nyemba. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

3.4 Carry Over Seeds

Table 3.4 depicts the percent distribution of households using carry over seed by crop type and sector. About 40.6 percent of the households in Communal Lands used carry-over white maize seed. In Small Scale Commercial Farms 35.3 percent of the households used carryover white seed compared to 45.1 percent for households in A1 Farms and 45.7 percent for households in Old Resettlement Areas. The use of carryover seed among crops was high across sectors. For instance, the use of carryover finger millet seed by households ranged from 71.4 percent in A1 Farms to 83.3 percent in Small Scale Commercial Farms. The use of carry over pearl millet seed by households also ranged from 55.6 percent in Old Resettlement Areas to 76.1 percent in Communal Lands.

Table 3.4: Percent Proportion of Households Using Carry-Over Seed by Crop Type and Sector

Crop Type	CL	SSCF	A1 Farms	ORA
White Maize	40.6	35.3	45.1	45.7
Yellow Maize	51.2	100.0	80.0	43.8
Red Sorghum	60.0	33.3	59.5	64.9
White Sorghum	57.9	60.0	62.0	65.5
Pearl millet	76.1	66.7	75.0	55.6
Finger millet	78.3	83.3	71.4	80.7
Tobacco	5.7	-	6.4	0.0
Cotton	2.7	33.3	8.0	2.6
Groundnuts	72.6	81.8	72.8	73.1
Sunflowers	77.1	100.0	73.0	84.6
Soya beans	87.1	-	82.8	75.0
Roundnut	68.0	75.0	67.1	65.4
Sweet Potatoes	0.4	8.3	2.7	-
Sugar beans	67.8	57.1	51.5	59.0
Cowpeas	64.6	69.2	69.9	64.5

N.B. Pearl millet is mhunga or nyawuti); Finger millet is rapoko or rukweza; Roundnut is nyimo or ndlubu. Cow peas is nyemba. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 3.5 depicts the percent distribution of households using seeds supplied on loan or given for free by crop type and sector. This includes seed which was supplied by donors, government, churches and others. Carryover seed is seed which is left over from the previous season. About 40.4 percent of the households in Communal Lands used white maize seed supplied on loan or given for free. In Small Scale Commercial Farms 34.1 percent of the households used white maize seed supplied on loan or given for free compared to 28.2 percent for households in A1 Farms and 35.6 percent for households in Old Resettlement Areas. The use of seed supplied on loan or given for free among crops remained high across sectors.

Table 3.5: Percent Proportion of Households Using Seed that was given/ provided to the Households either as a Loan or for Free by Crop Type and Sector

Crop Type	CL	SSCF	A1 Farms	ORA
White Maize	40.4	34.1	28.2	35.6
Yellow Maize	23.3	-	13.3	50.0
Red Sorghum	35.0	-	29.7	35.1
White Sorghum	38.3	60.0	21.5	22.1
Pearl millet	24.6	66.7	23.3	31.8
Finger millet	19.6	16.7	17.9	15.8
Tobacco	5.7	36.4	3.7	6.0
Cotton	75.7	66.7	72.0	71.1
Groundnuts	10.8	6.8	8.4	10.1
Sunflowers	25.3	-	18.9	15.4
Soya beans	9.7	-	3.5	8.3
Roundnut	13.7	10.7	5.9	11.2
Sweet Potatoes	4.0	8.3	1.3	3.0
Sugar beans	9.1	21.4	13.6	9.6
Cowpeas	23.9	19.2	14.7	18.6

N.B. Pearl millet is mhunga or nyawuti); Finger millet is rapoko or rukweza; Roundnut is nyimo or ndlubu. Cow peas is nyemba. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 3.6 shows the distribution of the free seed across sources by crop. Most of the free white maize seed constituting 65.9 percent was provided by the Government while 15.9 percent came from family members. Most of the free yellow maize constituting 36.8 percent was provided by family members. Family members and fellow farmers provided most support in the provision of free seeds for various types of crops such as red sorghum, white sorghum, pearl millet, rice, groundnuts, sunflowers and soya beans. Furthermore, 46.7 percent of the free tobacco seeds came from fellow farmers while 53.4 percent of the free cotton seeds came from the Government.

Table 3.6: Percent Distribution of Free Seed by Source of Input and by Crop

Crop Type	Government	NGOs	Agriculture Input Dealer	Fellow Farmer	Family Member	Other	Total
White Maize	65.9	5.7	0.3	9.3	15.9	3.0	100.0
Yellow Maize	26.3	10.5	5.3	15.8	36.8	5.3	100.0
Red Sorghum	12.1	6.1	1.5	33.3	43.9	3.0	100.0
White Sorghum	14.4	21.3	-	27.0	35.6	1.7	100.0
Pearl millet	6.9	6.9	-	37.6	44.6	4.0	100.0
Finger millet	2.3	4.5	2.3	45.5	45.5	-	100.0
Tobacco	13.3	-	13.3	46.7	13.3	13.3	100.0
Cotton	53.4	5.8	25.2	2.9	1.0	11.7	100.0
Groundnuts	4.3	7.0	0.9	25.2	59.1	3.5	100.0
Sunflowers	-	-	-	39.5	60.5	-	100.0
Soya beans	20.0	20.0	-	20.0	40.0	-	100.0

N.B. Pearl millet is mhunga or nyawuti); Finger millet is rapoko or rukweza; Roundnut is nyimo or ndlubu. Cow peas is nyemba. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 3.7 shows the distribution of free seed by source of input and by sector. It was noted that 39.5 percent of the free seed in Communal Lands was provided by the Government while 28.5 percent was provided by family members. In Small Scale Commercial Farms 44 percent of the free seeds was provided by the Government compared to 49.3 percent in A1 Farms. In Old Resettlement Areas, 37.8 percent of the free seeds was provided by the Government while 31.1 percent of free seeds originated from fellow farmers.

Table 3.7: Percent Distribution of Free Seed, by Source of Input and by Sector

Land Use Sector	Government	NGOs	Agriculture Input Dealer	Fellow Farmer	Family Member	Other	Total
CL	39.5	8.7	2.3	16.7	28.5	4.2	100.0
SSCF	44.0	8.0	0.4	17.3	26.2	4.0	100.0
A1 Farms	49.3	5.0	3.0	18.3	23.0	1.4	100.0
ORA	37.8	4.4	4.4	31.1	17.8	4.4	100.0

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 3.8: shows the percentage of households which used inputs by sector and type of input. In Communal Lands 48.1 percent of the households used organic fertilisers, 55.2 percent used inorganic fertilisers while 22.4 percent used pesticides. In Small Scale Commercial Farms 57.0 percent of the households used organic fertilisers, 75.6 percent used inorganic fertilisers while 38.4 percent used pesticides. In A1 Farms 70.8 percent of the households used inorganic fertilisers while 45.7 percent used pesticides. Finally in Old Resettlement Areas 68.4 percent of the

households used inorganic fertilisers while 54.6 percent used organic fertilisers. The usage of lime and herbicides was generally low in the smallholder sector.

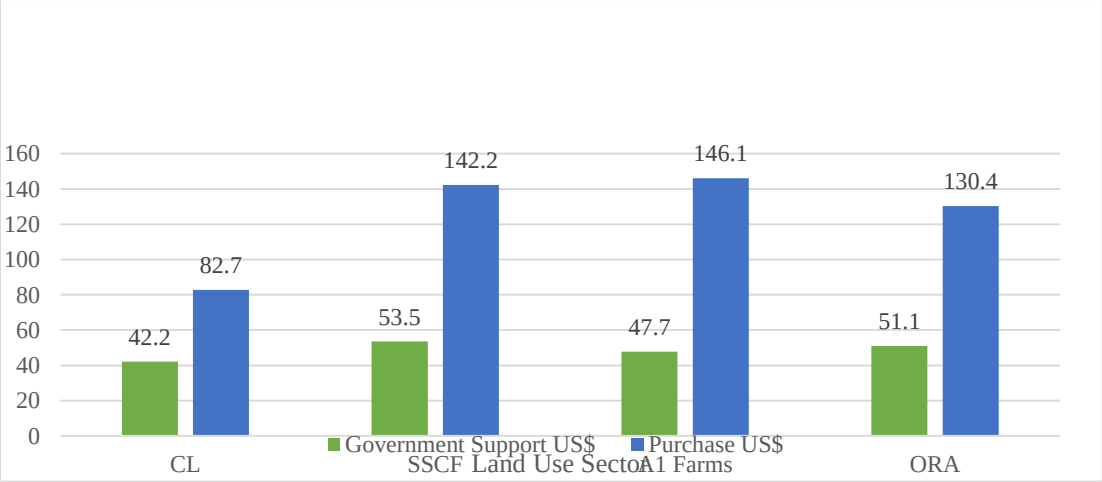
Table 3.8: Proportion and number of Farm Households in the Sample that Used Inputs by Sector and Type of Input

Type of Input	CL		SSCF		A1 Farms		ORA	
	%	No. of Hhs	%	No. of Hhs	%	No. of Hhs	%	No. of hhs
Organic fertiliser	48.1	566	57.0	49	35.8	162	54.6	326
Inorganic fertiliser	55.2	648	75.6	65	70.8	322	68.4	407
Lime	0.9	11	-	-	2.2	10	2.9	17
Herbicide	3.2	37	18.6	16	17.1	78	6.7	40
Pesticide	22.4	263	38.4	33	45.7	208	37.1	221

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 3.1 shows the average cost of inputs per household by source of input and sector. Most of the inputs used by households were purchased by households while government-supported inputs schemes also played a role in the smallholder agricultural sector. The highest average cost of US$53.50 of Government-supported inputs was incurred in Small Scale Commercial Farms followed by US$47.66 in A1 Farms. The highest average cost of US$ 146.13 inputs purchased by households was incurred in A1 Farms while the least average cost of US$82.69 was incurred in Communal Lands.

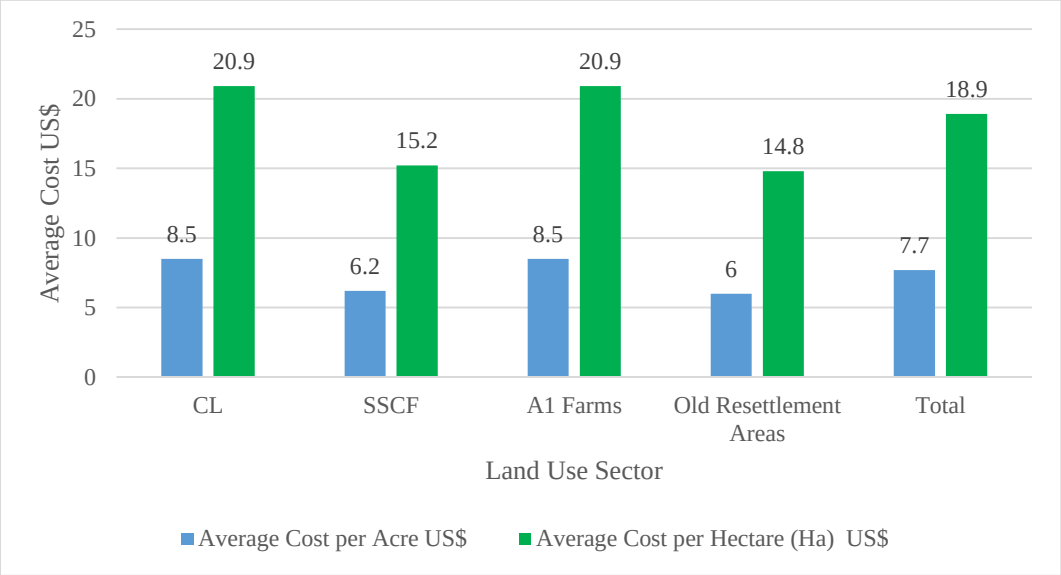
Figure 3.1: Average Cost Per Household (US$) of Purchased and Government Supported Inputs by Sector



3.5 Tractor Services

Figure 3.2: shows the average cost per hectare of using tractor services and animal traction by sector for households who reported using tractor and animal services. It was shown that the highest cost of using tractor services and animal traction was in Communal Lands and A1 Farms with US$20.9 per hectare each respectively. The least average cost of using tractor services and animal tractor services of US$14.8 per hectare was in Old Resettlement Areas. Furthermore, the average cost of using tractor services and animal tractor services for the smallholder sector was US$18.9 per hectare.

Figure 3.2: Average Cost Per Hectare or Cost Per Acre in US$ of Using Tractor Services and Animal Traction by Sector



3.6 Summary

Chapter 3 has shown that the use of certified seeds was higher than use of uncertified seeds in the smallholder sectors and for all types of crops. Proportions of certified seeds use are highest for cotton, white maize, and tobacco. For cotton and tobacco nearly all farm households (94-100 percent) use certified seeds, while for white maize is varies between 73.5 and 76.5 percent among smallholder groups. However, for yellow maize and small grains, groundnuts, beans and sunflower the proportion of households using certified seeds is small.

About 51.8 percent of the households in Communal Lands used purchased white maize seed. In Small Scale Commercial Farms 65.9 percent of the households used purchased white seed compared to 64.6 percent for households in A1 Farms and 63.9 percent for households in Old Resettlement Areas.

Most of the free white maize seed, constituting 65.9 percent was provided by Government followed by 15.9 percent from family members. Family members and fellow farmers provided most support in the provision of free seeds for various types of crops such as red sorghum, white sorghum, pearl millet, rice, groundnuts, sunflowers and soya beans.

Most of the inputs used by households were purchased by households while Government supported inputs schemes also played a vital role in the smallholder agricultural sector. The highest average cost of US$53.5 of Government supported inputs was incurred in Small Scale Commercial Farms followed by US$47.7 in A1 Farms. The average cost of using tractor services and animal tractor services for the smallholder sector was US$18.9 per hectare.

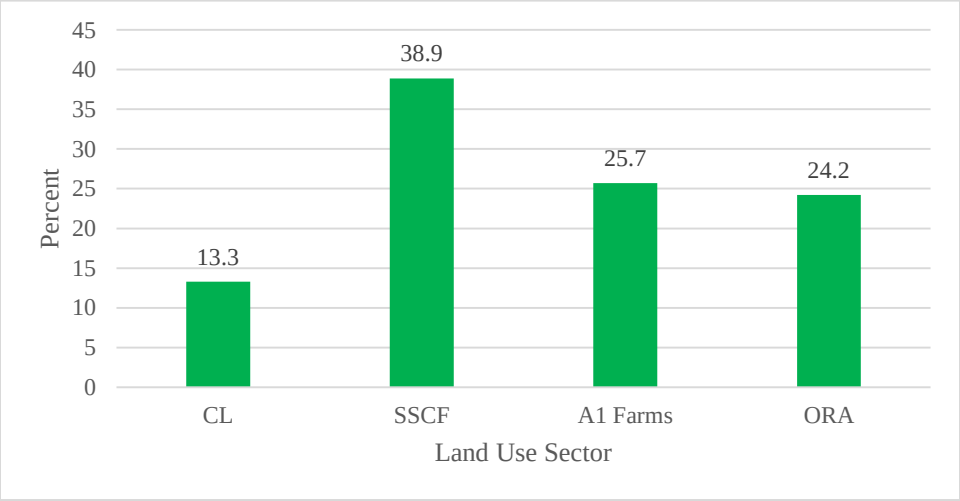
4. Field Crop Harvest and Field Crop Disposition

4.1 Introduction

Chapter four focuses on the harvest of crops, which allows for computation of productivity which is of relevance to the wellbeing of an agricultural household. The Chapter also presents information on whether the crop was harvested, the time of the harvest, and persons responsible for making decisions regarding the use of harvested crops.

Table 4.1 shows the percentage of households who sold their produce during the 2016/17 agricultural season. The results show that the lowest proportion (13.3 percent) of households that sold their produce was found in Communal Lands while the highest percentage was found in Small Scale Commercial Farms (38.9 percent).

Figure 4.1: Percentage of Households Who Sold Produce by Sector



NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

The survey also asked whether any household member sold any unprocessed crops harvested during the 2016/17 agricultural season. The percentages reported in Table 4.1 were based on those households reporting that they sold a crop. For example, the highest proportion of farm households selling white maize was found among A1 farms (35.3 percent), followed by households with Small Scale Commercial Farms (32.9 percent) Old Resettlement Areas (29 percent) and Communal Lands (11.8 percent). All households in Communal Lands sold their tobacco crop, while this was the case for only 81.8 percent of the households in Small Scale Commercial Farm Areas. Over 94 percent of the households in A1 Farms and Old Resettlement Areas sold their tobacco.

Table 4.1: Proportion of Households who Sold Produce by Sector by Type of Crop

Crop Name	CL	SSCF	A1 Farms	ORA
White Maize	11.8	32.9	35.3	28.9
Yellow Maize	13.9	-	-	5.9
Red Sorghum	4.6	-	10.3	3.9
White Sorghum	4.4	-	2.8	4.1
Pearl millet	4.2	-	9.1	4.0
Finger millet	6.2	10.0	-	9.8
Rice	9.5	-	16.7	14.3
Sesame	40.0	-	16.7	0.0
Tobacco	100.0	81.8	98.1	93.8
Cotton	94.3	66.7	100.0	100.0
Groundnuts	15.4	20.0	12.7	19.4
Sunflowers	2.6	50.0	5.9	4.9
Soya beans	25.8	.	51.9	42.9

N.B. Pearl millet is mhunga or nyawuti; Finger millet is rapoko or rukweza; Sesame is Uninga
NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 4.2 depicts the average income per crop received by households from sale of crops by type of crop and sector. The highest average income was received from the sale of tobacco. The average income received from sale of tobacco ranged from US$1 161 in Communal Lands to US$3 312 in Small Scale Commercial Farms.

