ZIMBABWE SMALLHOLDER AGRICULTURAL PRODUCTIVITY SURVEY 2017 REPORT

March 2019

Harare

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Acronyms

CL   -Communal Lands
CSPro   -Census and Surveys Processing System
EA   -Enumeration Area
PPS   -Probability Proportional to Size
PICES   -Poverty, Income, Consumption and Expenditure Survey
RA   - Resettlement Areas
SAS   -Statistical Analysis System
SSCF   - Small Scale Commercial Farms
SYS   -Systematic Sampling
GDP`   -Gross Domestic Product
TFP   -Total Factor Productivity
RSYS-Random Systematic Sampling
PSU   -Primary Sampling Unit
GPS   -Global Positioning System
APM   -Agriculture Productivity Module
ZIMSTAT   - Zimbabwe National Statistics Agency
FAO   - Food and Agricultural Organization of the United Nations
LWOP   -Lease with Option to Purchase
Ha   -Hectare
ALS   -Agricultural and Livestock Survey
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) implemented 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 small holders 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.

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 who were involved in making this exercise a success.

M. Dzinotizei

Director-General, Zimbabwe National Statistics Agency

Harare, November 2018

Chapter 1: Introduction and Sample Design

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, Small Scale Commercial Farming Areas, Old Resettlement Areas and A1 Farms. The APM data were 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 MLARR, ZIMSTAT, the Food and Nutrition Council and the World Bank. In turn, the APM Technical Committee operated under the guidance of the PICES 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 were 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.

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.

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 1000 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% of total area of Zimbabwe). Region two (intensive farming) receives between 750-1000 mm of rainfall per annum. It specializes in crop farming and intensive livestock rearing, and covers 58 600 km2 (15% 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% 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% 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 % of total area).

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 soybeans. About 70 percent of population derive their livelihood from agriculture

and one third of the formal labour force is found in this sector. Around 40 percent of agricultural products are exported while 60 percent are raw materials for the manufacturing 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, and 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 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, was 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 metric tonnes in the 2016/17 season. The special programme has been expanded to include wheat, livestock, soybeans, and cotton production.

Agriculture in Zimbabwe is divided into four major sectors namely:

Large Scale Commercial Farms

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. These have title deeds which is a proof of ownership of the land. Large Scale Commercial Farms were excluded from the survey because their information can be easily accessed on secondary sources.

Small Scale Commercial Farms

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 hand. It was a lease with option to purchase- deed of grant.

Old Resettlement Schemes

These came into existence following the Government's early land redistribution programme. From 1982 to 1998, the government bought land from Large Scale Commercial Farming areas 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 exists.

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

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 Farming areas and farmers from Communal Lands 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 depends 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.

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

Communal Lands

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.

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

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/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**

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.

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 sectors 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

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 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
Communal Lands	349	160	8	1,280
Small Scale Commercial Farms	9	9	14	126
A1, A2, LSCF	35	35	14	490
Old Resettlement Areas (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/households were not covered. It should be noted that, A2 Farms and Large Scale Commercial Farms were not included in the APM survey but the EAs/households were included in the PICES 2017 survey.

Sample Coverage

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

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

Province	Number of EAs By Sector					Total Interviewed APM Households
	Communal Lands	Old Resettlement Areas	A1 Farms	Small Scale Commercial Farms	Total	
Manicaland	19	18	1	.	38	301
Mashonaland Central	24	3	8	1	36	292
Mashonaland East	22	13	4	1	40	339
Mashonaland West	9	10	11	1	31	304
Matebeleland North	17	8	3	3	31	262
Matebeleland South	20	9	2	1	32	269
Midlands	23	9	3	.	35	260
Masvingo	23	9	4	1	37	311
Total	**157**	**79**	**36**	**8**	**280**	**2,338**

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**

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.

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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 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.

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 second-round data collection was conducted from 10 September to 9 November 2017, using the same approach.

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 publicised 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.

Conclusion

The importance of the APM has been highlighted in this Chapter. The data from the APM will be used to analyze productivity in smallholder agricultural sectors in Zimbabwe. The survey was conducted in Communal Lands, A1 Farms, Old Resettlement Farms and Small Scale Commercial Farms. 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

This chapter gives a brief description of land holding in Zimbabwe so as to give the tables in this report some perspective. According to the Food and Agricultural Organisation (FAO) (2002), Land tenure is an institution, i.e., rules invented by societies to regulate behaviour. Rules of tenure define how property rights to land are to be allocated within societies. They define how access is granted to rights to use, control, and transfer land, as well as associated responsibilities and restraints. 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 heads and household composition. 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 definitions and distinctions between parcels and plots in the Zimbabwean context.

Definition and Examples of Parcels and Plots

In this agricultural productivity module survey, we identified both PARCELS and PLOTS that were owned or cultivated by the sampled households. In order to correctly identify these pieces of lands and to link the post-planting

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PARCELS and PLOTS information with that of the post-harvest information, it was important to distinguish between what is meant by PARCEL versus 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 were some examples that were useful for establishing the existence of parcels and plots.

Example 1: One PARCEL that is divided into four PLOTS:

Local Maize;
(Operator

Fallow
MH18

Mixed
Groundnuts/
Local Maize
(Operator

Local Maize;
(Operator 02)
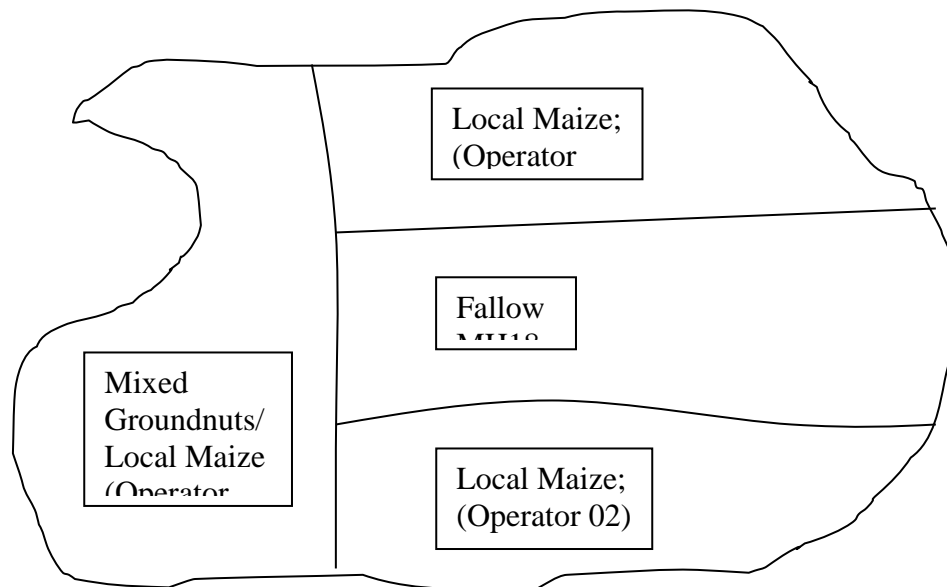
Household Characteristics