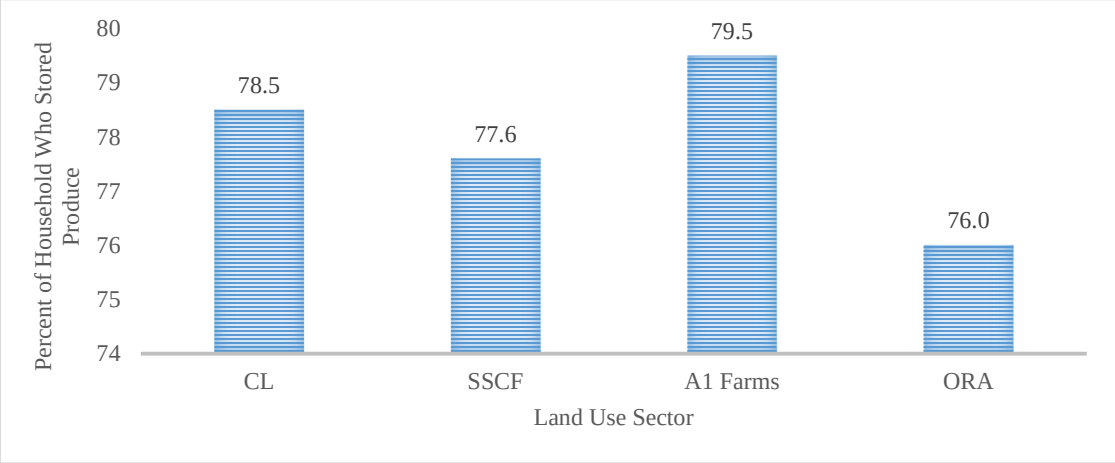
Table 4.2: Average Income Received by Households in US$ from Sale of Crop by Type of Crop and Sector

Crop Name	CL	SSCF	A1 Farms	ORA
White Maize	146.4	443.8	396.2	379.8
Yellow Maize	119.2	-	-	60.0
Red Sorghum	18.3	18.0	12.7	11.0
White Sorghum	89.3	-	125	95.3
Pearl millet	49.0	75.0	61.3	48
Finger millet	23.3	252	-	45.6
Rice	13.5	-	8.0	7.0
Sesame	72.0	50.0	-	-
Tobacco	1 161.1	3 312.0	2 498.5	3 175.9
Cotton	205.9	207.2	212.5	190.8
Groundnuts	59.5	59.1	70.1	77.8
Sunflowers	15.0	48.0	-	24.3
Soya beans	99.6	12.0	403.6	130.7

N.B. Pearl millet is mhunga or nyawuti; Finger millet is rapoko or rukweza; Sesame is Uninga
NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 4.2 highlights the percentage of households who stored their produce by sector. Over 76.0 percent of the households in the smallholder agricultural sector stored their produce. There were marginal differences in the percentage of households who stored their produce across sectors.

Figure 4.2: Percentage of Households who Stored Produce by Sector



NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 4.3: shows the distribution of households that stored produce by type of crop. It was observed that the majority of households in the smallholder agricultural sector stored the crops they grew. The proportion of households who stored white maize ranged from 80.7 percent in Small Scale Commercial Farms to 88.5 percent in A1 Farms. In addition, the proportion of households who stored white sorghum ranged from 80.0 percent in Small Scale Commercial Farms to 87.6 percent in Old Resettlement Areas.

Table 4.3: Percent Distribution of Households that Stored Produce by Type of Crop

Crop Names	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
White Maize	81.7	80.7	88.5	86.1
Yellow Maize	72.2	100.0	91.7	94.1
Red Sorghum	75.0	66.7	87.2	76.9
White Sorghum	81.7	80.0	83.1	87.6
Pearl millet	76.4	100.0	89.1	76.0
Finger millet	96.1	100.0	92.0	100.0
Rice	100.0	100.0	83.3	100.0
Sesame	60.0	-	66.7	100.0
Cotton	1.4	-	-	-
Groundnuts	86.8	97.6	88.2	86.5
Sunflowers	79.5	66.7	79.4	82.0
Soya beans	87.1	-	81.5	100.0

N.B. Pearl millet is mhunga or nyawuti; finger millet is rapoko or rukweza; sesame is uninga

Figure 4.3: shows the distribution of households that treated produce, method of treatment and by sector. It is shown that 64.8 percent of the households in Communal Lands practiced the traditional method of treating produce. Fifty four percent of the households in Small Scale Commercial Farms practiced the traditional method compared to 55.1 percent for Old Resettlement Areas. The proportion of households who practiced chemical application ranged from 30.9 percent in Communal Lands to 43.6 percent in A1 Farms.

Figure 4.3: Percent Distribution of Households That Stored Produce, Method of Treatment by Sector

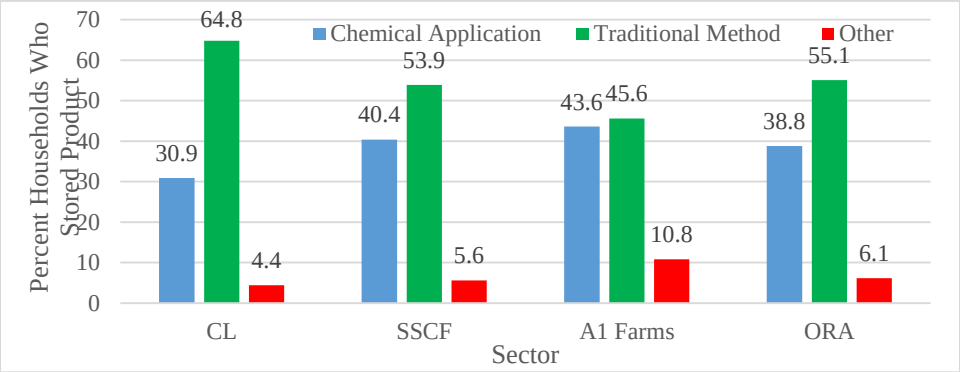


Table 4.4 depicts the storage techniques employed by households by type of crop. It was established that 67.8 percent of the households used chemical application to preserve white maize while 28.3 percent of the households used the traditional method. Slightly above 51 percent of the households practiced traditional method of treating white sorghum while 46.9 used chemical application.

Table 4.4: Percent Distribution of Storage Technique Employed By Households by Type of Crop

Crop Name	Chemical Application	Traditional Method	Other
White Maize	67.8	28.3	3.9
Yellow Maize	57.1	28.6	14.3
Red Sorghum	7.7	84.6	7.7
White Sorghum	46.9	51.6	1.6
Pearl millet	9.8	80.4	9.8
Finger millet	5.9	94.1	-
Rice	-	100.0	-
Groundnuts	12.3	83.6	4.1
Sunflowers	14.3	71.4	14.3
Soya beans	-	66.7	33.3

N.B. Pearl millet is mhunga or nyawuti; finger millet is rapoko or rukweza; sesame is uninga

Table 4.5 shows the percent distribution of storage structure by type of crop. It was noted that the majority of households used ordinary rooms as storage structures. The proportion of households who stored produce in ordinary rooms ranged from 82.4 percent to 100 percent. A small proportion

of households stored their produce in granaries which ranged from 8.2 percent to 14.3 percent across all crops.

Table 4.5: Percent Distribution of Storage Structure by Type of Crop

Crop Name	Granaries	Barns	Silos	Ordinary Rooms	Other	Total
White Maize	8.4	0.9	0.2	90.1	0.4	100.0
Yellow Maize	14.3	-	-	85.7	-	100.0
Red Sorghum	-	-	-	100	-	100.0
White Sorghum	9.4	-	-	90.6	-	100.0
Pearl millet	13.7	-	-	86.3	-	100.0
Finger millet	11.8	5.9	-	82.4	-	100.0
Rice	-	-	-	100.0	-	100.0
Tobacco	-	-	-	100.0	-	100.0
Groundnuts	8.2	-	-	91.8	-	100.0
Sunflowers	-	14.3	-	85.7	-	100.0
Soya beans	-	-	-	100.0	-	100.0

N.B. Pearl millet is mhunga or nyawuti; finger millet is rapoko or rukweza; sesame is uninga

4.2 Agricultural Productivity

Agricultural productivity measures the relationship between agricultural output and corresponding inputs. In simple terms, agricultural productivity is the ratio of agricultural output to agricultural inputs. Given that most individual agricultural products are usually measured by weight, their varying densities make measuring overall agricultural productivity difficult. To this end, agricultural productivity can also be measured as the value of agricultural output per agricultural input (labour, land, etc.). These are called partial measures of productivity. The different forms of productivity are calculated as follows:

Productivity = output ÷ input
Area Productivity = production ÷ area
Labour productivity = Total output ÷ Total work hours

Different measures of productivity serve different purposes.

The literature is replete with a number of factors determining agricultural productivity (use of fertilizer, herbicide, pesticide, high yielding varieties, mechanization etc.), as well as the impact of agricultural productivity on livelihoods of those engaged in the primary sectors of the economy (e.g. impact on poverty, food consumption, food security, etc.). Understanding these linkages in the context of Zimbabwe is important for designing policies and programs for rural poverty reduction that are based on evidence.

4.3 Output per Unit Area (Yield)

An analysis was done of the area planted in hectares (ha) as measured by the instruments using the Global Positioning System (GPS), expected production (kg), and yield, which is production per

hectare (kg/ha) by crop and sector. The yield figures shown in this Chapter are based on actual harvested production, as gathered through recall, and planted areas based on field measurement using GPS. The farmer's estimate for area planted was used only as a check on GPS measurement.

Table 4.6 shows the yield in kilogrammes per hectare (kg/ha) by crop and sector. Nationally only soya beans had a yield exceeding 1000 kilogrammes per hectare while the yield of most crops were below 1000 kilogrammes. The yield for white maize in Communal Lands was 735 kilogrammes per hectare. The highest yield for the white maize was in Small Scale Commercial Farms with 1 443 kilogrammes per hectare, followed by 1 158 kilogrammes per hectare in A1 Farms. The yield for white maize for the Old Resettlement Areas was 931 kilogrammes per hectare. In general, the yield for most crops was much less the potential. For the white maize, farmers are expected to have a yield of at least 5 tonnes per hectare, a target set for farmers in the Command Agriculture Programme. White maize productivity can be boosted in the smallholder agriculture sector through continued provision of inputs, agriculture credit, extension services and carrying out drought mitigation programmes. The yield for soya beans is also below expected levels and efforts should be made to promote the growing of soya beans so as to boost cooking oil and animal feed production in the smallholder agriculture of Zimbabwe.

Table 4.6: Average Yield by Crop by Sector (kg/ha)

Crop Type	CL		SSCF		A1 Farms		ORA		National Average	
	Yield (kgs)/ Ha)	No. of HHs	Yield (kgs)/ Ha)	No. of HHs	Yield (kgs)/ Ha)	No. of HHs	Yield (kgs)/ Ha)	No. of HHs	Yield (kgs)/ Ha)	No. of HHs
White Maize	735	1 008	1 443	83	1 158	419	931	566	939	2 076
Yellow Maize	764*	38*	380*	1*	653	12*	1 615*	14*	862	65
Red Sorghum	258	110	668*	2*	538*	35*	195*	26*	299	173
White Sorghum	340	292	450*	5*	495	66	383	90	376	453
Pearl millet	169	240	700*	1*	494	52	566*	47*	259	340
Finger millet	335	128	317*	10*	360*	24*	290	50	320	212
Rice	221*	22*	293*	2*	180*	6*	87*	7*	188*	37*
Tobacco	491*	33*	578*	11*	500	103	487	78	497	225
Cotton	136	69	217*	3*	140*	17*	249*	23*	160	112
Groundnuts	355	542	672*	42*	370	204	384	259	382	1047
Sunflowers	610	77	1 641*	3*	559*	32*	449	59	532	171
Soya beans	644*	29*	-	-	1 130*	27*	1 124*	7*	1 001	63
Roundnut	170	355	218*	24*	282	144	211	169	209	692
Sweet Potatoes	574	201	325*	20*	803	131	1 099	116	736	468
Sugar beans	534	113	167*	13*	697	59	349	75	494	260
Cowpeas	150	373	620*	23*	138	113	143	141	155	650

*N.B. * means less than 50 observations on the number of households: Pearl millet is mhunga or nyawuti. Finger millet is rapoko or rukweza. Roundnut is nyimo or ndlubu,* Cowpeas is nyemba. *NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.*

4.4 Summary

The results in Chapter 4 revealed that, 13.3 percent of the households in Communal Lands sold their produce compared to 38.9 percent in Small Scale Commercial Farms. In A1 Farms 35.3 percent of households sold white maize compared to 32.9 percent in Small Scale Commercial Farms. Twenty nine percent of the households in Old Resettlement Areas sold white maize while 12 percent and Communal Lands respectively sold white maize.

Nationally only soya beans had a yield exceeding 1000 kilogrammes per hectare while the yield of most crops were below 1000 kilogrammes per hectare. The yield for white maize in Communal Lands was 735 kilogrammes per hectare. The highest yield for the white maize was in Small Scale Commercial Farms with 1,443 kilogrammes per hectare, followed by 1,158 kilogrammes per hectare in A1 Farms. The yield for white maize for the Old Resettlement Areas was 931 kilogrammes per hectare. In general, the yield for most crops was less than expected.

5. Livestock Production, Livestock Holdings and Animal Costs

5.1. Introduction

Chapter 5 presents information on animal holdings and livestock production by the household. Animal holdings are defined as animals or livestock owned by a person or jointly owned with another member of the household. The reference period for animal holdings was from January 1, 2017 to August 31, 2017. This Chapter further reports on information on pastures, cost of raising animals, the production systems and use of animal vaccines. The animals were grouped into large ruminants (cattle or bovines), small ruminants, pigs, other poultry and rabbits.

5.2. Definitional Terms

- Vaccination is the administration of antigenic material (a vaccine) to stimulate an individual's immune system to develop adaptive immunity to a pathogen.
- Deworming is the treatment given to animals to free it of worms.
- Dosing generally applies to feeding chemicals or medicines in small quantities into a process fluid or to a living being at intervals or to atmosphere at in sufficient time for the chemical or medicine to react or show the results.
- Dehorning is removal of horns from an animal, mostly ruminants.

5.3. Animal Holdings

Table 5.1 shows the percent of households owning livestock by type of livestock and sector. The proportion of households which owned cattle in Communal Lands was 49.8 percent while in Old Resettlement Areas it was 62.4 percent. In A1 Farms and Small Scale Commercial Farms the proportion of households which owned cattle was 54.6 percent and 52.7 percent respectively. In Communal Lands 60.9 percent of the households owned goats compared to 53.9 percent in Old Resettlement Areas and 42.9 percent in Small Scale Commercial Farms. Indigenous chicken were owned by most households across the smallholder agricultural sector with the highest ownership of 87.9 percent for households in A1 Farms.

Table 5.1: Percent Households Owning Livestock by Type of Livestock and by Sector

Livestock	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
Cattle	49.8	52.7	54.6	62.4
Donkeys	12.2	4.4	10.7	8.4
Goats	60.9	42.9	51.8	53.9
Sheep	3.6	5.5	4.0	3.3
Pigs	4.2	2.2	3.3	3.0
Chicken – Layer	0.4	1.1	0.2	0.2
Chicken – Local	83.5	76.9	87.9	86.7
Chicken – Broiler	1.6	7.7	1.3	2.3
Other Poultry	16.5	9.9	15.2	16.9
Rabbit	3.0	2.2	3.6	3.3
Other Livestock	2.1	1.1	1.3	2.8

Chicken – Local is indigenous chicken.

Table 5.2 shows the proportion of households owning pastures and the average size of pasture in hectares for those raising livestock by sector. About 2.7 percent of households in Communal Lands grazed their livestock and owned an average of 2.0 hectares of pasture. In A1 Farms, 16.9 percent owned pastures with an average size of 15.7 hectares. In Old Resettlement Areas 8.7 percent of households owned pastures with an average size of 8.4 hectares, compared to 56.6 percent and 27.7 hectares respectively for households in Small Scale Commercial Farms.

Table 5.2: Proportion of Households Owning Pastures and Average Size of Pasture in Hectares for those Raising Livestock by Sector

Land Use Sector	Households Owning Pastures	Average Grazing Area in Hectares (Ha)
Communal Lands	2.7	2.0
Small Scale Commercial Farms	56.6	27.7
A1 Farms	16.9	15.7
Old Resettlement Areas	8.7	8.4

Tables 5.3 shows the average value (US$) of inputs used per household by type of input and by sector. In Communal Lands, the highest average cost of $11.1 per household was incurred for animal feed including salt. This was followed by veterinary services which had an average cost of $6.4. In Small Scale Commercial Farms households spent an average value of animal feeds and salt of $79.8 compared to $17.6 for Old Resettlement Areas and $16.0 in A1 Farms. Households in the smallholder agricultural sector incurred between $6.0 and $16.0 on the average value of veterinary services.

Table 5.3: Average Value (US$) of Inputs Used Per Household by Type of Input and by Sector

Type of Input	CL	SSCF	A1 Farms	ORA
Animal Feed Including Salt	11.1	79.8	16.0	17.6
Veterinary Services	6.4	15.7	11.5	10.8
Transport of Animal To and from Farm	0.3	3.4	0.3	0.5
Building or Maintenance of Pens and Stables	1.9	6.2	5.7	1.3
Transport of Animal Feed	0.2	5.2	0.2	0.5
Other Related Costs	1.5	5.3	1.8	1.2
Number of Responding Households	**577**	**47**	**248**	**374**

N.B. Veterinary services: includes vaccination deworming, and medicine. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.4 shows average value (US$) of inputs used per household in the small holder agricultural sector. An average cost of $15.6 per household was spent on animal feeds and salt, followed by $10.3 spent on veterinary services for the households that own livestock. Households spent US$116.8 on pigs for animal feeds and salt.

Table 5.4: Value (US$) of Inputs Used Per Household in the Smallholder Agricultural Sector

Inputs Used	Large Ruminants	Donkeys	Goat/Sheep	Pigs	Chicken Local
Animal Feed & Salt	13.7	11.6	0.9	116.8	8
Veterinary Service*	22.4	1.1	4.2	22.4	2.5
Transport of Animal to fro Farm	0.2	-	0.1	1.2	0
Building or Maintenance of Pens and Stables	3.3	0.4	1	13.1	1.2
Transport of Animal Feed	1.3	0.2	0.1	1.6	0.6
Commission on Sale of Animals	0.3	0	-	-	-
Compensation for Damages	0.7	-	0.3	0	0
Other Related Costs	3.7	-	0	0.6	0
No. of Responding Households	1 096	153	701	50	1 026

N.B.* Veterinary services includes vaccination, deworming, and medicine. Chicken – Local is Indigenous, example of large ruminants is cattle.

Table 5.4 further shows that households spent $332.1 per household on chicken layer animal feeds, $251.3 on broiler chicken animal feeds and $56.6 on chicken layer veterinary services.

Table 5.4: Value (US$) of Inputs Used Per Households in the Smallholder Sector Continued

Inputs Used	Chicken Broiler	Chicken Layer	Other Poultry	Rabbit	Total
Animal Feed & Salt	251.3	332.1	9.3	9.8	15.6
Veterinary Service *	14.8	56.6	2.5	2.5	10.3
Transport of Animal to fro Farm	3.8	24.3	0.1	-	0.3
Building or Maintenance of Pens and Stables	30.5	3.9	0.2	1.4	2.5
Transport of Animal Feed	9.5	11.2	0.4	0.6	0.9
Commission on Sale of Animals	-	-	-	-	0.1
Compensation for Damages	-	-	-	-	0.3
Other Related Costs	0.7	-	-	-	1.3
No. of Responding Households	58	9	107	24	3 224

N.B.* Veterinary services includes vaccination, deworming, and medicine. Chicken – Local is Indigenous, example of large ruminants is cattle.

Table 5.5 shows the proportion of households using a livestock production system. The extensive production system was the most practiced livestock production system across all sectors. Households in Small Scale Commercial Farms practiced extensive production system constituting 98.7 percent, followed by households in Communal Lands with 97.1 percent and Old Resettlement Areas with 95.3 percent. Households that practiced a semi-intensive production system ranged from 5.7 in Communal Lands to 13.3 percent in Small Scale Commercial Farms. Intensive production system was practiced by between 3.4 percent and 8.0 percent of the households.

Table 5.5: Production System Used by Sector (Multiple Response)

Land Use Sector	Intensive	Semi-Intensive	Extensive	Number of Responding Households
CL	3.4	5.7	97.1	1 066
SSCF	6.7	13.3	98.7	75
A1 Farms	8.0	8.0	90.2	450
ORA	5.9	7.8	95.3	576

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.6 shows the percentage of households by production system and animal type. Of the households that produced large ruminants, 4.2 percent held these in an intensive production system while 13.2 percent and 82.6 percent used semi-intensive and extensive systems respectively. About 90 percent of the households produced goats/sheep under the intensive production system while 72.0 percent produced pigs under the same system.

Table 5.6: Percent Distribution of Livestock Production by the Different Production Systems and by Type of Livestock

Animal and Poultry Group	Intensive	Semi-Intensive	Extensive	Total	Number of Households in Sample that owned Animals
Large Ruminants (Cattle)	4.2	13.2	82.6	100.0	1 095
Donkeys	1.3	7.2	91.5	100.0	153
Goat/Sheep	1.6	8.1	90.3	100.0	701
Pigs	16.0	12.0	72.0	100.0	50
Chicken-Local	2.4	11.8	85.7	100.0	1 024
Chicken - Broiler	62.1	6.9	31.0	100.0	58
Chicken - Layer	33.3	11.1	55.6	100.0	9
Other Poultry	0.9	19.6	79.4	100.0	107
Rabbit	16.7	12.5	70.8	100.0	24

N.B. Chicken-Local is indigenous chicken

5.4. Livestock Pastures

Table 5.7 shows the percent distribution of type of pasture used to feed livestock by sector. Overall 77.6 percent of the households fed livestock on pasture provided by the community, while 13.8 percent of the households used pasture provided by the Government. In Small Scale Commercial Farms, 57.1 percent of the households fed their livestock on own pasture while in Communal Lands 96.1 percent of the households fed their livestock on pastures provided by the Community.

Table 5.7: Percent Distribution of Type of Pasture Used to Feed Livestock by Sector

Type of Pasture	CL	SSCF	A1 Farms	ORA	Total
Other Households Pasture	0.6	21.4	1.6	2.9	2.1
Pasture Provided by the Government	2.1	3.6	31.7	24.8	13.8
Pasture Provided by the Community	96.1	16.1	58.2	63.6	77.6
Own Pasture	0.8	57.1	8.2	8.6	6.2
Other	0.4	1.8	0.3	0.2	0.4
Total	100.0	100.0	100.0	100.0	100.0
Number of Responding Households	**849**	**56**	**306**	**456**	**1 667**

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

5.5. Animal Costs

Table 5.8 presents the average cost of inputs for raising animals by sector. The highest monthly expenditure by households on animal inputs was in the broiler chicken animal group with US$23.9 for households in Communal Lands. The average monthly expenditure by households on chicken layers was US$91.9 for households in Small Scales Commercial Farms.

Table 5.8: Average Household Expenditure on Animal Inputs (US$) by Animal Group and by Sector for Households Owning Animals

	CL		SSCF		A1 Farms		ORA	
Animal Group	**US$**	**No. of HHolds**	**US$**	**No. of HHolds**	**US$**	**No. of HHolds**	**US$**	**No. of HHolds**
Large ruminants	2.3	577	8.3	47	4.2	248	3.8	374
Donkeys	0.4	140	-	4	0.3	54	0.3	42
Goat/sheep	0.3	709	0.5	39	0.6	228	0.3	327
Pigs	7.1	48	32.1	2	22.7	18	7.0	13
Chicken – local	0.9	976	2.2	67	1.1	398	1.1	513
Chicken – broiler	23.9	15	35.6	8	24.1	6	36.7	10
Chicken – layer	4.4	5	91.9	1	11.9	3	-	-
Other poultry	0.8	180	0.5	9	1.0	56	1.4	96
Rabbit	0.5	27	1.0	2	0.6	12	0.7	18

N.B. Chicken – local is indigenous; Large ruminants are Cattle. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.9 shows the percentage of households that took animals for dipping by animal group and sector. It was shown that in the Communal Lands, 47.7 percent of the households took their large ruminants for dipping while 40 percent took their goats or sheep for dipping. In Old Resettlement Areas, 24.0 percent of the households took goats and sheep for dipping. In A1 Farms 31.8 percent of the households took cattle for dipping while 28.0 percent of the households took goats and sheep for dipping.

Table 5.9: Percentage Distribution of Households that Took Animals for Dipping by Animal Group and by Sector for those Households Owning Animals

Animal Group	CL	SSCF	A1 Farms	ORA	Total	Number of Households who Took Animals for Dipping
Large Ruminants	47.7	17.9	31.8	2.6	100.0	1 058
Goat/Sheep	40.0	8.0	28.0	24.0	100.0	25
Pigs	-	-	-	100.0	100.0	1
Chicken - Local	32.0	6.0	28.0	34.0	100.0	50
Chicken - Broiler	-	-	50.0	50.0	100.0	2
Other Poultry	100.0	-	-	-	100.0	2

N.B. Chicken – Local is indigenous chicken, large ruminants are cattle. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.10 depicts the proportion of households vaccinating animals against any disease by animal group. It was indicated that 24.1 percent of the households in Communal Lands vaccinated large ruminants compared to 40.4 percent in Small Scale Commercial Farms. In A1 Farms and Old Resettlement Farms 37.1 percent and 35.3 percent respectively of the households vaccinated large

ruminants. The proportion of households which vaccinated indigenous chicken against diseases ranged from 5.1 percent in Communal Lands to 20.9 percent in Small Scale Commercial Farms.

Table 5.10: Proportion of Households Vaccinating Animals against any Disease by Animal Group, for those Households Owing Animals

Animal Group	% HH Vaccina-ting	HHs Owning	% HH Vaccina-ting	HH Owning	% HH Vaccina-ting	HH Owning	% HH Vaccina-ting	HH Owning
Large ruminants	24.1	577	40.4	47	37.1	248	35.3	374
Donkeys	1.4	140	-	4	3.7	54	2.4	42
Goat/sheep	4.1	709	5.1	39	8.3	228	6.7	327
Pigs	2.1	48	-	2	5.6	18	23.1	13
Chicken – local	5.1	976	20.9	67	10.8	398	9.2	513
Chicken – broiler	13.3	15	12.5	8	33.3	6	30	10
Chicken – layer	-	5	100.0	1	-	3	-	-
Other poultry	1.1	180	-	9	3.6	56	4.2	96
Rabbit	-	27	-	2	8.3	12	-	18

N.B. Large ruminants are cattle, Chicken – local is indigenous chicken

Table 5.11: presents the proportion of households that vaccinated animals by type of disease, animal category and sector for households owing cattle. The table further depicts that the major diseases which affected large ruminants or cattle were black leg, foot and mouth and lumpy skin disease. In Communal Lands, 34.5 percent of the households vaccinated large ruminants against foot and mouth disease compared to 31.8 percent for households in Old Resettlement Areas. The proportion of households which vaccinated large ruminants against black leg ranged from 40.2 percent in A1 Farms to 47.7 percent in Old Resettlement Areas. The proportion of households that vaccinated animals against lumpy skin disease ranged from 22.0 percent in Old Resettlement Areas to 47.4 percent in Small Scale Commercial Farms.

Table 5.11: Proportion of Households That Vaccinated Animals by Type of Disease and Animal Category and Sector (for those Households Owning an Animal).

Large Ruminants (Cattle)

Disease	CL	SSCF	A1 Farms	ORA
Rinderpest	8.6	-	5.4	3.0
Foot and Mouth Disease	34.5	21.1	31.5	31.8
Lumpy Skin Disease	28.8	47.4	38.0	22.0
Black Leg	46.0	42.1	40.2	47.7
Brucellosis	0.7	-	-	-
Bovine Tuberculosis	1.4	-	-	2.3
Contagious Bovine Pleuro Pneumonia	-	-	-	1.5
Botulism	2.2	-	5.4	2.3
Tick-Borne Disease	11.5	31.6	10.9	11.4
Internal Parasites	4.3	5.3	6.5	6.1
Other	7.2	15.8	10.9	16.7

Table 5.12 shows that the proportion of households which vaccinated indigenous chicken against new castle in Old Resettlement Areas was 40.4 percent compared to 46.5 percent for households in A1 Farms. It is also shown that bird flu and newcastle were the major disease affecting indigenous chicken in the smallholder agricultural sector. About 44 percent of the households in Communal Lands vaccinated indigenous chickens against bird flu compared to 50 percent in Small Scale Commercial Farms.

Table 5.12: Percentage of Households that Vaccinated Animals by Type of Disease and Animal Category and Sector (for Households that Vaccinated their Animals)

Chicken - Local/Indigenous

Disease	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
Bird Flu	44.0	50.0	41.9	53.2
Newcastle Disease	46.0	42.9	46.5	40.4
Internal Parasites	6.0	-	2.3	-
Other	14.0	7.1	18.6	12.8

Table 5.13 shows the distribution of animal vaccinations, type of disease and type of animal. The table depicts that of the households which vaccinated their livestock, 27.4 percent vaccinated cattle against black leg while 23.9 percent vaccinated cattle against foot and mouth disease. About 46 percent of the households that kept donkeys indicated that they vaccinated them against internal parasites while 33.3 percent of the households that kept pigs vaccinated them against swine flu.

Table 5.13: Percent Distribution of Animal Vaccinations by Type of Disease, and Type of Animal

Type of Disease	Cattle	Donkeys	Goat/Sheep	Pigs
Swine Flu	-	-	3.4	33.3
Rinderpest	4.3	9.1	0.7	-
Foot and Mouth Disease	23.9	9.1	12.8	-
Lumpy Skin Disease	19.2	9.1	15.5	-
Black Leg	27.4	-	4.1	-
Brucellosis	0.3	-	2.7	-
Bovine Tuberculosis	0.6	-	0.7	11.1
Contagious Bovine Pleuro Pneumonia	0.3	9.1	0.7	-
Dermatophilosis	-	-	0.7	-
Botulism	1	-	-	-
Tick-Borne Disease	10.6	-	15.5	11.1
Newcastle Disease	0.3	-	0.7	11.1
Internal Parasites	4.6	45.5	19.6	-
Other	7.6	18.2	23.0	33.3
Total	100.0	100.0	100.0	100.0

Table 5.14 presents the percent distribution of households that vaccinated their livestock by type of disease and by sector. In Communal Lands, it is shown that of those households which

vaccinated their livestock, 23.0 percent vaccinated their livestock against black leg, 16.4 percent against lumpy disease and 16.6 percent against foot and mouth disease. In Small Scale Commercial Farms, 19.0 percent of the households vaccinated livestock against lumpy skin disease while 17.7 percent vaccinated livestock against tick borne disease. In A1 Farms it is shown that of those who vaccinated their livestock, 19.6 percent vaccinated their livestock against lumpy skin disease while 16.3 percent vaccinated against black leg.

Table 5.14: Percent Distribution of Households that Vaccinated Their Animals by Type of Disease and Sector

Disease	CL	SSCF	A1 Farms	ORA
Bird Flu	7.4	15.2	8.7	10.6
Swine Flu	0.2	-	-	0.4
Rinderpest	3.5	1.3	2.5	1.8
Foot and Mouth Disease	16.6	7.6	15.2	15.4
Lumpy Skin Disease	16.4	19.0	19.6	14.3
Black Leg	23.0	12.7	16.3	24.0
Brucellosis	0.7	-	-	0.4
Bovine Tuberculosis	0.7	-	-	0.9
Contagious Bovine Pleuro Pneumonia	0.5	-	-	0.4
Dermatophilosis	0.2	-	-	-
Botulism	1.0	-	2.2	1.1
Tick-Borne Disease	8.0	17.7	6.8	8.1
Newcastle Disease	6.1	11.4	7.6	5.9
Internal Parasites	7.1	5.1	9.2	5.5
Other	8.7	10.1	12.0	11.0
Total	100.0	100.0	100.0	100.0

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.15 shows the proportion of households practicing deworming by type of animal and by sector. It was observed that of those households practicing deworming, in Old Resettlement Areas, 53.2 percent practiced deworming of cattle compared to 26.6 percent of the households in Small Scale Commercial Farms. Of those households that practiced deworming in Communal Lands 20.5 percent practiced deworming on Broiler Chickens compared to 10.0 percent in Old Resettlement Areas.

Table 5.15: Proportion of Households Practicing Deworming by Type of Animal and by Sector

	CL		SSCF		A1 Farms		ORA	
Type of Animal	**Percent**	**No. of HHs**	**Percent**	**No. of HHs**	**Percent**	**No. of HHs**	**Percent**	**No. of HHs**
Large Ruminants	26.6	576	41.2	243	47.2	379	53.2	47
Donkeys	3.5	141	-	4	7.4	54	2.4	42
Goat/Sheep	10.2	708	12.8	39	18.9	227	16.8	327
Pigs	10.4	48	-	2	18.8	16	23.1	13
Chicken - Local	4.1	976	11.9	67	8.6	395	4.9	514
Chicken – Broiler	20.5	15	12.5	8	-	6	10	10
Chicken – Layer	-	6	100	1	-	3	-	-
Other Poultry	7.3	179	-	9	5.4	56	5.2	96
Rabbit	-	27	-	2	8.3	12	-	18
Total	**10.9**	**2 676**	**30.7**	**375**	**23.3**	**1 148**	**10.8**	**1 067**

N.B. Chicken – local is indigenous chicken, large ruminants are cattle. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.16 shows the average cost per household of hired labour for livestock rearing for households hiring labour. In Old Resettlement Areas, the average cost of hired labour for livestock rearing was US$524 per household followed by US$251 in Small Scale Commercial Farms. Households residing in Communal Lands spent on average US$177 per household on hiring labour for livestock rearing.