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 about 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 2.1 shows the percent distribution of heads of agricultural households classified by sex of household head and sector. About 64 percent of agriculture households in the smallholder agricultural sector were headed by males compared to 36 percent which were female-headed households. In A1 Farms, 26 percent of the agriculture households were headed by females compared to 37 percent in Old Resettlement Areas. Male heads of households are predominant across land use sectors in the smallholder agricultural sector. In the Communal Lands, about 60 percent of households are headed by males. In Small Scale Commercial Farms about 60 percent of households are male headed as compared to 40 percent which were female-headed.

Table 2.3 shows the percent distribution of household heads by age group of head and sector. The 40-44 age group had the highest proportion of head of households in all the sectors (except for Small Scale Commercial Farms), ranging from 10.9 percent in the Old Resettlement Areas to 13.4 percent in A1 Farms. The 15 -19 age group had the least proportion of less than 1 percent of head of households in all sectors. Table 2.3 further shows that 14.3 percent of the household heads in Small Scale Commercial Farms were aged from 45 years to 49 years.

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Table 2.3: Number of Household Heads by Age Group and Sector

Age Group	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas		Sample Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
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	82	3.5
25-29	55	4.6	10	11	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
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	33	7.2	63	10.4	205	8.8
65-69	100	8.4	5	5.5	32	7	55	9.1	192	8.2
70-74	78	6.6	6	6.6	17	3.7	30	5	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

Average and Median Age of Households Head by Land Use Sector

The mean age of the household heads was around 50 years for all land use sectors except A1 Farms which had a younger mean age of household heads of 47.1 years as shown in Table 2.4. The median age of the household heads ranged from 45 years in A1 Farms to 50 years in Small Scale Commercial Farms.

Table 2.4: Mean and Median Age of Households Head by Land Use Sector

Sector	Mean	Median	Number of Household Heads
Communal Lands	50.4	48	1,186
Small Scale Commercial Farms	51.4	50	91
A1 Farms	47.1	45	457
Old Resettlement Areas	50.3	49	604
Total			**2,338**

Table 2.5 shows the distribution of reasons for not participating in agriculture given by people 15 years and above who were not engaged in farming. Overall, 16.9 percent of people who did not participate in agriculture in the small holder agricultural sector gave "work was not needed" as a reason for not participating in agriculture. When comparison is made across sectors, about 16.9 percent of people who did not participate in agriculture in Communal Lands, 42.6 percent in Small Scale Commercial Farms, 21.6 percent in A1 Farms and 10.1 percent in Old Resettlement Farms gave this as a reason. About 12.3 percent of the people who did not work in agriculture smallholder sector responded "school" as a reason. Disability was given as a reason by 6.5 percent of those who did not work in agriculture. "Busy with other work" was the most given reason (15.3 percent) for not participating in agriculture.

Table 2.5: Distribution of Reasons for not Participating in Agriculture by Sector (Given by People of 15+ Years who were not engaged in farming)

Reason	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
	Percent	**Percent**	**Percent**	**Percent**
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**

Decision Making

Table 2.6 shows distribution of decision makers for managing plots by sex of decision maker and sector. Within the four sectors, 54 percent of persons responsible for decision making were females. In A1 Farms, 51.6 percent of decision makers for managing plots were males. Across all sectors there were more female decision makers than male decision makers.

Table 2.6: Percent Distribution of Plots Decision Makers for Managing Plots by Sex and Sector

Sector	Male	Female	Persons in the sample
	%	%	
Communal Lands	43.6	56.4	1,722
Small Scale Commercial Farms	49.2	50.8	122
A1 Farms	51.6	48.4	686
Old Resettlement Areas	45.8	54.2	933
Sample Total	**46**	**54**	**3,463**

Table 2.7 shows the percentage distribution of parcel with and without documentation by sector. The table shows that A1 Farms had the highest percentage distribution of 51.6 and had the least percentage distribution of parcel with no documentation

Table 2.7: Percent Distribution of Parcels with Ownership Documentation by Sector- Option 2 Without Communal Lands.

Sector	Percent distribution of Parcel with Documentation	Percent distribution of Parcel with no Documentation	Total	Number of Parcels in Sample
Small Scale Commercial Farms	19.9	80.1	100	161
A1 Farms	51.6	48.4	100	795
Old Resettlement Areas	51.5	48.5	100	1,161

Table 2.8 shows the ownership of parcels by type of ownership and sector, option two without Communal Lands. Households in Communal Lands were excluded from the table since they did not have land ownership documents. Ownership of land in Small Scale Commercial Farms was by lease with option to purchase (LWOP) (3.1 percent) or by title deeds (16.2 percent).

Table 2.8: Percent Distribution of Parcel Documentation for Ownership by Type of Documentation and Sector -Option 2 Without Communal Lands

Sector	Lease With Option To Purchase (LWOP)	Title Deeds	A1 Offer Letter	A1 Settlement Permit	Permit	Other	No Documentation	Total	Number of Households
	%	%	%	%	%	%	%	%	N
Small Scale Commercial Farms	3.1	16.2	-	-	0.6	-	80.1	100	161
A1 Farms	-	-	37	14.6	-	-	48.4	100	795
Old Resettlement Areas	-	0.2	0. 8	0.7	43.2	6.7	48.5	100	1,161

Table 2.9: shows the percent distribution of parcel documentation for ownership by type of documentation and sector -option1 with Communal Lands. The Communal Lands parcels were owned customarily through village heads and chiefs. 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. About 37.0 percent of the households in A1 Farm had offer letters as parcel documentation.