Table 5.16: Average Cost (US$) of Hired Labour for Livestock Rearing for Households Hiring Labour

Sector	US$	Number of Households Who Hired Labour for Livestock
Communal Lands	177.3	106
Small Scale Commercial Farms	250.8	36
A1 Farms	186.7	92
Old Resettlement Areas	523.7	15

5.6. Agricultural Products and By Products

The APM survey also collected information on the harvest of animal products and/or by-products that generate income for farmers through sales. Examples of animal by-products include eggs, manure, hides/skins, etc.

Table 5.17 depicts the proportion of households producing animal by-product by sector for those households owning animals. About 17 percent of the households in Communal Lands produced cattle milk compared to 34.1 percent in Small Scale Commercial Farms and 26.9 percent in A1 Farms. Furthermore, the production of eggs by households in the smallholder agricultural sector ranged from 36.8 percent for households in Communal Lands to 46.5 percent for households in

Old Resettlement Areas. Additionally the production of Manure ranged from 40.7 percent for households residing in Small Scale Commercial Farms to 53.2 percent for households residing in Old Resettlement Areas.

Table 5.17: Proportion of Households Producing Animal By-Product by Type of By-Product and Sector for Households Owning Animals

By-Product	CL	SSCF	A1 Farms	ORA
Cattle Milk	16.9	34.1	26.9	31.5
Goat Milk	7.2	1.1	2.8	2.0
Eggs	36.8	38.5	44.2	46.5
Honey	1.6	5.5	4.2	5.1
Hide/Skins	1.7	1.1	0.9	1.7
Manure	46.0	40.7	41.1	53.2

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.18 shows the average value of sales and quantity of livestock by-product produced by type by product by sector. In smallholder agriculture sector an average of 111 litres of cow milk was sold, at an average of $165. Households in Old Resettlement Areas sold an average of 219 litres of milk valued at an average of $285. Households in the smallholder agriculture sector produced an average of 41 dozens of eggs valued at an average of $128

Table 5.18: Average Sales Value in (US$) of By-Product by Sector and Type of By Product

		By Product				
Sector		**Cattle Milk (Litres)**	**Eggs (Dozens)**	**Honey (Litres)**	**Hide/Skins (Pieces)**	**Manure (Cubic Metres)**
CL	Average Quantity	29.2	41	24.6	1	19
	Average Value (US$)	149.6	83.5	54.8	3	17.3
SSCF	Average Quantity	74.6	63.7	23.1	-	1
	Average Value (US$)	137.4	236.2	52.6	-	10
A1 Farms	Average Quantity	153.9	10.1	19.6	-	1
	Average Value (US$)	162.2	64.8	68.4	-	5
ORA	Average Quantity	218.8	2.5	20	-	6
	Average Value (US$)	284.6	15	110	-	30
Total	Average Quantity	111.0	41.1	22.0	1	10.8
	Average Value (US$)	165.0	128.4	61.1	3	16.2

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.19 displays the proportion of households producing by-product and sold produce by type of by-product and by sector, for households producing a by-product. About 7 percent of the households in Communal Lands produced and sold cattle milk, compared to 25.8 percent in Small Scale Commercial Farms, 19.5 percent in A 1 Farms and 14.2 in Old Resettlement Areas. The proportion of households that produced and sold honey ranged from 20.0 percent in Small Scale Commercial Farms to 52.6 percent in A1 Farms. Honey and milk were the main by-products sold by households in the smallholder agricultural sector.

Table 5.19: Proportion of Households Producing by-Product and Sold by-Product by Type of by-Product and by Sector, for Households Producing a by Product.

By-Product	CL	SSCF	A1 Farms	ORA
Cattle Milk	7.0	25.8	19.5	14.2
Eggs	3.0	2.9	5.0	2.1
Honey	31.6	20.0	52.6	32.3
Hide/Skins	5.0	-	0.0	0.0
Manure	0.6	2.7	0.5	0.6

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.20 shows the distribution of households producing product/ by-product by type of product and sector. It was indicated that of the households that produced milk, 39.4 percent were in the Communal Lands followed by 34.3 percent for households in the A1 Farms. The least percentage of households with milk production was in Old Resettlement Areas with 6.2 percent. Of the households that produced eggs, 49.6 percent were in the Communal Lands followed by 26.3 percent in the Old Resettlement Areas. Of the households that produced honey, 41.7 percent were from the Old Resettlement Areas, while 30.6 percent of the households were from Communal Lands.

Table 5.20: Percent Distribution of Households Producing Product or By-Product by Type of Product and Sector.

Product	CL	SSCF	A1 Farms	ORA	Total Small Holder	Number of Responding Households
Cattle Milk (Litres)	39.4	20.1	34.3	6.2	100.0	452
Goat Milk (Litres)	70.4	2.5	14.8	12.3	100.0	81
Eggs (Dozens)	49.6	3.4	20.8	26.3	100.0	920
Honey (Litres)	30.6	2.8	25	41.7	100.0	72
Hide/Skins (Pieces)	61.1	-	11.1	27.8	100.0	18
Manure (Cubic Metres)	52.5	4.2	16.7	26.7	100.0	570

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 5.21 presents the average distance from farm gate to the market, by-product and by sector. In Communal Lands and A1 Farms the average distance travelled to sell eggs was 1.2km and 0.3 km respectively. The average distance travelled by households to the market to sell honey in Communal Lands was 17.1km compared to 2.6 km in A1 Farms. The average distance covered to sell honey was 7.9 km across compared to 0.9 km travelled to sell eggs in the smallholder sector.

Table 5.21: Average Distance from Farm Gate to the Market by Sector and by-Product, for those Households Producing a by Product.

Land Use Sector	Cattle Milk	Eggs	Honey
	Average Distance in km	Average Distance in km	Average Distance in km
CL	0.3	1.2	17.1
SSCF	3.2	-	-
A1 Farms	4.7	0.3	2.6
ORA	7.0	-	0.1
Total	4.4	0.9	7.9

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

5.7. Summary

In Chapter 5 it was indicated that for those households owning cattle the major diseases which affected large ruminants or cattle were black leg, foot and mouth and lumpy skin disease. The proportion of households which vaccinated large ruminants against black leg ranged from 40.2 percent in A1 Farms to 47.7 percent in Old Resettlement Areas. The proportion of households that vaccinated against lumpy skin disease ranged from 22.0 percent in Old Resettlement Areas to 47.4 percent in Small Scale Commercial Farms. It was further depicted that of the households which vaccinated their livestock, 27.4 percent vaccinated cattle against black leg while 23.9 percent vaccinated cattle against foot and mouth disease.

In smallholder agriculture sector an average of 111 litres of cow milk was sold, at an average of U$165, for those households producing a by-product. Furthermore, households in Old Resettlement Areas sold an average of 219 litres of milk valued at an average of US$285. Moreover, households in the smallholder agriculture sector produced an average of 41.1 dozens of eggs valued at an average of US$128.

6. Agricultural Capital

6.1. Introduction

This Chapter presents information on agricultural equipment ownership by the surveyed households. The types of agricultural capital equipment surveyed included tractors, ploughs, trailers, planters, sprayers, etc. This agricultural equipment is an important determinant of agricultural productivity and subsequently household welfare and standards of living. The reference period for data collection was January 1 to August 31, 2017. The Chapter also presents information on agricultural capital utilization by rural households during the agricultural season 2016/2017. The results presented also help to understand agricultural capital accessibility and their relevance to increasing agricultural productivity among rural smallholder households in the country.

6.2. Households Owning Agriculture Equipment

Table 6.1 shows the percentage of households' ownership of agricultural equipment by type of equipment and sector. About 48 percent and 46.2 percent of the households in Communal Lands owned animal drawn implements and a yoke respectively. The ownership pattern of animal drawn implements ranged from 47.9 percent in Communal Lands to 64.8 percent in Old Resettlement Areas. The ownership of scotch carts by households ranged from 25.2 percent in Communal Lands to 43.6 percent in Old Resettlement Areas. In general, the ownership of tractors, the major productive assets needed for agriculture production, was very low in the smallholder agricultural sector. The proportion of households owning tractors ranged from 0.1 percent in Communal Lands to 7.7 percent in Small Scale Commercial Farms.

Table 6.1: Percentage of Households Owning Agricultural Equipment by Type and Sector

Type of Equipment	CL	SSCF	A1 Farms	ORA
Tractor	0.1	7.7	0.2	0.3
Tractor-drawn implements	1.1	10.3	1.5	1.7
Animal-drawn implements*	47.9	49.4	56.0	64.8
Pickup truck	0.6	6.9	2.2	2.4
Water pump	2.0	16.1	7.4	8.9
Sprinkler	0.8	2.3	1.7	1.9
Scotch carts	25.2	31.0	37.9	43.6
Water bowser	0.3	3.5	0.9	1.2
Tobacco baler	0.3	-	1.1	2.5
Sheller – manual	0.1	1.2	0.2	0.2
Knapsack sprayer	16.6	41.4	42.9	34.9
Wheelbarrow	36.0	51.7	35.7	41.3
Yoke	46.2	44.8	55.1	65.4
Other equipment	20.7	19.5	17.4	21.1

* *Includes Oxen and donkeys. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.*

6.3. Households Acquiring Agricultural Equipment

Table 6.2 shows the proportion of households acquiring agriculture equipment by type of equipment and by sector for the period January 1 to August 31, 2017. The table indicates that 4.4 percent of households in A1 Farms acquired an animal drawn implement compared to 3.3 percent of the households in Old Resettlement Areas and 1.9 percent in Communal Lands. Slightly over 11 percent of the households in Communal Lands acquired a sprinkler, compared to 12.5 percent in A1 Farms and 27.3 in Old Resettlement Areas. It was noted that most households did not acquire mechanized productive assets such as tractors, tractor drawn implements / equipment and tobacco baler over the reference period.

Table 6.2: Proportion of Households Acquiring Agriculture Equipment by Type and Sector

Equipment	CL	SSCF	A1 Farms	ORA
Tractor	-	14.3	-	-
Tractor-drawn implements	-	-	-	10.0
Animal-drawn implements*	1.9	2.3	4.4	3.3
Water pump	8.3	28.6	8.6	17.3
Sprinkler	11.1	-	12.5	27.3
Scotch carts	1.3	-	4.1	1.9
Water bowser	25.0	-	20	16.7
Tobacco baler	-	-	-	6.3
Knapsack sprayer	5.1	8.3	3.1	8.1
Wheelbarrow	2.1	4.4	0.6	1.6
Yoke	3.5	2.6	7.6	4.1
Other equipment	2.9	11.8	2.9	3.7

NB. Includes Oxen and Donkeys. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.*

6.4. Households Disposing Agricultural Equipment

Table 6.3 shows the percent distribution of households disposing agriculture equipment by type of equipment and sector during the period January 1 to August 31, 2017. The agriculture equipment which were disposed of in Communal Lands includes scotch carts, knapsack sprayers, wheelbarrows yokes and other agriculture equipment. Over 2 percent of the households in Small Scale Commercial Farms disposed of animal-drawn implements and equipment. The proportion of households which disposed water pumps in Old Resettlement Areas was 3.8 percent.

Table 6.3: Percentage Distribution of Households Disposing Agriculture Equipment by Type of Equipment and Sector

Equipment	CL	SSCF	A1 Farms	ORA
Animal-drawn implements	-	2.3	0.8	0.3
Water pump	-	-	-	3.8
Scotch carts	0.7	-	0.6	0.8
Knapsack sprayer	1.0	-	-	0.5
Wheelbarrow	1.2	-	-	2.0
Yoke	1.3	2.6	0.8	1.0
Other equipment	0.8	-	1.4	0.7

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

6.5. Households Renting out Agriculture Equipment

Table 6.4 shows the percent distribution of households renting out agriculture equipment by type of equipment and by sector during the period January 1 to August 31, 2017. In Communal Lands 25.0 percent, and 4.2 percent of the households mostly rented out tobacco bailers, and water pumps respectively. The situation in Small Scale Commercial Farms was different as 42.9 percent and 22.2 percent of the households rented out tractors, tractor drawn implements. Only 2.3 percent of the households in Small Scale Commercial Farms rented out animal drawn implements while the rest of the agriculture equipment were not rented out. In A1 Farms 50.0 percent of the households rented out tobacco balers, 40.0 percent water bowsers and 14.3 tractor drawn implements. In Old Resettlement Areas 31.3 percent of the households mostly rented-out tobacco bailers.

Table 6.4: Percentage Distribution of Households Renting Out Agriculture Equipment by Type of Equipment and Sector

Equipment	CL	SSCF	A1 Farms	ORA
Tractor	-	42.9	-	-
Tractor-drawn implements	-	22.2	14.3	-
Animal-drawn implements	1.1	2.3	2.0	1.0
Water pump	4.2	-	2.9	-
Sprinkler	-	-	12.5	-
Scotch carts	3.4	-	4.7	3.4
Water bowser	-	-	40.0	-
Tobacco baler	25.0	-	50.0	31.3
Knapsack sprayer	1.5	-	1.5	1.4
Wheelbarrow	0.9	-	2.5	0.4
Yoke	0.5	-	0.4	0.5
Other equipment	-	-	1.4	-

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

6.6. Income Received by Households for Renting out Agriculture Equipment

Table 6.5 shows the average amount of income received by households for renting out agriculture equipment by type of equipment and by sector. Households residing in Small Scale Commercial Farms received US$63.9 for renting out a tractor and US$25.0 for renting out animal drawn implements. Households residing in A1 Farms received on average US$30.0 from a water pump and $17.1 from animal –drawn implements.

Table 6.5: Average Income from Renting-Out Agriculture Equipment by Type of Equipment and Sectors

	CL	SSCF	A1 Farms	ORA
Livestock	**Average Income$**	**Average Income$**	**Average Income $**	**Average Income$**
Tractor	-	63.9	-	-
Tractor-drawn implements	-	24.2	3	-
Animal-drawn implements	5.7	25	17.1	-
Water pump	0.7	-	30	-
Sprinkler	-	-	5	-
Scotch carts	2.6	-	5.3	1.8
Water bouser	-	-	17	-
Tobacco baler	7.5	-	7.6	11.3
Sheller - Mechanical	-	-	9	-
Knapsack sprayer	-	-	0.3	1.7
Wheelbarrow	-	-	-	-
Yoke	1	-	1	-
Other equip.	-	-	93.8	-

N.B. There were few observations households renting out equipment. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

6.7. Households Using Agriculture Equipment

Table 6.6 shows the percentage of households using agriculture equipment by type of equipment and sector. It was indicated that 19 percent of the households in the Small Scale Commercial Farms used a tractor. The use of tractor services by households in A1 Farms was 10.0 percent compared to 3.3 percent for households in Old Resettlement Areas and 1.9 percent for households in Communal Lands. The usage of animal drawn implements was high ranging from 69.3 percent in Small Scale Commercial Farms to 89.0 percent in Old Resettlement Areas.

Table 6.6: Percentage of Households that Used Agriculture Equipment by Type and Sector

Equipment	CL	SSCF	A1 Farms	ORA
Tractor	1.9	18.7	10.0	3.3
Tractor-drawn implements	2.9	15.9	10.7	5.4
Animal-drawn implements*	76.4	69.3	83.4	89.0
Pickup truck	0.8	3.4	4.7	5.3
Water pump	1.6	6.8	7.2	7.2
Sprinkler	1.0	1.1	0.7	2.0
Scotch carts	41.5	44.3	60.0	66.6
Water bowser	0.6	5.7	1.1	1.5
Tobacco baler	1.6	8.0	15.7	10.4
Sheller – Mechanical	0.1	3.4	2.2	0.7
Sheller – Manual	0.3	2.3	0.4	0.2
Knapsack sprayer	21.3	40.9	53.7	40.0
Wheelbarrow	44.3	64.8	44.5	49.3
Yoke	69.5	61.4	77.9	84.7
Other equipment	22.7	23.9	17.2	26.9

*N.B. *Includes oxen and donkeys. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.*

Table 6.7 shows the percentage distribution of households who rented-in agriculture equipment by type of equipment and by sector during the period January 1 to 31 August 2017. While the usage of agriculture equipment was high, it is important to note that some of the equipment used was rented- in. In Communal Lands 22.5 percent of the households rented in animal drawn implements while in Small Scale Commercial Farms 24.6 percent of the households rented-in animal drawn implements. Slightly over 24 percent of the households in A1 Farms rented-in animal drawn implements compared to 14.1 percent in Old Resettlement Areas. Furthermore, the percentage of households who rented-in tractor services was high ranging from 64.7 percent in Small Scale Commercial Farms to 95.0 percent in Old Resettlement Areas.

Table 6.7: Percentage of Households Who Rented-In Agriculture Equipment for those Who Used Equipment by Type and Sector

Equipment	CL	SSCF	A1 Farms	ORA
Tractor	82.6	64.7	84.4	95.0
Tractor-drawn implements	38.2	50.0	58.3	36.4
Animal-drawn implements	22.5	24.6	24.1	14.1
Pickup truck	40.0	-	42.9	62.5
Scotch carts	19.2	25.6	18.7	16.6
Water bowser	14.3	40.0	-	-
Tobacco baler	57.9	42.9	64.3	41.3
Sheller – mechanical	-	100.0	80.0	100.0
Sheller – manual	33.3	-	-	-
Knapsack sprayer	5.6	8.3	6.7	5.8
Wheelbarrow	3.6	10.5	3.5	3.0
Yoke	16.7	20.4	14.4	8.4
Other equipment	0.7	14.3	3.9	1.8

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 6.8 shows the average amount paid per day for renting-in agriculture equipment by type of equipment and sector. In Communal Lands, the cost of renting-in a pick-up truck was US$135 per day, while in A1 Farms, the rental cost of a pick-up truck was US$76 per day. In Old Resettlement Areas, however, the rental cost of a pick-up truck was US$58 per day. It was notable that the households in Old Resettlement Farms paid the highest renting in cost for tractor services, averaging $71 per day compared US$31 per day in Communal Lands.