Table 2.9: Percent Distribution of Parcel Documentation for Ownership by Type of Documentation and Sector -Option1 with Communal Lands

Sector	Lease With Option to Purchase (LWOP)	Title Deeds	A1 Offer Letter	A1 Settlement Permit	Permit	Other	No Documentation	Communal Parcel	Total	Number of Households
	%	%	%	%	%	%	%	%	%	N
Communal Lands	-	-	-	-	-	-	-	100.0	100.0	2,076
Small Scale Commercial Farms	3.1	16.2	-	-	0.6	-	80.1	-	100.0	161
A1 Farms	-	-	37	14.6	-	-	48.4	-	100.0	795
Old Resettlement Areas	-	0.2	0.8	0.7	43.2	6.7	48.5	-	100.0	1,161

Table 2.10 shows the total number of household members involved in agricultural activities and share of females among those who were involved in agricultural activities. A total of 7,144 persons were involved in agriculture with Communal Lands accounting for 3,497 persons. Small Scale Commercial Farms had the least number of persons involved in agricultural activities of 292. Women accounted for less than 50 percent of persons involved in agricultural activities in all sectors.

Table 2.10 Percent of Women Involved in Agricultural Activities by Sector

Land Use Sector	Percent of Members 15+ Years Who were Involved in Agriculture	Percent of Women among Those who were Involved in Agriculture	Number of Members 15+ Years Involved on Agricultural Activities in the Sample
Communal Lands	83.1	45.3	3,497
Small Scale Commercial Farms	76	39.4	292
A1 Farms	83	39.7	1,418
Old Resettlement Areas	84.7	43.5	1,937
Total Sample			7,144

Table 2.11: shows the number and percentage of households cultivating crops and keeping livestock. The number of households who cultivated crops and livestock were 2,307 and 2,058 respectively. Almost all households in the small holder 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 92.9 percent while households in Small Scale Commercial Farms had the least percentage of households who kept livestock.

Table 2.11: Number and Percentage of Households Cultivating Crops and Keeping Livestock

Land Use Sector	Household Cultivated Crops	Household kept Livestock	Household Cultivated Crops	Household kept Livestock
	Number of Households	Number of Households	Percent	Percent
Communal Lands	1,168	1,018	98.5	85.8
Small Scale Commercial Farms	86	70	94.5	76.9
A1 Farms	454	411	99.3	89.9
Old Resettlement Areas	599	559	99.2	92.6
Sample Total	**2,307**	**2,058**	**98.7**	**88.0**

Table 2.12 shows the average area of holding and area under crop by sector measured in hectares. Out of a total of 2307 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 average area under crop ranged from 1.4 hectares in Communal Lands to 2.1 hectares in A1 Farms.

Table 2.12 Average Area of Holding and Area under Crop by Sector (Hectares)

Land Use Sector	Holdings/Households	Average Area under crop(ha)	Average arable Area of holding(ha)
Communal Lands	1,168	1.4	1.5
Small Scale Commercial Farms	86	1.4	2.0
A1 Farms	454	2.1	2.5
Old Resettlement Areas	599	1.8	2.1
Sample Total	**2,307**	**1.6**	**1.8**

Figure 2.2 shows the number of households and mean size of the land holding as reported by the farmer. At sample size, the average land holding size is 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 is highest in A1 Farms with 2.1 hectares followed by Old Resettlement Areas with 1.8 hectares. The difference between area under crop of 1.5 hectares is largest in Small Scale Commercial Areas which indicates reduced land use compared to other land use sectors. A1 Farms had the highest area under crop 2.1 hectares compared to 1.3 hectares in Communal Lands.

Figure 2.2: Average Area of Land Holding and Area Under Crop (Hectares) by Land Use Sector
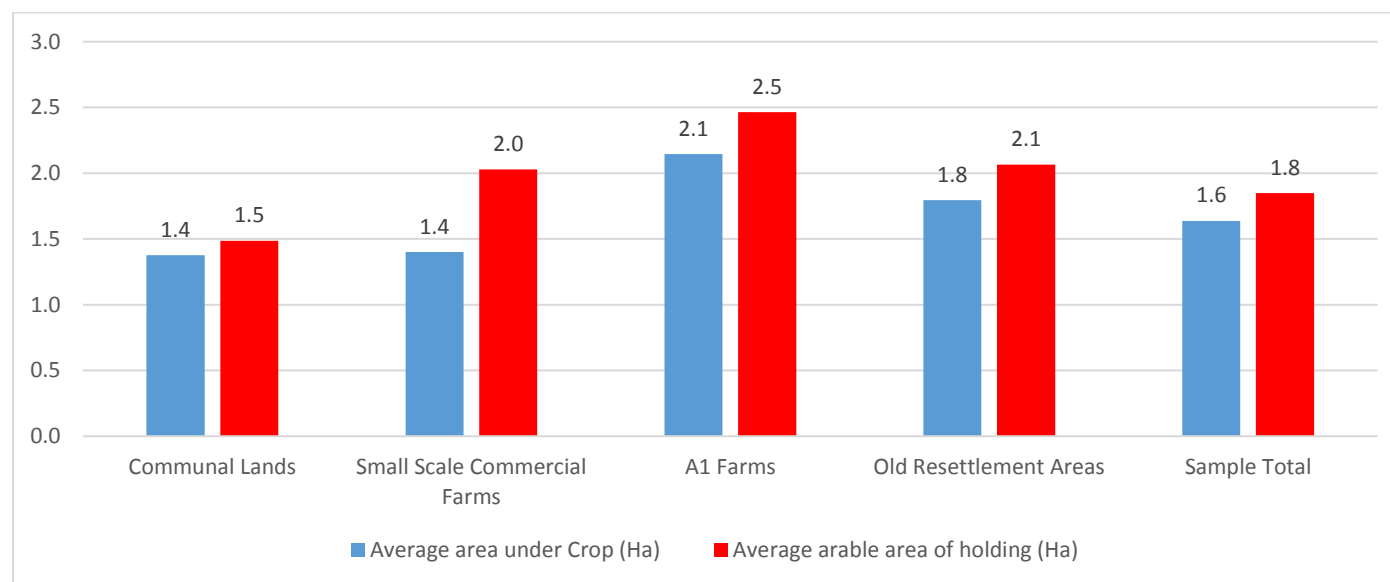
Table 2.13 shows average plot size (hectares) and average number of arable plots per household by sector. The average plot size for the smallholder sectors was 0.5 hectares. A1 Farms and Old Resettlement areas had the highest

average plot size of 0.5 hectares and 0.5 hectares respectively, while the Communal Land Sector had the least plot size of 0.4 hectares.