Table 6.8: Average Amount Paid Per Day for Renting-in Agriculture Equipment by Type of Equipment and Sector

Equipment	CL	SSCF	A1 Farms	ORA
Tractor	30.8	56.1	61.2	71.3
Tractor-drawn implements	19.4	56.9	46.4	47.0
Animal-drawn implements	8.2	9.7	12.9	5.6
Pickup truck	134.6	-	75.9	58.0
Scotch carts	4.5	4.4	5.0	4.0
Water bouser	0.0	7.5	-	-
Tobacco baler	13.1	8.0	14.0	15.1
Sheller – mechanical	-	36.3	35.4	47.8
Sheller – manual	2.0	-	-	-
Knapsack sprayer	1.5	0.0	0.6	2.4
Wheelbarrow	0.2	0.0	0.1	0.6
Yoke	2.0	2.2	4.0	2.1
Other equipment	5.0	0.0	61.7	15.0

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 6.9: depicts the average number of days for renting-in agriculture equipment by type of equipment and sector for those households who used equipment. The households in Communal Lands rented-in a tractor for an average of 1.1 day compared to an average of 1.9 days in Old Resettlement Areas. Households in Old Resettlement Areas rented-in animal drawn implements for an average period of 13.7 days whilst households in Small Scale Commercial Farms rented-in animal drawn implements for an average of 9.4 days. Households in the smallholder agricultural sector rented-in a wheelbarrow for an average period ranging from 5.3 to 6.8 days.

Table 6.9: Average Number of Days for Renting-in Agriculture Equipment by Type of Equipment and Sector for Households who used Equipment

Equipment	CL	SSCF	A1 Farms	ORA
Tractor	1.1	1.6	1.6	1.9
Tractor-drawn implements	1.8	1.4	1.9	1.8
Animal-drawn implements*	5.7	9.4	6.2	13.7
Pickup truck	1.8	-	1.3	1.7
Scotch carts	5.0	2.4	5.9	4.7
Water bowser	4.0	2.5	-	-
Tobacco baler	1.4	3.3	2.2	2.1
Sheller - mechanical	-	1.0	1.0	1.3
Sheller – manual	1.0	-	-	-
Knapsack sprayer	10.6	3.3	5.4	5.1
Wheelbarrow	6.8	5.3	6.4	5.4
Yoke	7.9	3.8	10.0	11.3
Other equipment	3.5	12.0	1.0	1.3

N.B. *Includes oxen and donkeys.

The proportion of households using agriculture equipment by type of equipment and sex of head of household is presented in Table 6.10. The table shows that the usage of tractors in female-headed households was lower compared to usage of tractors in male-headed households. In Communal Lands, 2 percent of male-headed households used a tractor compared to 1.9 percent for female-headed households. Furthermore, 24.1 percent of the male-headed households used a tractor in Small Scale Commercial Farms compared to 11.1 percent for the female-headed households.

Table 6.10: Percent Proportion of Households Using Agriculture Equipment by Type of Equipment, Sex of Head of Household and Sector

Capital Equipment	CL			SSCF		
	Male-headed	Female-headed	Both sexes	Males – headed	Female-headed	Both sexes
Tractor	2.0	1.9	1.9	24.1	11.1	17.6
Tractor-drawn implements	3.8	1.5	2.6	19.6	11.1	15.4
Animal-drawn implements*	79.6	71.6	75.6	66.7	72.2	69.4
Pickup truck	1.3	0.2	0.7	5.9	-	2.9
Water pump	2.3	0.6	1.4	7.8	5.6	6.7
Sprinkler	1.3	0.6	1.0	2.0	-	1.0
Scotch carts	46.1	34.5	40.3	43.1	44.4	43.8
Water bowser	0.6	0.6	0.6	7.8	2.8	5.3
Tobacco baler	2.4	0.4	1.4	5.9	11.1	8.5
Sheller - Mechanical	-	0.2	0.1	5.9	-	2.9
Sheller – Manual	0.3	0.2	0.2	3.9	-	2.0
Knapsack sprayer	27.7	11.8	19.8	45.1	36.1	40.6
Wheelbarrow	45.8	42.1	44	66.7	61.1	63.9
Yoke	74.4	62.3	68.4	58.8	66.7	62.7
Other equipment	21.2	24.8	23	25.5	22.2	23.9

N.B. Includes oxen and donkeys.* *NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.*

Table 6.10 further shows that in A1 Farms, 11.4 percent of male-headed households used a tractor compared to 6.1 percent of female-headed households. Additionally, 3.9 percent of the male-headed households in Old Resettlement Areas used a tractor while 2.2 percent of female-headed households used a tractor. The usage of animal drawn implements by female-headed households was high across sectors. The usage of animal drawn implements in female-headed households ranged from 71.6 percent in Communal Lands to 83.9 percent in Old Resettlement Areas. The usage of animal drawn implements in male-headed households ranged from 66.7 percent in Small Scale Commercial Farms to 91.9 percent in A1 Farms. The same pattern was observed on the usage of the yoke.

Table 6.10: Proportion of Households Using Agriculture Equipment by Type of Equipment, Sex of Head of Household and Sector Continued

Capital Equipment	A1 Farms			ORA		
	Male-headed	Female-headed	Both sexes	Male-headed	Female-headed	Both sexes
Tractor	11.4	6.1	8.8	3.9	2.2	3.0
Tractor-drawn implements	12.3	5.3	8.8	6.5	3.6	5.0
Animal-drawn implements*	85.5	78.1	81.8	91.9	83.9	87.9
Pickup truck	6.3	-	3.2	6.0	4.0	5.0
Water pump	8.4	3.5	6.0	8.4	5.4	6.9
Sprinkler	0.6	0.9	0.7	2.3	1.3	1.8
Scotch carts	63	50.9	56.9	74.2	53.6	63.9
Water bowser	1.2	0.9	1.0	1.3	1.8	1.5
Tobacco baler	19.9	3.5	11.7	13.3	5.4	9.3
Sheller – Mechanical	2.4	1.8	2.1	1.0	-	0.5
Sheller – Manual	0.6	-	0.3	0.3	-	0.1
Knapsack sprayer	61.4	30.7	46.1	45.7	30.4	38
Wheelbarrow	46.4	39.5	42.9	52.2	44.2	48.2
Yoke	81.3	68.4	74.9	88.3	78.6	83.4
Other equipment	15.7	21.9	18.8	27.4	25.9	26.7

N.B. Includes oxen and donkeys. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.*

Table 6.11 presents the proportion of households owning agriculture equipment by type of equipment and sex of head of household. This analysis aims to show the disparities between male and female-headed households in the ownership of agriculture equipment. High proportions were reported in the ownership of animal drawn implements, scotch carts, knapsack sprayer, wheelbarrow and yoke by both male and female head of households. There were marginal disparities in the ownership of animal drawn implements between male and female head of households across sectors. In Communal Lands 53.0 percent of male-headed households owned an animal drawn implement compared to 40.2 percent for the female-headed households. In Small Scale Commercial Farms, 46.0 percent of the male-headed households owned an animal drawn implement compared to 54.1 percent for the female-headed households. In A1 Farms the ownership of an animal drawn implement by male-headed and female-head households was the same at about 56 percent. In Old Resettlement Areas 66.6 percent of male-headed households owned an animal drawn implement compared to 60.4 percent for the female-headed households. There were marginal differences in the ownership of wheelbarrows between male-headed and female-headed households.

Table 6.11: Proportion of Households Owning Agriculture Equipment by Type of Equipment and Sex of Head of Household

Equipment	CL		SSCF		A1 Farms		ORA	
	Male-Headed	Female-Headed	Male-Headed	Female-Headed	Male-Headed	Female-Headed	Male-Headed	Female-Headed
Tractor	0.1	-	9.3	5.4	0.3	-	0.5	-
Tractor-drawn implements	1.3	0.8	14	5.4	2.1	-	1.8	1.3
Animal-drawn imple*	53.0	40.2	46.0	54.1	56.3	56.5	66.6	60.4
Pickup truck	1.0	-	10	2.7	3.3	-	2.6	1.3
Water pump	2.8	0.8	18	13.5	9.3	3.5	10.4	5.3
Sprinkler	0.8	0.6	4	-	2.1	0.9	2.1	1.3
Scotch carts	28.9	19.8	26	37.8	40.7	31.3	47.8	35.6
Water bowser	0.4	0.2	4	2.7	0.9	1.7	0.5	1.8
Tobacco baler	0.6	-	-	-	1.2	-	3.9	0.4
Sheller - mechanical	-	-	-	-	0.3	-	-	-
Sheller - manual	-	0.2	2	-	-	0.9	-	0.4
Knapsack sprayer	22.3	8	48	32.4	49.4	26.1	39.4	26.7
Wheelbarrow	37.8	33.3	48	56.8	37	33.9	42	38.7
Yoke	53.7	34.9	42	48.6	56.6	53.9	68.4	58.2
Other equipment	18.1	24.6	22	16.2	14.8	18.3	22.5	22.2

N.B Includes oxen and donkeys; imple is implement. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.*

6.8. Summary

In general the ownership of tractors, the major productive assets needed for agriculture production, is very low in the smallholder agricultural sector. The proportion of households owning tractors ranged from 0.1 percent in Communal Lands to 7.7 percent in Small Scale Commercial Farms.

It was noted that most households did not acquire mechanized productive assets such as tractors, tractor drawn implements and tobacco baler. The agriculture equipment which were disposed of in Communal Lands included scotch carts, knapsack sprayers, wheelbarrows yokes and other agriculture equipment.

In Communal Lands 25.0 percent, and 4.2 percent of the households mostly rented out tobacco bailers, and water pumps respectively. The situation in Small Scale Commercial Farms was different as 42.9 percent and 22.2 percent of the households rented out tractors and tractor drawn implements.

7. Command Agriculture

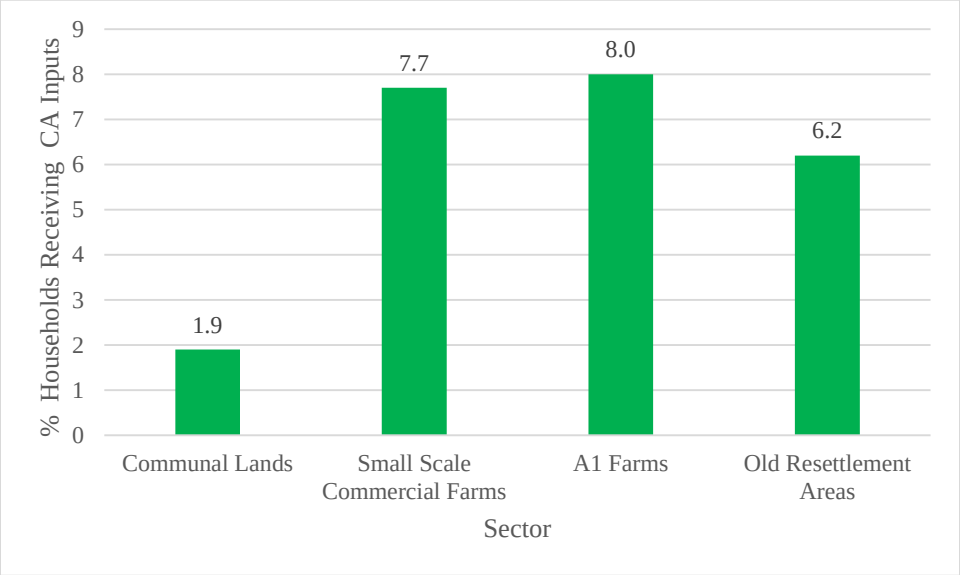
7.1. Introduction

Chapter seven focuses on the Command Agriculture programme, a Government initiative aimed at providing agricultural inputs to farmers in all farming sectors. Agricultural input packages were given to selected farmers in the form of a loan to produce specific crops. In the 2016/17 agriculture season, the targeted crops under the command agriculture were maize and wheat. Command Agriculture was later extended to livestock and fisheries. It should be noted that the analysis in this chapter was based on a few number of observations constituting 104 households and so the results are for indicative purposes.

7.2. Share of Households under the Command Agriculture Programme

Figure 7.1 shows the percentage of households that received inputs under the Command Agriculture (CA) programme by sector. The inputs provided under the Command Agriculture Programme included fertilizers, herbicides, lime, diesel, pesticides, maize seed and wheat seed. It was noted that 8.0 percent of the households in A1 Farms received inputs under the Command Agriculture programme compared to 7.7 percent for households in Small Scale Commercial Farms. Moreover, 6.2 percent of the households in Old Resettlement Areas received agricultural inputs under the Command Agriculture Programme compared to 1.9 percent for households in Communal Lands.

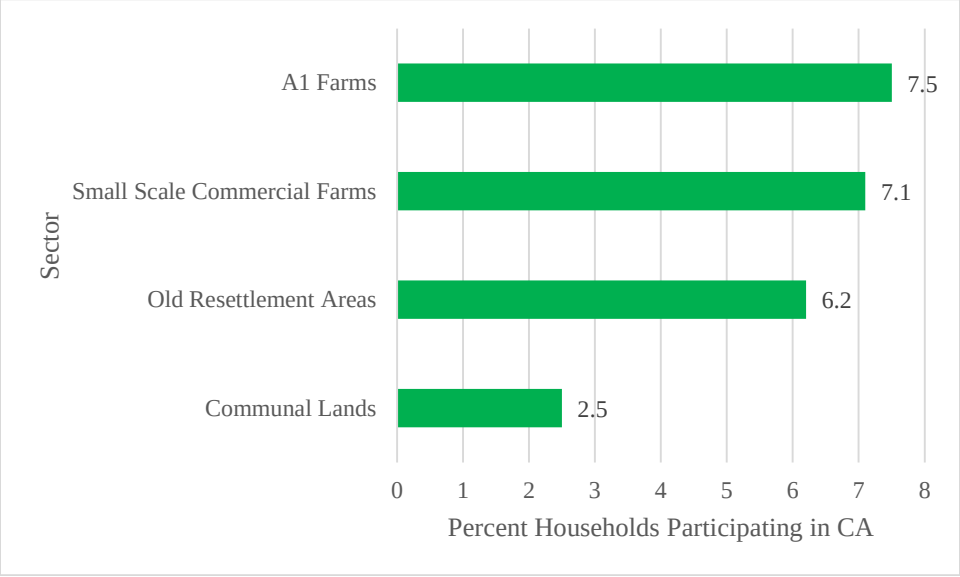
Figure 7.1: *Percent Households that Received Inputs under the Command Agriculture Programme by Sector*



N.B. CA is Command Agriculture: Figures were based on input use data, APM first round

Figure 7.2: displays the percentage of households that participated in Command Agriculture by sector based on the plot-level data gathered in the APM Survey second round. The question asked was: “Was this [crop] on this [plot] under Command Agriculture during the agricultural season 2016/2017?” This question was only asked for maize and wheat. It was noted that the participation of households in Command Agriculture based on the plot-crop results was similar to those based on the inputs access data in Figure 7.1. It is further shown that 7.5 percent of the households in A1 Farms participated in Command Agriculture compared to 7.1 percent for households in Small Scale Commercial Farms. Only 2.5 percent of the households in Communal Lands participated in Command Agriculture compared to 6.2 percent of the households in Old Resettlement Areas.

Figure 7.2: Percentage of Households Participating in Command Agriculture by Sector based on plot level data



N.B. CA Means Command Agriculture. Figures were based on plot-crop level data, APM second round

Table 7.1 shows the distribution of households that received inputs under the Command Agriculture programme by sector. In Communal Lands 2.2 percent of the households received maize seeds while 1.1 percent received ammonium nitrate fertilizer from the programme. In A1 Farms 7.8 percent of the households received maize seed from the Command Agriculture Programme compared to 7.0 percent for households in Small Scale Commercial Farms. Furthermore, 6.6 percent of the households in Old Resettlement Areas received maize seeds under the Command Agriculture Programme. The distribution of Command Agriculture Compound D fertiliser to households ranged from 0.6 percent for households in Communal Lands to 4.7 percent for households residing in Small Scale Commercial Farms.

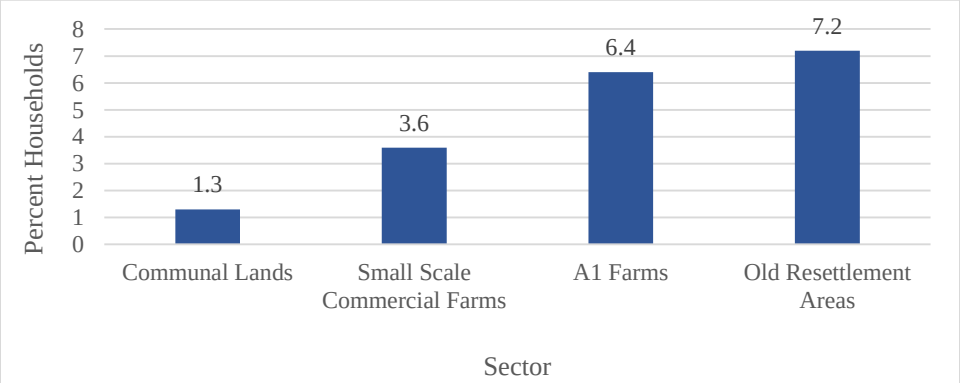
Table 7.1: Percentage of Households that Received a particular type of Input under Command Agriculture by Sector

Type of Inputs	CL	SSCF	A1 Farms	ORA
Land Preparation	-	1.2	0.9	-
Lime	0.1	-	-	1.2
Fertilizer - Compound D	0.6	4.7	4.2	3.5
Fertilizer - Ammonium Nitrate	1.1	3.5	2.1	3.7
Fertilizer – Urea	0.7	2.3	3.2	2.7
Herbicide – Glyphosate	-	2.3	1.4	-
Herbicide – Atrazine	-	1.2	0.7	1.5
Herbicide – Metolachlor	-	2.3	0.9	0.2
Herbicide - Bateleur Gold	-	-	0.2	-
Herbicide – Nicosulfuron	0.2	-	1.6	0.6
Herbicide – Halosulfuron	-	-	-	0.2
Herbicide - Stella Star	-	1.2	0.5	-
Herbicide – Dual	-	-	0.5	-
Pesticide – Lambda	0.1	-	1.2	1.0
Pesticide – Cabrayl	0.4	-	0.2	0.4
Diesel	0.4	3.5	2.3	1.5
Maize Seeds	2.2	7.0	7.8	6.6
Wheat Seeds	0.2	-	0.5	0.6

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 7.3 depicts the percentage of households that participated in maize production under the Command Agriculture Programme by sector. It is shown that 7.2 percent of the households in Old Resettlement Areas who participated in the programme produced maize, followed by 6.4 percent of households in A1 Farms. In Small Scale Commercial Farms 3.6 percent of the households participated in maize production compared to only 1.3 percent of the households in Communal Lands.

Figure 7.3: Percentage Household Participation in Maize Production under Command Agriculture by Sector



N.B. Data From Field Crop Harvest.

7.3. Maize Production among Smallholder Agricultural Sector - Command Agriculture Recipients

This section displays the yield (kg/ha) for the maize crop grown under the Command Agriculture Programme by sector in the 2016/17 agricultural season. To compute yield, the maize production in tonnes was divided by the area of maize under cultivation in hectares. The yield is measured in kilogrammes per hectare but can be converted to tonnes per hectare by dividing by 1000 kilogrammes. Maize production is computed in kilogrammes then converted into tonnes. The maize crop which was harvested was used to measure the output. The data on area was collected in square metres. The area of plots were all converted into hectares.

Table 7.2 reveals that the maize yield under Command Agriculture measured in kilogrammes per hectare was generally low across all sectors as compared to the expected standard yield of 5 tonnes per hectare based on a target set by Government on the Command Agriculture Programme. The maize yield in Communal Lands was as low as 1.7 tonnes per hectare compared to 3.0 tonnes per hectare in Small Scale Commercial Farms. The maize yield under the Command Agriculture Programme in A1 Farms was 1.8 tonnes per hectare compared to 2.0 tonnes per hectare in Old Resettlement Areas. Table 7.2 further shows that the yield of the maize crop not grown under Command Agriculture were generally lower. However, further data analysis is needed to assess the impact of command agriculture on yields.

Table 7.2: Yield (kg/ha) for Maize under Command Agriculture and Non Command Agriculture by Sector

	Non -Command Agriculture			Command Agriculture		
Land Use Sector	**Production (Tonnes)**	**Total area (Ha) of surveyed farmers**	**Yield (kgs)/Ha)**	**Production Tonnes**	**Total area (Ha) of surveyed farmers**	**Yield (kgs/Ha)**
CL	536	742	722	16	9	1 713
SSCF	106	76	1 382	9	3	3 014
A1 Farms	564	504	1 118	61	35	1 752
ORA	497	589	844	96	48	1 995

Ha is hectare. NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 7.3 depicts that in the smallholder farming sector, the average area under maize for households participating in the Command Agriculture Programme in the 2016/17 agricultural season was 1.1 hectares. The area under maize in the smallholder agricultural sector ranged from 0.7 hectares per household in Communal Lands to 1.3 hectares per household in Old Resettlement Areas.

Table 7.3: Average Area under Command Agriculture by Sector in the 2016/17 Agricultural Season

Land Use Sector	Average Area	No of Households
Communal Lands	0.7	21
Small Scale Commercial Farms	1.0	6
A1 Farms	1.2	31
Old Resettlement Areas	1.3	36
Total		**94**

N.B. There were very few observations for the wheat Command Agriculture. Therefore there was no analysis done on this.

7.4. Interest Shown by Farmers in Command Agriculture

Table 7.4 presents the comparison of household interest on Command Agriculture in the 2016/17 agricultural season, application and intention to apply in 2017/2018. The table reveals that there was growing interest in the Command Agriculture Programme. In Communal Lands, 3.5 percent of the households applied to join the Command Agriculture Programme in 2016-17 season compared to 9.8 percent of the households in A 1 Farms. During the same period, 8.8 percent of households in Small Scale Commercial Farms applied to join Command Agriculture compared to 8.2 percent in Old Resettlement Areas. The applications to join the Command Agriculture Programme increased in the 2017/18 agricultural Season by 6.2 percentage points in Old Resettlement Areas and to 4.4 percentage points in Small Scale Commercial Farms.

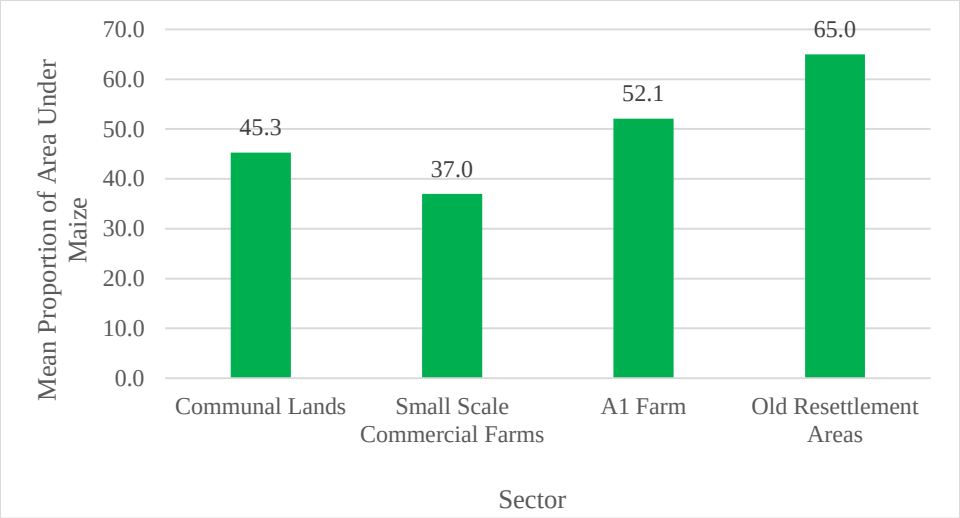
Table 7.4: Comparison of Household Interest on Command Agriculture in the 2016/17 Application and Intention to Apply in 2017/2018

Sector	Applied 2016/17	Already applied 2017/2018	Still intend to Apply 2017/2018	Number of Households in Sample
	%	%	%	
CL	3.5	3.2	12.2	1 186
SSCF	8.8	13.2	5.5	91
A1 Farms	9.8	11.4	8.0	449
ORA	8.2	14.4	11.6	612

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 7.4: depicts the proportion of the area under maize in Command Agriculture as a proportion of the farmers' total area under maize by sector. It was noted that the farmers who benefited from inputs provided under the Command Agriculture program also had other portions of land under maize not under Command Agriculture. In Communal Lands, 45.3 percent of the households had maize under Command Agriculture compared to the total area under maize within their farms. In Old Resettlement Areas 65.0 percent of the households had maize under Command Agriculture as a proportion of the farmer's total area under maize within their farms. About 37.0 of the Command Agriculture households in Small Scale Commercial Farms had area under maize compared to the total area under maize.

Figure 7.4: Average Proportion of Area Under Maize that Uses Inputs Provided through Command Agriculture as a Proportion of the Farmers' Total Area Under Maize, for farmers who participated in Command Agriculture, by Sector



7.5. Summary

The inputs provided under the Command Agriculture Programme included fertilizers, herbicides, lime, diesel, pesticides, maize seed and wheat seed. It was noted that 8.0 percent of the households in A1 Farms received inputs under the Command Agriculture Programme compared to 7.7 percent for households in Small Scale Commercial Farms. Moreover, 6.2 percent of the households in Old Resettlement Areas received agricultural inputs under the Command Agriculture Programme compared to 1.9 percent or households in Communal Lands.

It is shown that 7.5 percent of the households in A1 Farms participated in Command Agriculture compared to 7.1 percent for households in Small Scale Commercial Farms. Only 2.5 percent of the households in Communal Lands participated in Command Agriculture compared to 6.2 percent of the households in Old Resettlement Areas.

The maize yield in Communal Lands was as low as 1.7 tonnes per hectare compared to 3.0 tonnes per hectare in Small Scale Commercial Farms. The maize yield under the Command Agriculture Programme in A1 Farms was 1.8 tonnes per hectare compared to 2.0 tonnes per hectare in Old Resettlement Areas.

In Communal Lands, 3.5 percent of the households applied to join the Command Agriculture Programme in 2016-17 agricultural season compared to 9.8 percent of the households in A1 Farms. In the same period, 8.8 percent of households in Small Scale Commercial Farms applied to join Command Agriculture compared to 8.2 percent in Old Resettlement Areas. The applications to join the Command Agriculture Programme increased in the 2017/18 agricultural Season by 6.2 percentage points in Old Resettlement Areas and by 4.4 percentage points in Small Scale Commercial Farms.

8. Agricultural Credit and Extension Services

8.1. Introduction

This Chapter covers the survey findings regarding agricultural support services. Agricultural services include extension services received by households, credit and loans accessed during the 2016/2017 agricultural season.

8.2. Credit and Loans

Credit is the money that households borrowed for agricultural purposes and would need to be repaid. This excludes any gifts or transfers that the household was given without any obligations of paying back. Table 8.1 shows that slightly less than six percent of the households in the smallholder agricultural sector were able to access agricultural credit loans. The access to credit loans varied from 2.1 percent for households residing in Communal Lands to 5.8 percent for households residing in A1 Farms. The proportion of households receiving agricultural credit loans in Old Resettlement Areas was 5.4 percent compared to 4.4 percent for households residing in Small Scale Commercial Farms.

Table 8.1: Proportion of Households Receiving Credit

Communal Lands	2.1
Small Scale Commercial Farms	4.4
A1 Farms	5.8
Old Resettlement Areas	5.4

Figure 8.1 depicts the percentage distribution of households who accessed agricultural credit by source of loan. Slightly over half of the households who accessed agricultural credit received it from contract farming institutions while 16 percent received credit from friends and relatives. Banks and microfinance institutions gave 8 percent each of the agricultural loans to households. Saving Associations only provided 1 percent of agricultural loans to households.

Figure 8.1: Percent Distribution of Households Who Accessed Agricultural Credit by Source of Loan

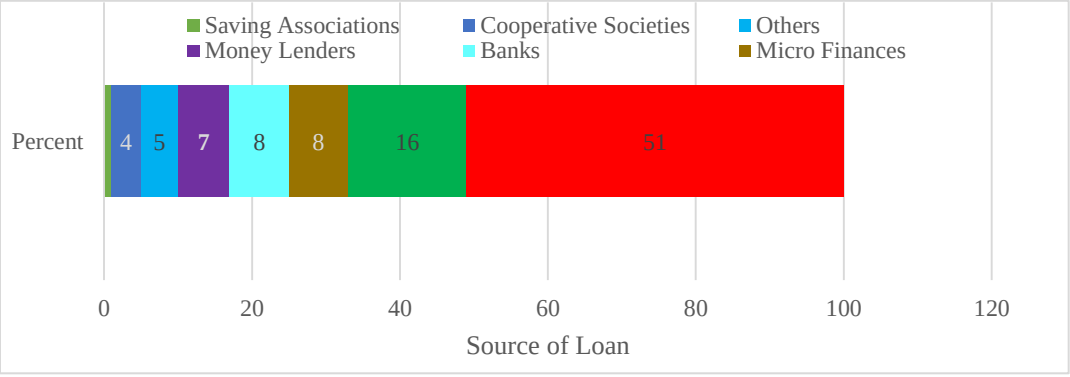


Table 8.2 shows the average amount borrowed by source of loan and sector for those that were able to obtain a loan. The average amount borrowed per household in A1 Farms was U$876 followed by US$600 in Small Scale Commercial Farms. The least average loan amounting to US$339 was accessed by household in Communal Lands. The average amount loans given out by banks ranged from US$200 in Communal Lands to US$1 351 in A1 Farms. The average amount of money borrowed for Contract Farming ranged from US$700 in Small Scale Commercial Farms to US$1 085 in Old Resettlement Areas.

Table 8.2: Average Amount Borrowed (US$) by Source of Loan and Sector (for those that borrowed)

Source of Loan	CL	SSCF	A1 Farms	ORA	Total
Cooperative Society	315.0	-	1 200.0	-	610.0
Savings Association	-	-	120.0	-	120.0
Micro Finance	719.0	-	-	120.0	419.5
Bank	200.0	500.0	1 351.0	300.0	842.2
Friends & Relatives	47.5	-	85.0	284.2	172.1
Money Lenders	36.7	-	660.0	60.0	166.0
Contract Farming	787.5	700.0	969.1	1 084.8	982.1
Other	344.0	1 000.0	1 150.0	300.0	714.7
Total	**338.9**	**600.0**	**875.8**	**543.2**	**582.6**

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Figure 8.2 displays the average amount borrowed by the age group. It was noted that the average amount of money borrowed by persons aged between 15-35 years was US$626 while the average amount borrowed by persons 36 years of age was US$595.The average amount borrowed for the for the two age groups was US$603.

Figure 8.2: Average Amount Borrowed By Age Group

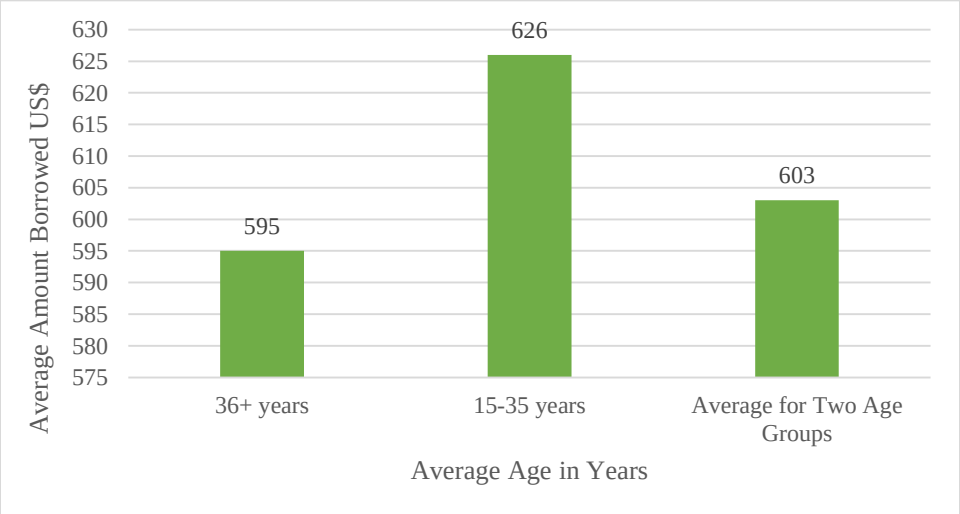
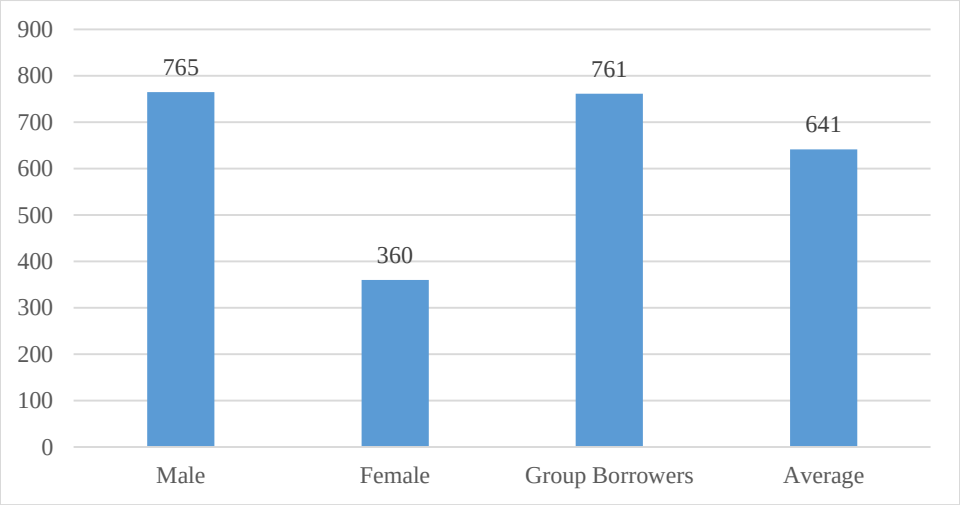


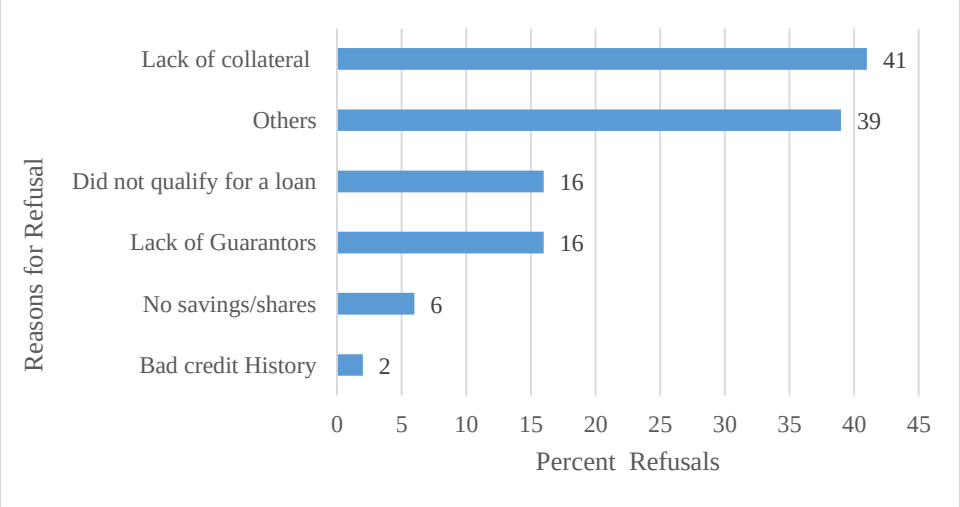
Figure 8.3 presents the average amount borrowed by sex of the farmer. The average amount borrowed by farmers was US$641. However, the amount borrowed by male farmers was higher being US$765 compared to an average amount of US$360 for female farmers. It was noted that group borrowers received a higher average amount of money being US$761 compared to those who borrowed as individuals. Borrowing as groups was advantageous to borrowers as individual borrowers received much less.