Table 2.13: Average Plot Size (Hectares) and Average Number of Arable Plots by Sector

Land Use Sector	Average Plot Size(Ha)	Average Number of Plots
Communal Lands	0.4	5.0
Small Scale Commercial Farms	0.5	4.9
A1 Farms	0.5	5.7
Old Resettlement Areas	0.5	5.4
Sample Total	**0.5**	**5.2**

Table 2.14 shows the number of parcels and plots by sector. The definition of a parcel and a plot were elucidated in the introductory section of this chapter on household characteristics and plot details. In Table 2.14, it is shown that Communal Lands had the largest number of parcels and plots of 2,075 and 5,848 respectively. Small Scale Commercial Farms had the least number of 161 parcels and 424 plots.

Table 2.14: Total Number of Arable Parcels and Plots by Sector in the sample

Land Use Sector	Total Number of Parcels	Total Number of Plots
Communal Lands	2,075	5,844
Small Scale Commercial Farms	161	424
A1 Farms	795	2,590
Old Resettlement Areas	1,161	3,239
Sample Total	**4,192**	**12,097**

Table 2.15 shows distribution of plots by main use and sector. The number of cultivated plots were highest in Communal Lands with 5,474. The number of fallow plots (327) were also highest in Communal Lands. In total the number of cultivated plots in the smallholder sector was 11,308 while the number of plots left fallow was 712.

Table 2.15: Number of Plots by Main Use and Sector- Option 2

Land Use Sector	Number of Plots Cultivated	Number of Plots Left Fallow	Number of Plots Rented Out/Sharecropped Out/Given Out For Free forest/ Woodlot/Pasture/Other	Total plots in Sample
Communal Lands	5,474	327	43	5,844
Small Scale Commercial Farms	399	24	1	424
A1 Farms	2426	145	19	2,590
Old Resettlement Areas	3,009	216	14	3,239
Sample Total	**11,308**	**712**	**77**	**12,097**

Table 2.16 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 were left fallow of 2.0 while A1 Farms had the smallest number of years plots were left fallow of 1.5 years.

Table 2.16: 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 2.17 shows the percent distribution of acquiring plots by type and sector. In Communal Lands, 64.5 percent of households were using agricultural plot as a result of being granted/allocated by local/community leaders followed by 27.5 percent who reported that it was owned by household (purchased with or without title, family inheritance, gift, bride price, family allocated). In Old Resettlement Areas, 53.5 percent of the households were given by right to use land by Government. In Small Scale Commercial Farms 50.8 percent of the households were given by right to use land by Government.

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

Capacity in Use	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas	Number of Plots in Sector
Owned by household (purchased with or without title, family inheritance, gift, bride price, family allocated)	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**

Irrigation

Table 2.18 shows the total area under irrigation by sector. The total area under irrigation was 66.3 hectares. A1 Farms had the highest area under irrigation of 26.2 hectares while in Old Resettlement Areas the area under irrigation was 23.9 hectares. Small Scale Commercial Farms had the least area under irrigation of 1.8 hectares.

Table 2.18: Total Number of Plots and Area Under Irrigation in The Sample

Land Use Sector	Number of Plots	Total Area Under Irrigation (ha)
Communal Lands	134	14.4
Small Scale Commercial Farms	12	1.8
A1 Farms	66	26.2
Old Resettlement Areas	136	23.9
All	**348**	**66.3**

Table 2.19 shows the percent distribution of plots and area irrigated by sector. The percent of area under irrigation constituted ranged from 1.3 hectares in Communal Lands to 2.9 hectares in A1 Farms. The percent of irrigated plots ranged from 3.7 percent to 8.0 percent in Old Resettlement Areas. In total 588 plots were irrigated.

Table 2.19: Percent Number of Plots and Area under Irrigation

Land Use Sector	Percent of plots irrigated	Percent of Area irrigated	Total Area (ha) Irrigated	Total Number of Plots Irrigated
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

Table 2.20 shows percent distribution of major sources of water for irrigation by source and sector. Across all sectors, the major source of water for irrigation was river/ streams with a percentage high of 37.7 followed by well with 28.8 percent. In A1 Farms, dams were the major source of water for irrigation with a percentage of 38.3.

Table 2.20: Percent Distribution of Major Source of Irrigation Water by Source and Sector

Land Use Sector	Well	Borehole	Created Pond	River/Stream	Dam	Other	Number of Plots with Irrigation in Sample
	%	%	%	%	%	%	
Communal Lands	15.7	2.2	27.6	41	11.9	1.5	134
Small Scale Commercial Farms	-	41.7	-	16.7	41.7	-	12
A1 Farms	9.1	9.1	7.6	16.7	42.4	15.2	66
Old Resettlement Areas	11.8	2.9	2.9	53.7	22.1	6.6	136
All	12.4	5.2	13.2	40.5	22.7	6	348

Table 2.21 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 to the main source of irrigation. In the Communal Lands, the main

irrigation system was flood irrigation followed by gravity. In the A1 Farms the main system was flood irrigation followed by motor pump. In Old Resettlement Areas the main irrigation system was motor pump followed by flood irrigation. In Small Scale Commercial Farms, the main system of irrigation was motor pump followed by flood irrigation.

Table 2.21: Percent Distribution of Major Source of Irrigation Water by Source and Sector

Land Use Sector	Divert Stream	Hand Pump	Motor Pump	Gravity	Sprinkler/ Center Pivot	Drip Irrigation	Flood Irrigation	Other	All	Number of Plots with Irrigation in the Sample
	%	%	%	%	%	%	%	%	%	
Communal Lands	3.7	4.5	9	19.4	3.7	0.7	32.1	26.9	100.0	134
Small Scale Commercial Farms	-	-	58.3	8.3	-	-	33.3	.	100.0	12
A1 Farms	3	4.5	28.8	10.6	10.6	-	37.9	4.5	100.0	66
Old Resettlement Areas	14	0.7	30.1	22.1	5.1	0.7	25	2.2	100.0	136
All	7.5	2.9	22.7	18.4	5.5	0.6	30.5	12.1	100.0	348

Chapter 3: Input Use

Input Acquisition and Cost

This section presents information on inputs used during the agricultural season 2016/2017 and also looks at how the inputs were acquired: through Government input support programmes, acquired for free, or purchased. Own-production was also considered for organic fertilizer. The information in this section was collected at the household level for each input and not specific to any parcel, plot or crop.

Table 3.1 shows the distribution of seeds used by type of seed and land use sector. The type of seed included information on whether it was certified or not certified. Use of certified seeds was higher than use of uncertified seeds across the smallholder sectors and across all types of crops. In general, households in Communal Lands used the highest amount of certified seeds for most crops, compared to households in Small Scale Commercial Farms, A1 farms and Old resettlement farms .Of all white maize seeds, 48 percent is certified and used in Communal Lands, 26 percent is certified and used in A1 farms, 19 percent is certified and used in Small Scale Commercial Farms and 4 percent is certified and used in old resettlement areas. About 3.9 percent of the households in Old Resettlement Areas used certified white maize seeds. The same pattern was observed for white sorghum certified seed.

Table 3.1: Distribution of Certified/Not Certified Seeds across Land use sector (percentage)

Land Use Sector

Crops	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas		
	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 (Mhunga/ Nyawuti)	43.8	25.0	21.9	-	6.3	3.1	-	-	100.0
Finger millet (Rapoko/ Rukweza)	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
Soybeans	33.3	-	44.4	11.1	11.1	-	-	-	100.0

Table 3.2 depicts the proportion of households that use a particular type of certified seeds used by crop and sector. The use of certified seed was highest for the cotton crop and ranged from 91.7 percent in A1 Farms to 100.0 percent in Small Scale Commercial Farms. This was followed by the use of tobacco certified seeds which ranged from 90.9 percent in Small Scale Commercial Farms to 98.8 percent in Old Resettlement Areas. About 73.5 percent of the households in Communal Lands used certified white maize seed, followed by A1 Farms with 73.3 percent, Old Resettlement Areas with 75.9 percent and Small Scale Commercial Farms with 76.5 percent.

Table 3.2: Proportion of Households using Certified Seeds by crop and Land use Sector (percentage)

Crop Type	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
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 (Mhunga/ Nyawuti)	5.4	-	11.9	3.4
Finger millet (Rapoko/ Rukweza)	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
Soybeans	10.0	-	17.2	9.1
Roundnut (Nyimo or Ndlubu)	4.4	-	1.9	3.4
Sugar beans	6.6	-	20.6	8.6
Cowpeas (Nyemba)	13.3	4.0	11.0	18.8

Table 3.3 depicts the percent distribution of households using carry-over, free or purchased seed by crop type and sector. About 40.6 percent of the households in Communal Lands areas used retained white maize seed while 40.4 percent and 51.8 percent used free seed and purchased seed respectively (more than one response was possible as households may combine different sources of their seed). In Small Scale Commercial Farms areas 65.9 percent of the households used purchased white seed while 35.1 percent and 34.1 percent of the households used retained and free seed respectively. About 64.6 percent of the households with A1 Farms used purchased white maize seed while 45.1 percent and 28.2 percent of the households used retained and free white maize seed respectively. In Old Resettlement Areas 63.9 percent of the households used purchased white maize seed while 45.7 percent and 35.6

percent of the households used retained and free white maize respectively. The use of purchased in small grain crops across all land use sectors is minimal.

Table 3.3 Proportion of Households Using Carry-Over, Free or Purchased Seed by Crop Type and Sector (percentage).

Crop Type	Communal Lands			Small Scale Commercial Farms			A1 Farms			Old Resettlement Areas		
	Retained seed	Free seed	Purchased	Retained seed	Free seed	Purchased	Retained seed	Free seed	Purchased	Retained seed	Free seed	Purchased
White Maize	40.6	40.4	51.8	35.3	34.1	65.9	45.1	28.2	64.6	45.7	35.6	63.9
Yellow Maize	51.2	23.3	20.9	100	-	-	80	13.3	13.3	43.8	50	12.5
Red Sorghum	60	35	10.8	33.3	-	66.7	59.5	29.7	13.5	64.9	35.1	13.5
White Sorghum	57.9	38.3	10.1	60	60	20	62	21.5	20.3	65.5	22.1	12.4
Pearl millet (Mhunga/ Nyawuti)	76.1	24.6	4.9	66.7	66.7	-	75	23.3	11.7	55.6	31.8	9.5
Finger millet (Rapoko/ Rukweza)	78.3	19.6	2.8	83.3	16.7	8.3	71.4	17.9	7.1	80.7	15.8	10.5
Tobacco	5.7	5.7	80	-	36.4	81.8	6.4	3.7	91.7	0	6	88
Cotton	2.7	75.7	10.8	33.3	66.7	-	8	72	12	2.6	71.1	13.2
Groundnuts	72.6	10.8	23.1	81.8	6.8	6.8	72.8	8.4	26.8	73.1	10.1	22.2
Sunflowers	77.1	25.3	4.8	100	-	-	73	18.9	13.5	84.6	15.4	4.6
Soybeans	87.1	9.7	16.1	-	-	-	82.8	3.5	34.5	75	8.3	16.7
Roundnut (Nyimo or Ndlubu)	68	13.7	23.1	75	10.7	10.7	67.1	5.9	27.1	65.4	11.2	26.2
Sweet Potatoes	0.4	4	6.6	8.3	8.3	8.3	2.7	1.3	10	-	3	3.7

Sugar beans	67.8	9.1	37.2	57.1	21.4	14.3	51.5	13.6	40.9	59	9.6	33.7
Cowpeas (Nyemba)	64.6	23.9	16	69.2	19.2	7.7	69.9	14.7	24.3	64.5	18.6	22.4

Table 3.5 shows the distribution of the free seed across sources by crop. Most of the free white maize seed, that is, 65.9 percent came from government followed by 15.9 percent from family members. For free yellow maize most (36.8 percent) was provided by family members. For crops like red sorghum, white sorghum, pearl millet, rice, groundnuts, sunflowers and soybeans larger percent of households received free seeds from family members. For crops like tobacco, about 46.7 percent of the free seeds came from fellow farmers. For cotton 53.4 percent of the free seeds came from government.