Figure 8.3: Average Amount Borrowed (US$) for those that borrowed by Sex of Farmer



About 41 percent of the households applied but were denied access to loans due to lack of collateral security, while 39 percent applied but were unsuccessful for other reasons. Sixteen percent of the households were not given loans as they lacked guarantors and so did not qualify for a loan. Furthermore, 2 percent of the households indicated that they had a bad credit history. See Figure 8.4.

Figure 8.4: Percentage of Loan Refusals by Reason for Refusal



8.3. Agricultural Extension Services

This section presents survey findings on agricultural extension services or advice received by households during the 2016/17 agricultural season. Agricultural Extension Services are defined as technical assistance, advice or a demonstration of agricultural techniques given to a farmer or group of farmers to improve productivity.

Table 8.3 shows the proportion of households that received agricultural extension services by sector. The proportion of households who received Government Agricultural Extension Services ranged from 68.8 percent in A1 Farms to 78.0 percent in Old Resettlement Areas. Furthermore, the proportion of households that received extension services from electronic media such as television and radio ranged from 22.0 percent in Communal Lands to 45.2 percent in Small Scale Commercial Farms. The proportion of households which received extension services from peer farmer or neighbour or relative ranged from 9.5 percent in Small Scale Commercial Farms to 14.7 percent in Communal Lands.

Table 8.3: Proportion of Households that Received Extension Services by Sector

Main Extension Services Providers	CL	SSCF	A1 Farms	ORA
Government Agricultural Extension Service	70.6	73.8	68.8	78.0
Private Agricultural Extension Service	4.0	16.7	7.2	7.3
NGO	9.2	2.4	3.0	5.9
Agricultural Cooperative/ Farmers' Association	2.1	4.8	1.9	0.8
Fishing Cooperative	0.2	4.8	0.0	0.5
Farmer Field Days/Field School	9.6	16.7	8.0	7.0
Lead Farmer	5.2	7.1	2.3	3.2
Peer Farmer (Neighbor/Relative)	14.7	9.5	14.8	11.8
Master Farmer Training Course	0.6	2.4	1.9	0.3
Electronic Media (Tv, Radio, Etc)	22.0	45.2	31.9	25.5
Paper Media (Handouts/Flyers)	2.1	4.8	2.7	1.9
Agro-Input Dealers	1.9	2.4	4.6	2.7
Other	8.2	16.7	12.2	7.5

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

Table 8.4 reveals the percentage of households that received advice by type of information and by sector. In A1 Farms 39.5 percent of the households received advice on new seed varieties compared to 29.5 percent in Communal Lands. The proportion of households who received information on pest and disease control ranged from 24.2 percent in Communal Lands to 36.1 percent in Old Resettlement Areas.

Table 8.4: Percentage of Households who Received Advice by Type of Information and Sector

Type of Information	CL	SSCF	A1 Farms	ORA
New Seed Varieties	29.5	33.0	39.5	38.5
Pest/Disease Control	24.2	28.6	32.0	36.1
Fertilizer Use	26.9	33.0	30.3	39.1
Herbicide Use	16.3	20.9	26.1	25.5
Composting (Manure)	21.0	19.8	17.2	26.0
Irrigation	10.1	14.3	12.2	15.7
Post-Harvest Handling	15.6	16.5	13.9	24.5
Storage	16.0	16.5	17.6	23.7
Forestry/Agroforestry	17.6	19.8	25.9	24.7
Animal Production	18.4	20.9	20.0	27.9
Animal Diseases/Vaccination	19.2	22.0	20.9	28.9
Bee Keeping	6.9	7.7	9.8	8.7
Fish Production	4.1	4.4	6.1	6.5
Marketing	9.9	6.6	11.5	16.4
Conservation Agriculture	12.4	3.3	11.3	17.4
Access To Credit	9.5	13.2	15.3	18.4
Other	2.0	-	1.5	1.7

NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms; ORA is Old Resettlement Areas.

8.4. Summary

In this Chapter it was shown that slightly less than six percent of the households in the smallholder agricultural sector were able to access agricultural credit loans. The access to credit loans varied from 2.1 percent for households residing in Communal Lands to 5.8 percent for households residing in A1 Farms. The proportion of households receiving agricultural credit loans in Old Resettlement Areas was 5.4 percent compared to 4.4 percent for households residing in Small Scale Commercial Farms.

Slightly over half of the households who accessed agricultural credit received it from contract farming institutions while 16 percent received credit from friends and relatives. Banks and microfinance institutions gave 8 percent each of the agricultural loans to households. Saving Associations only provided 1 percent of agricultural loans to households.

The average amount borrowed per household in the A1 Farms was U$876 followed by US$600 in Small Scale Commercial Farms. The least average loan amounting to US$339 was accessed in by household in Communal Lands. The average amount of money borrowed for Contract Farming ranged from US$700 in Small Scale Commercial Farms to US$1 085 in Old Resettlement Areas.

About 41 percent of the households applied but were denied access to loans due to lack of collateral security, while 39 percent applied but were unsuccessful for other reasons. Sixteen percent of the households were not given loans because they lacked guarantors and so did not qualify for a loan. Only 2 percent of the households indicated that they had a bad credit history.

9. Food and Nutrition Security

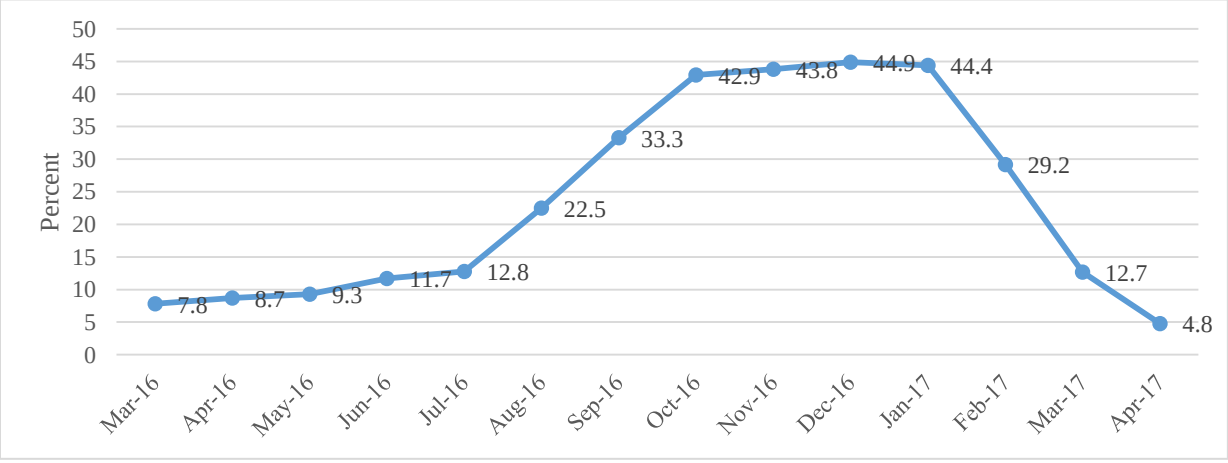
9.1. Introduction

This Chapter presents findings on the food and nutrition security situation in the smallholder agricultural sector. According to the Food and Nutrition Policy developed by the Food and Nutrition Council (2012) "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". The food security indicators used in this module were food availability, Household Dietary Diversity Score (HDDS) and Food Consumption Score (FCS). The food availability used a twelve-month reference period to identify the months when the household experienced food shortages. The HDDS and FCS measure the dietary diversity taking into account all the different types of food consumed by the household and respective weights based on a seven-day reference period.

9.2. Peak Hunger Period

To measure the peak hunger period the question asked to the households was "during which month if any the household did not have enough food to eat?". Figure 9.1 reveals the proportion of households who did not have enough food to eat during a particular month in the past 12 months. It was noted that the peak hunger period for the 2016/17 farming was experienced from October 2016 to January 2017. In March 2016, about 8 percent of households were food insecure, which steadily rose to about 13 percent in July of the same year. The proportion of households who were food insecure in October 2016 was 42.9 percent and this proportion increased to 44.9 percent in January 2017. The main causes of food insecurity included drought, inadequate household food stocks due to pest damage, low production and small land size. Usually the peak hunger period is from January to March, but the 2016/17 season was different in that a lot of rains were received from December to January such that most farmers who planted early had enough food to eat.

Figure 9.1: Percent Proportion of Households who did not Have Enough Food to Eat During a Particular Month in the Past 12 Months



9.3. Food Availability

Figure 9.2 shows the percentage of households who faced a situation where they did not have enough food to eat from March 2016 to April 2017. In the Communal Lands, 56.8 percent of households indicated that they experienced food shortages, followed by 44.6 percent for Small Scale Commercial Farms. In Old Resettlement Areas 29.1 percent of households indicated that they experienced food shortage.

Figure 9.2: Percent Households Who Faced a Situation Where They Did Not Have Enough Food

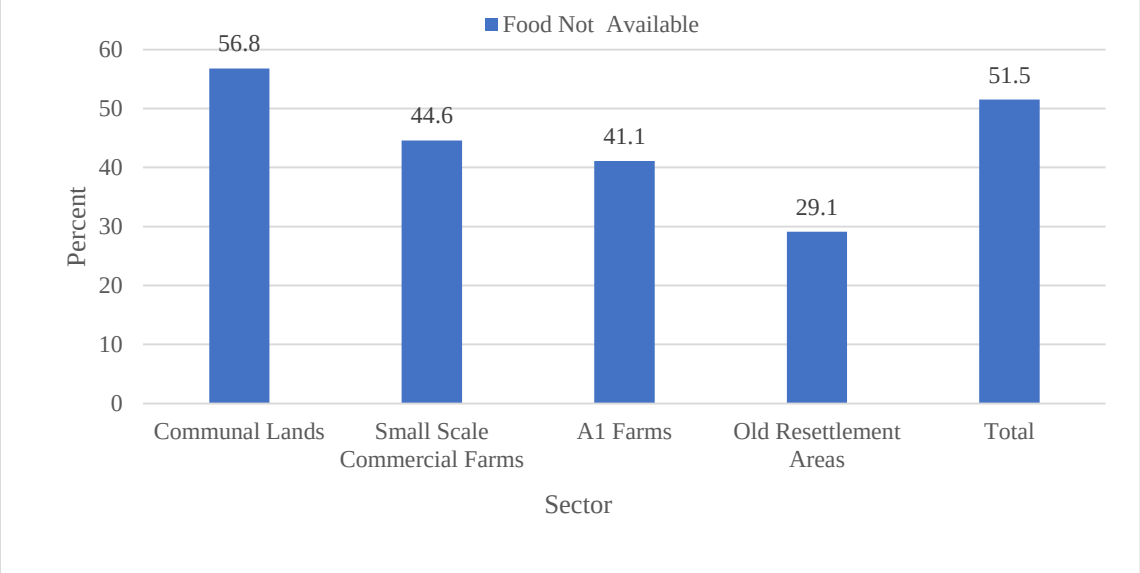
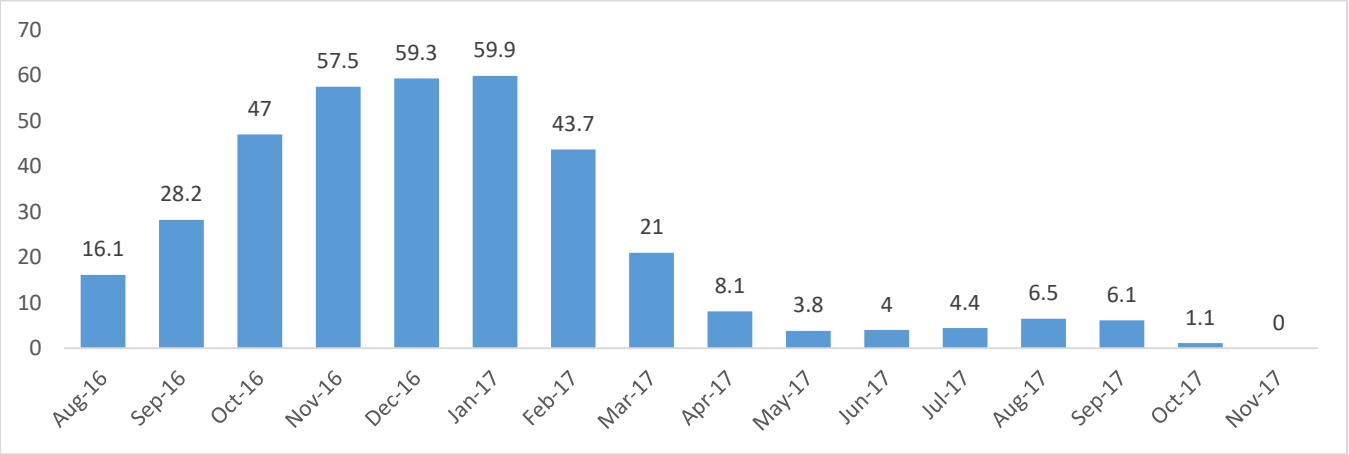


Figure 9.3 reveals the proportion of households and month during which households experienced shortage of food from August 2016 to November 2017. Generally, incidents of food shortages were higher in 2016 than in 2017. The peak hunger period was experienced from November 2016 to January 2017 where between 57.5 percent and 59.9 percent respectively of the households indicated that they experienced food shortages.

Figure 9.3: Proportion and Month in which Households Experienced Food Shortages



The definition of food consumption scores is presented in Figure 9.4.

Figure 9.4: Food Consumption Score Groups and Description of Scores

Food Consumption Score Groups	Score	Description
Poor	0-21	An expected consumption of staple food during 7 days, including vegetables 5-6 days, sugar 3-4 days, oil/fat 1 day a week, while animal proteins are totally absent.
Borderline	21.5-35	An expected consumption of staple food for 7 days, including vegetables 6-7 days, sugar 3-4 days, oil/fat 3 days, meat/fish/egg/pulses 1-2 days a week, while dairy products are totally absent.
Acceptable	>35	As defined for the borderline group with more number of days a week eating meat, fish, egg, oil, and complemented by other foods such as pulses, fruits, milk

Figure 9.5 shows the food consumption score of households from March 2016 to November 2017. Furthermore Figure 9.5 indicates that 69 percent of households had acceptable consumption, while 26 percent had borderline consumption and 5 percent had poor consumption patterns.