Table 3.5: Distribution of Free Seed Across Sources by Crop (percentage)

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 (Mhunga/ Nyawuti)	6.9	6.9	-	37.6	44.6	4.0	100.0
Finger millet (Rapoko/ Rukweza)	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
Soybeans	20.0	20.0	-	20.0	40.0	-	100.0

Table 3.6 shows the distribution of free seed across land use sector. 39.5 percent of the free seed in Communal Lands came from government while 28.5 percent came from family member. In Small Scale Commercial Farms 44 percent of the free seeds came from government while 26.2 percent came from family members. In A1 Farms 49.3 percent of the free seeds came from government while 23 percent came from family members. In Old Resettlement Areas 37.8 percent of the free seeds came from government while 31.1 percent of free seeds originated from fellow farmers.

Table 3.6: Distribution of Free Seed Across Sources by Land use Sector (Percentage)

Land Use Sector	Government	NGOs	Agriculture Input Dealer	Fellow Farmer	Family Member	Other	Total
Communal Lands	39.5	8.7	2.3	16.7	28.5	4.2	100.0
Small Scale Commercial Farms	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
Old Resettlement Areas	37.8	4.4	4.4	31.1	17.8	4.4	100.0

Table 3.7: 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 of the households used inorganic fertilisers while 22.4 percent of the households used pesticides. In Small Scale Commercial Farms 57.0 percent of the households used organic fertilisers, 75.6 percent of the households used inorganic fertilisers while 38.4 percent of the households used pesticides. In A 1 farms 70.8 percent of the households used inorganic fertilisers while 45.7 percent of the households used pesticides. Finally in Old Resettlement Areas 68.4 percent of the households used inorganic fertilisers while 54.6 percent of the households used organic fertilisers. The usage of lime and herbicides was generally low in the smallholder sector.

Table 3.7: Proportion of Households that Used Inputs by Sector and Type of Inputs Post-Harvest (percentage)

Type of input	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas	
	Percent	Number of Households	Percent	Number of Households	Percent	Number of Households	Percent	Number of Households
Organic fertiliser	48.1	566	57	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

The average cost of inputs by source of input is shown in Table 3.9. For inputs from government support programmes, the highest average cost of $53.50 was incurred in Small Scale Commercial Farms followed by $ 47.66 in A1 Farms. For inputs purchased by households, the highest average cost of US$ 146.13 was incurred in A1 Farms and the least average cost of $82.69 was incurred in Communal Lands.

Table 3.9: Average Cost of Inputs by Source of Input and Sector

Land Use Sector	From Government Support US$	From Purchases US$
Communal Lands	42.16	82.69
Small Scale Commercial Farms	53.50	142.24
A1 Farms	47.66	146.13
Old Resettlement Areas	51.05	130.40

Table 3.10: shows the average cost per hectare or acre of using tractor services and animal traction by sector for households who reported on tractor and animal services. The land area that the services were used was for each sector. It is shown that the highest cost of using tractor services and animal traction was in Communal Lands and A1 Farms with US$ 20.90 per hectare each respectively. The least average cost of using tractor services and animal tractor services of US$14.80 per hectare was in Old Resettlement Areas. The average cost of using tractor services and animal tractor services for the smallholder sector was US$18.90 per hectare.

Table 3.10: Average Cost Per Hectare or (Acre Ha/Acre) in US$ of Using Tractor Services and Animal Traction by Sector

Land Use Sector	Average Cost per Acre US$	Average Cost per Hectare (Ha) US$
Communal Lands	8.47	20.92
Small Scale Commercial Farms	6.15	15.19
A1 Farms	8.46	20.90
Old Resettlement Areas	5.99	14.80
Total	**7.65**	**18.90**

Chapter 4: Agriculture Labour

4.1 Introduction

This chapter presents information on agricultural labour for land preparation and planting, non-harvest activities between planting and harvesting, and harvesting activities during the agricultural season 2016/2017. The information was collected at plot level.

Analysis has been done for household, hired (casual) and exchange labour. For household labour, all household members of 5 years and older who worked on a plot or who hired the labour were selected, and the relevant plot questions were asked to that person. Labour was disaggregated into men (15 years and above), women (15 years and above), and children (5-14 years old). It should be noted that this covered casual labour, but not permanent labour.

Finally, information on exchange labour or non-household members working on a plot without pay was collected. Exchange labour takes two forms. Firstly, non-household members can work on a household's plot in exchange for other services that the household might have rendered to those other households. In addition, a group of farmers can agree to assist each other on their farms at different but agreed days and times. Secondly, other households can decide to work on a household's plot for free (without pay) or to assist without compensation.

Land Preparation and Planting Activities

The APM survey collected information on soil conservation and agricultural practices that the household has undertaken on the applicable plots with respect to land preparation for the agricultural season 2016/2017. The methods of land preparation and the means (in terms of implements used to conduct these activities) of preparing the land was explored. Moreover, the survey collected information on whether the manager practices crop rotation or continuous cropping on a plot, which has implications for productivity.

Non-harvest activities between planting and harvesting

Non-harvest activities were defined as work done on each plot between planting and harvesting during the 2016/17 agricultural season. Non-harvest labour activities consisted of weeding, ridging, spraying, and application of fertilizer and/or herbicide to the plot. Labour information collected included the number of weeks, number of days and number of hours. **Weeks** covered only weeks in the agricultural season 2016/2017. This can be a minimum of one week. **Days** cover a minimum of one to a maximum of seven days in a week. **Hours** can be a minimum of one to a maximum of sixteen hours per day.

Household Labour for Harvesting

Information was collected on the total number of household members aged 5 years and above who worked on the plot during the agricultural season 2016/2017 for **harvesting** only.

Agricultural Labour – Post-Harvest Activities

The APM survey also collected information on agricultural labour for post-harvesting activities during the agricultural season 2016/2017. Post-harvest activities included threshing, shelling and cleaning. Information was collected for household members, hired labour and exchange labour. The information was collected for the total number of household members aged 5 years and above who worked on **post-harvest activities** for each crop during the agricultural season 2016/2017.

4. 2 Labour use in agriculture

Table 4.1 shows household members providing labour for land preparation and planting activities by sex and sector. Men and women provided almost equal proportions of household labour for land preparation and planting activities in the smallholder agricultural sector. In Communal Lands and A1 Farms more women (53.1 percent) provided

household labour for land preparation and planting activities compared to men with 46.9 percent. The highest proportion of male labour (53.7 percent) was found in Old Resettlement Areas whilst the highest proportion (53.1 percent) of female labour was found in Communal Lands.

Table 4.1: Distribution of Sex of Household Members Providing Labour for Land Preparation and Planting Activities by Sector

Land Use Sector	Men	Women	All
	%	%	%
Communal Lands	46.9	53.1	100.0
Small Scale Commercial Farms	50.2	49.8	100.0
A1 Farms	48.7	51.3	100.0
Old Resettlement Areas	53.7	46.3	100.0
Total	49.2	50.8	100.0

Table 4.2: shows the average number of household members providing labour for land preparation and planting per plot by sector. There were marginal differences in the average number of men and women who provided labour for land preparation and planting. The average number of household members who provided labour for land preparation and planting ranged from 1.5 to 1.8 persons per plot for men. Thus on average almost two persons provided labour for land preparation and planting per plot for both men and women.

Table 4.2: Average Number of Household Members Providing Labour for Land Preparation and Planting Per Plot by Sector

Land Use Sector	Men	Women	All
	Average No. of Persons Per Plot	Average No. of Persons Per Plot	Average No. of Persons Per Plot
Communal Lands	1.6	1.5	1.5
Small Scale Commercial Farms	1.7	1.5	1.6
A1 Farms	1.8	1.6	1.7
Old Resettlement Areas	1.7	1.5	1.6
Total	1.6	1.5	1.6

Table 4.3 presents the average number of days worked by household members providing labour for land preparation and planting, per plot by sector. Men worked on average 9.3 days per plot while women worked 8.8 days on average per plot. Both men and women worked for 9 days on average for land preparation and planting in the smallholder agricultural sector. In Old Resettlement Areas each male worked for 10.9 days, each female worked for 9.2 days while both male and female worked on average 10.1 days per plot.

Table 4.3: Average Number of Days Worked by Household Members for Land Preparation and Planting, Per Plot by Sector

Land Use Sector	Males Average Days Worked Per Plot	Females Average Days Worked Per Plot	All Average Days Worked Per Plot
Communal Lands	9.2	9.0	9.1
Small Scale Commercial Farms	8.0	7.8	7.9
A1 Farms	9.4	9.7	9.6
Old Resettlement Areas	10.9	9.2	10.1
Total	9.3	8.8	9.0

Table 4.4: shows the average number of hired labour per plot by sector for land preparation and planting. The table shows that 1.9 hired men aged 15 + years worked per plot while 2.4 women aged 15 years and above worked per plot for land preparation and planting in Old Resettlement Areas. There were only slight differences in the number of hired men, women and children in the smallholder agriculture sector for land preparation and planting.

Table 4.4: Average Number of Hired Labour Per Plot for Land Preparation and Planting by Sector

Land Use Sector	Males Males 15+ Years	Females Females 15+ Years	Children Children 5-14 Years
Communal Lands	1.6	1.9	1.3
Small Scale Commercial Farms	1.8	1.9	1.0
A1 Farms	1.8	2.4	6.0
Old Resettlement Areas	1.9	2.4	2.0
Total	**1.7**	**2.1**	**1.7**

Table 4.5 shows the average amount (US$) spent on hired labour per plot per day for land preparation and planting (men, women and children) by sector for households hiring labour.

Table 4.5 shows that in Small Scale Commercial Farm areas and A1 Farm areas, households paid more per day for a male worker than for a female worker. The average amount spent in Small Scale Commercial Farms was $26 per man per day compared to $21 per woman per day in the same sector. The same pattern was observed for households living in A1 farms with a man being paid $17 per day while a woman was paid $10 per day for land preparation and planting activities. In both Communal Lands and Old Resettlement Areas women was paid $15 and $17 per day respectively while men in the same sector were paid less than women. Children were generally paid less than both men and women and payment per working child ranged from $3 per day per child in Old Resettlement Areas to $6 per day per child in Communal Lands.

The last column of Table 4.5 shows how much the households were spending on hired labor per plot. On average households in the small scale commercial farms paid $29 per plot for land preparation and planting. The cost per plot ranged from US$16 per plot in Communal Lands to US$20 per plot each in A1 Farms and Old Resettlement Areas respectively.

Table 4.5 Average Amount (US$) Spent on Hired Labour per Plot per Day for Land Preparation and Planting (Men, Women and Children) by Sector for Households Hiring Labour

Land Use Sector	Men 15+ Years	Women 15+ Years	Children 5-14 Years	Total average
Communal Lands	14	15	6	16
Small Scale Commercial Farms	26	21	5	29
A1 Farms	18	10	4	20
Old Resettlement Areas	15	17	3	20

Table 4.6a shows average days worked per hired labour per plot for land preparation and planting by sector. The average number of days worked by a hired man or woman ranged between 1 and 2 days per worker while the number of days worked by children ranged from 3 to 7 days. The total average days worked per plot was 2 days across all land use sectors.

Table 4.6a Average amount of Hired Labour Days per Plot for Land Preparation and Planting (Men, Women and Children) by Sector and for Households Hiring Labour

Land Use Sector	Men 15+ Years	Women 15+ Years	Children 5-14 Years	Total average
Communal Lands	1	2	6**	2
Small Scale Commercial Farms	2	1	7**	2
A1 Farms	2	1	4**	2
Old Resettlement Areas	1	2	3**	2

N.B. Data based on few observations for children of 45 plots

Table 4.6b shows average amount of hired labour days per plot in non-harvest activities between planting and harvesting by sector. The average number of days worked by a hired man for non-harvesting activities between planting and harvesting ranged from 2 to 3 days per worker while the average days worked by a hired woman ranged between 1 and 2 days per worker. The number of days worked by children ranged from 2 to 4 days for non-harvesting activities between planting and harvesting. The total average days worked per plot was 3 to 4 days across all land use sectors.