Figure 9.5: Food Consumption Score

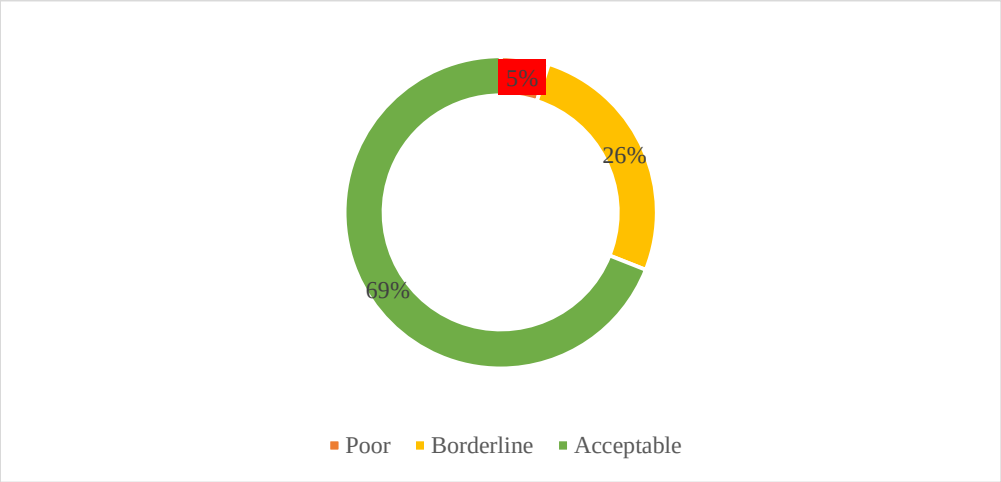


Figure 9.6 displays the food consumption score by sector. In Old Resettlement Areas 82.4 percent of the households had acceptable food consumption patterns. Generally, 69.5 percent of the households in the smallholder agricultural sector had acceptable consumption patterns while 25.8 percent of the households had borderline food consumption patterns. Only 4.7 percent of households in the smallholder sector had poor food consumption patterns. The favourable food consumption scores can be attributed to a good 2016/17 agricultural season.

Figure 9.6: Food Consumption Score by Sector

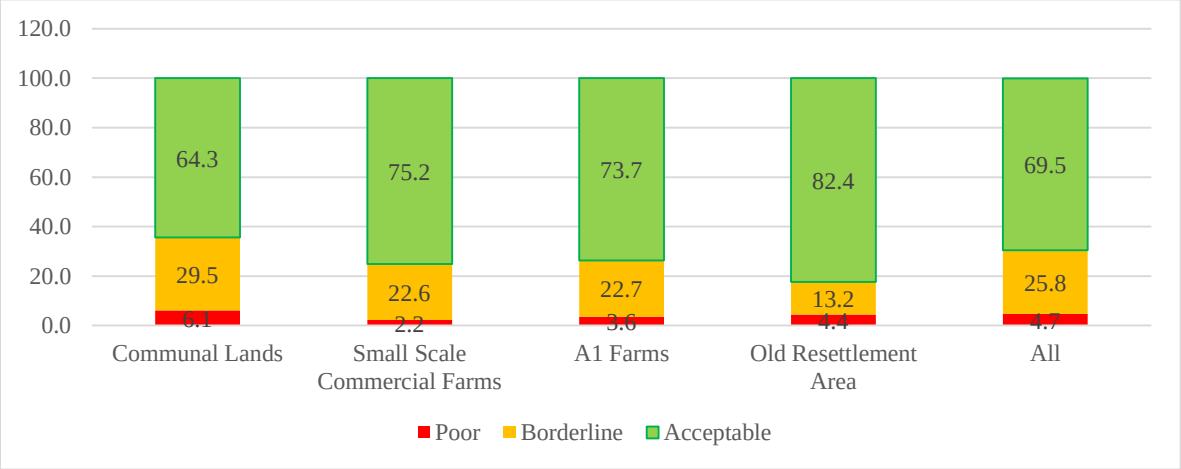


Figure 9.7 shows a comparison of food consumption score between the APM first and second round visits. The figure indicates that household food consumption scores were similar for both visits. The food consumption scores for the acceptable region for households residing Communal Lands hovered between 64.3 percent and 65.3 percent in the APM first and second rounds respectively. It was noted that Old Resettlement Areas had acceptable food consumption scores of 82.4 percent in the first round and 82.8 percent in the second round. Furthermore, the acceptable

food consumption scores for Small Scale Commercial Farms and A1 Farms ranged from 73.2 to 75.2 percent respectively between the first and second APM rounds.

Figure 9.7: Food Consumption Score by Sector APM First and Second Round

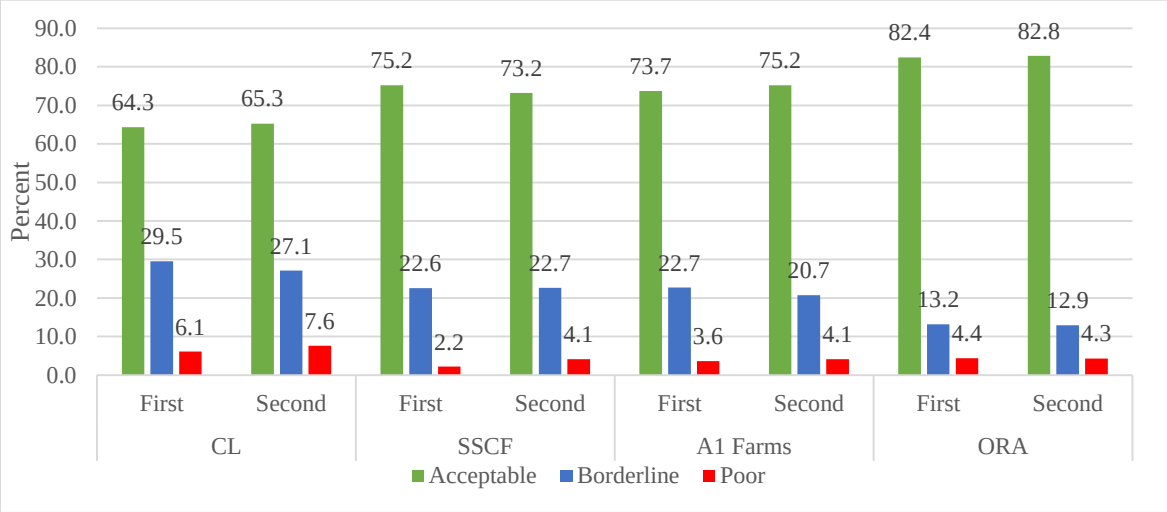


Table 9.1 shows the food consumption score by cereals and pulses output. Households that had acceptable food consumption scores had higher cereal outputs across sectors. In Old Resettlement Areas, households which had a poor consumption score had a cereal output of only 192kgs compared to 2 727kg for those with an acceptable score.

Table 9.1: Food Consumption Score by Cereal and Pulses Output

Sector	FCS	Total Output of Cereals kgs Classified by Food Consumption Score Groups	Pulses kgs
CL	Poor	343	200
	Borderline	482	180
	Acceptable	906	381
SSCF	Poor	559	89
	Borderline	1 490	273
	Acceptable	2 522	531
A1 Farms	Poor	1 020	120
	Borderline	1 061	154
	Acceptable	1 921	451
ORA	Poor	192	1 142
	Borderline	489	122
	Acceptable	2 727	628

N.B. APM Second survey round

9.4. Dietary Diversity

In addition, to food consumption, information collected in the main PICES survey, the level of household food security was explored and the survey sought to know the level of household dietary diversity. A seven-day recall period was used to make the Household Dietary Diversity Score as precise as possible and reduce recall bias.

Figure 9.8 shows that households across all sectors consume an average of 4 food groups. Farm households in all sectors have a medium dietary diversity which mainly comprises cereals, green leafy vegetables, vitamin "A" rich fruits and oils. The pattern is similar for both rounds of the survey.

Figure 9.8: Household Dietary Diversity Score in APM First and Second Round

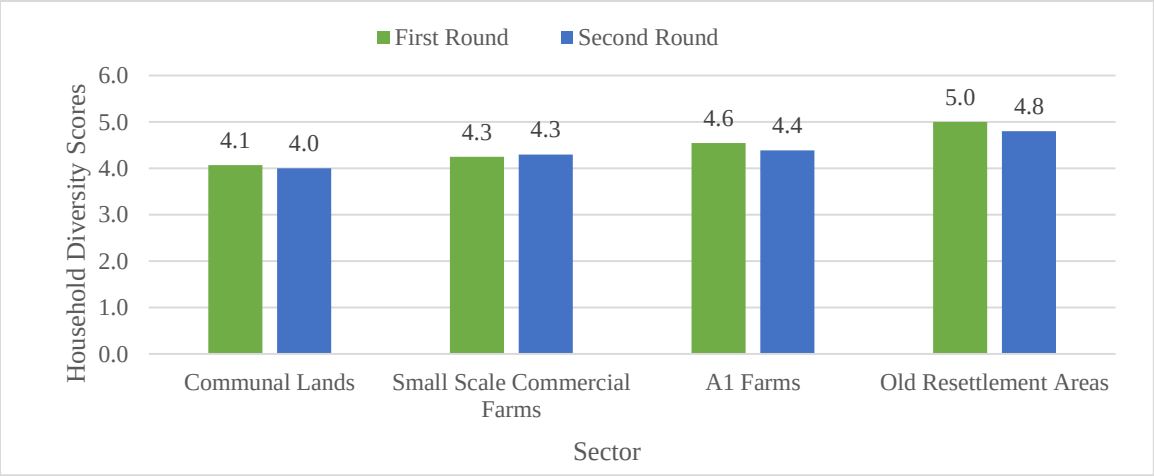


Table 9.2 displays that the average number of meals per day consumed by children aged between 0-59 months was 5.7 meals per day, while household members of five years and above consumed an average of 2.4 meals per day. Additionally, households in the Old Resettlement Areas had the highest average number of meals consumed amounting to 2.6 meals per day while Communal Lands had an average of 2.4 meals per day. There were marginal disparities of the number of meals consumed by children of the two age groups across all agricultural sectors.

Table 9.2: Average Number of Meals Consumed by Household Members by Sector and by Age Group

Sector	5 Years and Above	Children (0-59 Months
Communal Lands	2.4	5.7
Small Scale Commercial Farms	2.5	5.5
A1 Farms	2.5	5.8
Old Resettlement Areas	2.6	5.9
Total	2.4	5.7

Table 9.3 shows that across all agricultural sectors, most household members aged five years and above consumed two and three meals per day. Communal Lands had the highest proportion of households (55.2 percent) who consumed two meals per day while Small Scale Commercial Farms had the highest proportion of households (56.0 percent) consuming 3 meals per day.

Table 9.3: Percent Distribution of Number of Meal Frequency by Sector for Persons Five Years and Above

Sector	Number of Meals							
	0	1	2	3	4	5	6	7
CL	0.5	4.1	55.2	39.0	0.8	0.3	-	-
SSCF	-	2.2	39.6	56.0	2.2	-	-	-
A1 Farms	0.9	2.5	50.2	44.9	1.3	-	-	0.2
ORA	-	2.6	48.4	47.5	1.5	-	-	-
Sample Total	0.4	3.3	51.9	43.0	1.2	0.1	-	-

9.5. Summary

In this Chapter, it has been shown that the peak hunger period for the 2016/17 agricultural season was experienced from October 2016 to January 2017. Furthermore, the proportion of households who were food insecure in October 2016 was 42.9 percent and this proportion increased to 44.9 percent in January 2017. It was elucidated that the main causes of food insecurity included drought, inadequate household food stocks due to pest damage, low production and small land size.

In the Communal Lands, 56.8 percent of households indicated that they experienced food shortages, followed by 44.6 percent for Small Scale Commercial Farms. In Old Resettlement Areas 29.1 percent of households indicated that they experienced food shortage. The peak hunger period was experienced from November 2016 to January 2017 where between 57.5 percent and 59.9 percent respectively of the households indicated that they experienced food shortages.

It was highlighted that in Old Resettlement Areas 82.4 percent of the households had acceptable food consumption patterns. Generally, 69.5 percent of the households in the smallholder agricultural sector had acceptable consumption patterns while 25.8 percent of the households had borderline food consumption patterns. Only 4.7 percent of households in the smallholder sector had poor food consumption patterns. The favourable food consumption scores was attributed to a good 2016/17 agricultural season.

It was further displayed that the average number of meals per day consumed by children aged between 0-59 months was 5.7 per day, while household members of five years and above consumed an average of 2.4 meals per day. Households in the Old Resettlement Areas had the highest average number of meals consumed of 2.6 meals per day while Communal Lands had an average of 2.4 meals per day.

10.Appendix Tables

Table 10.1: Percent Proportion of Carry-Over, Free or Purchased Seed by Crop Type and Sector

Crop Type	CL				SSCF			
	Retained Seed %	Free Seed %	Purchased %	Average Seed (kg)	Retained Seed %	Free Seed %	Purchased %	Average Seed (kg)
White Maize	14.0	11.1	74.9	41.2	29.9	9.7	60.4	47.8
Yellow Maize	24.8	6.2	69.0	26.8	100.0	-	-	30.0
Red Sorghum	23.1	12.4	64.6	12.5	-	-	100.0	125.5
White Sorghum	27.8	13.4	58.8	19.7	63.8	36.2	-	6.0
Pearl millet	51.9	9.5	38.6	16.0	66.8	33.2	-	6.0
Finger millet	36.2	63.7	0.1	7.1	93.8	6.2	-	4.0
Tobacco	0.2	0.4	99.4	185.9	-	3.8	96.2	104
Cotton	0.6	69.0	30.4	28.9	-	100.0	0	35.0
Groundnuts	39.2	2.0	58.9	24.3	98.0	1.8	0.2	27.2
Sunflowers	84.3	10.5	5.2	2.3	100.0	-	-	1.4
Soya beans	93.4	5.8	0.9	8.6	-	-	-	-
Roundnut	20.3	2.7	77.0	20.0	77.1	0.6	22.3	46.8
Sugar beans	13.0	0.9	86.1	28.1	12.3	3.0	84.7	24.6
Cowpeas	20.8	8.7	70.5	8.7	89.0	11.0	-	2.3

N.B. Pearl millet is mhunga or nyawuti; Finger millet is rapoko or rukweza, cow peas is nyemba, roundnut is nyimo or ndlubu). NB. CL is Communal Lands; SSCF is Small Scale Commercial Farms

Table 10.1: Proportion of Carry-Over, Free or Purchased Seed by Crop Type and Sector Continued

Crop Type	A1 Farms				ORA			
	Retained Seed %	Free Seed %	Purchased %	Average Seed (kg)	Retained Seed %	Free Seed %	Purchased %	Average Seed (kg)
White Maize	34.6	16.4	49.0	31.7	29.8	12.9	57.3	38.8
Yellow Maize	100.0	-	-	9.7	17.8	6.1	76.1	23.5
Red Sorghum	63.4	36.6	-	7.1	12.9	6.3	80.8	20.0
White Sorghum	41.8	9.1	49.1	11.7	22.8	6.8	70.5	21.1
Pearl millet	71.0	7.0	22.1	20.2	34.2	5.4	60.4	23.4
Finger millet	84.7	9.9	5.5	1.5	29.1	1.8	69.1	13.5
Tobacco	0.9	-	99.1	218.7	-	0.4	99.6	198.4
Cotton	2.9	97.1	-	17.9	3.5	96.5	-	15.9
Groundnuts	27.3	1.9	70.8	25.8	49.4	2.2	48.4	20.5
Sunflowers	11.4	1.6	87.0	43.6	88.9	10.7	0.4	4.2
Soya beans	63.5	-	36.5	79.8	37.7	0.5	61.8	57.8
Roundnut	16.6	1.6	81.8	26.6	24.3	1.7	74.0	21.1
Sugar beans	33.1	1.6	65.3	37.8	22.5	0.5	77.0	34.2
Cowpeas	11.7	2.4	86.0	19.9	21.1	4.8	74.1	10.7

N.B. Pearl millet is mhunga or nyawuti; Finger millet is rapoko or rukweza, cow peas is nyemba. Roundnut is nyimo or ndlubu). NB. ORA is Old Resettlement Areas.

Table 10.2: Average Number of Livestock per Household by Sector

Animal Type	Communal Lands	A1 Farms	Old Resettlement	Small Scale Commercial Farms	Total
Calf female	1.2	1.5	1.5	1.9	1.4
Calf male	1.2	1.5	1.4	1.8	1.4
Heifer	2.5	5.1	2.0	2.4	2.9
Steer	3.2	2.0	1.8	2.4	2.5
Cow	2.2	2.8	2.8	4.1	2.6
Bull	1.2	8.2	1.3	1.6	2.6
Ox	1.7	1.9	5.3	2.4	3.0
Donkey	3.8	3.3	3.8	2.6	3.7
Goat - buck/billy	1.6	1.9	1.3	1.7	1.6
Goat- doe	3.8	3.8	3.5	3.4	3.7
Goat – kid	2.6	2.8	2.3	3.2	2.5
Sheep – ram	1.6	2.0	2.1	1.0	1.8
Sheep – ewe	3.3	4.4	5.1	5.4	4.1
Sheep – lamb	1.5	2.1	1.8	8.0	2.0
Pig – boar	1.6	1.3	1.0	1.0	1.4
Pig – sow	1.7	2.5	1.4	11	1.9
Pig – piglet	5.0	52.2	3.6	9.5	13.4
Pig – gilts	5.4	34.7	10.0	1.0	13.0
Chicken-layer	13.2	110.0	2.6	-	17.2
Chicken-local	9.7	19.2	12.4	16.8	12.5
Chicken-broiler	32.0	37.7	26.4	40.3	32.2
Turkey	5.7	5.9	5.6	3.3	5.6
Duck	4.7	4.4	6.1	-	4.8
Rabbit – bucks	1.7	1.8	1.1	1.0	1.6
Rabbit – does	2.9	3.7	1.7	1.0	2.8
Rabbit – bunnies	5.1	13.9	4.5	-	6.6
Guinea fowl	6.0	5.2	5.2	2.0	5.5
Other animals	14.6	11.0	14.6	30.0	14.5

N.B. Chicken-local is indigenous chicken

For more information please kindly contact

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