Table 4.6b: Average amount of Hired Labour days per Plot for Non-Harvest Activities between Planting and Harvesting During the Agricultural Season 2016/2017(Men, Women and Children) by Sector for Households Hiring Labour

Land Use Sector	Men 15+ Years Average Days Per Worker	Women 15+ Years Average Days Per Worker	Children 5-14 Years Average Days Per Worker	Total Average Days Per Plot For Hired Labour
Communal Lands	2	2	2	3
Small Scale Commercial Farms	3	2	3	3
A1 Farms	2	3	4	4
Old Resettlement Areas	3	2	4	3

Table 4.6c shows the average days per hired worker per plot for harvesting activities during the agricultural season 2016/2017 by sector. The average number of days worked by a hired man and woman for harvesting activities ranged from 3 to 4 days per worker. The number of days worked by children ranged from 1 to 4 days. The total average days worked per plot for harvesting activities ranged from 3 to 5 days across all land use sectors.

Table 4.6c Average amount of Hired Labour days per Plot for <u>Harvesting Activities</u> during the Agricultural Season 2016/2017 (Men, Women and Children) by Sector for Households Hiring Labour

Land Use Sector	Men 15+ Years Average Days Per Worker	Women 15+ Years Average Days Per Worker	Children 5-14 Years Average Days Per Worker	Total Average Days Per Plot For Hired Labour
Communal Lands	3	3	1	3
Small Scale Commercial Farms	4	4	-	5
A1Farms	3	3	1	5
Old Resettlement Areas	3	3	4	4

The Table 4.7a shows the average number of days per plot by hired labour (men, women and children) for land preparation and planting, post planting and pre-harvest, and harvesting activities. In Communal Lands hired males, females and children spent an average of 1.9 days, 2.1 days and 1.8 days per plot respectively for land preparation and planting activities. The hired labour males, females and children in Communal Lands also spent an average of 3.2 days, 3.5 days and 2.3 days for post planting and pre-harvesting activities. Harvesting activities lasted longer than land preparation and planting activities and post planting and pre-harvesting activities across all land use sectors.

Table 4.7a: Average Number of Days Per Plot By Hired Labour (Men, Women And Children) For Agricultural Activities Such as Land Preparation and Planting, Post Planting and Pre-Harvest, and Harvesting Activities.

Land Use Sector	Land Preparation and Planting Activities			Post Planting and Pre-Harvest Activities			Harvesting Activities		
	Males	Females	Children	Males	Females	Children	Males	Females	Children
Communal Lands	1.9	2.1	1.8	3.2	3.5	2.3	4.4	4.2	3.1
Small Scale Commercial Farms	2.3	2.8	7.0	5.0	3.6	10.0	5.8	6.5	-
A1 Farms	2.4	2.4	3.5	4.0	4.4	3.1	6.0	5.0	2.8
Old Resettlement Areas	2.0	2.5	1.0	3.9	3.5	3.3	5.5	5.0	5.5
All	2.1	2.4	2.2	3.8	3.8	3.0	5.5	4.9	3.4

Table 4.7b shows the percentage of households hiring labour by sector for non-harvest activities between planting and harvesting. It is shown that overall 22.7 percent of households in the small holder sector hired labour for non-harvest activities between planting and harvesting. About 29.3 percent of the households in A1 Farms hired labour while 20.6 percent of the Communal Lands households hired labour.

Table 4.7b: Percent of Households Hiring Labour by Sector for Non-Harvest Activities Between Planting and Harvesting.

Land Use Sector	Hired labour
Communal Lands	20.6
Small Scale Commercial Farms	24.2
A1 Farms	29.3
Old Resettlement Areas	21.7
Total	22.7

Table 4.8 shows the average number of days per plot worked by <u>exchange labour</u> for men, women and children for land preparation, post planting and pre-harvest, and harvesting activities. The table shows that exchange labour was used for fewer days for land preparation and plating activities compared to post planting or pre-harvest activities, and harvesting activities. The highest number of days were done by female exchange labour in Small Scale Commercial Farms with 4.6 days per plot for harvesting activities while the least was done by children exchange labour 1.6 days in Old Resettlement Areas for land preparation and planting**.**

Table 4.8: **Average Number of Days per Plot by Exchange Labour for Men, Women and Children for Land Preparation, Post Planting and Pre-Harvest, and Harvesting Activities) per Plot.**

	Land Preparation and Planting Activities			Post Planting and Pre-Harvest Activities			Harvesting Activities		
Land Use Sector	Men	Women	Children	Men	Women	Children	Men	Women	Children
Communal Lands	2.2	2.6	2.0	2.9	3.2	3.3	2.3	3.0	2.1
Small Scale Commercial Farms	1.7	1.8	1.7	2.7	2.9	1.4	4.3	4.6	3.7
A1 Farms	2.8	2.7	2.9	4.2	4.4	7.7	4.3	3.9	4.1
Old Resettlement Areas	2.3	2.1	1.6	3.5	3.6	3.5	3.4	3.3	2.4
All	**2.3**	**2.4**	**2.0**	**3.3**	**3.5**	**4.1**	**3.2**	**3.4**	**2.6**

Chapter 5: Field Crop Harvest and Field Crop Disposition

5.0 Introduction

This chapter 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 5.1 shows the percentage of households who sold their produce during the 2016/17 agricultural season. The results show that, households in Communal Land areas had the lowest proportion of households who sold produce with 13.3 percent while Small Scale Commercial Farms had the highest percentage of households with 38.9 percent who sold their produce.

Table 5.1: Percentage of Households Who Sold Produce by Sector

Land Use Sector	Sold Produce
Communal Lands	13.3
Small Scale Commercial Farms	38.9
A1 Farms	25.7
Old Resettlement Areas	24.2

Table 5.2 (a) shows the distribution of households who sold produce across sectors by type of crop. The highest percentages of those who sold white maize (34.6 percent) were in A1 Farms while the lowest percentages of households (13.8 percent) were in Old Resettlement Areas. For yellow maize 83.3 percent of households who sold the produce were from Communal Lands, while 16.7 percent was from Old Resettlement Areas. A1 Farms had the highest percentage of households who sold tobacco (41.9 percent) while cotton was high in Communal Lands had high percentages of household for cotton and ground nuts.

Table 5.2 (a) (old): Distribution of households who sold produce across sectors by type of crop

Crop Name	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas	
White Maize	25.7	25.9	34.6	13.8	100.0
Yellow Maize	83.3	-	-	16.7	100.0
Red Sorghum	44.4	11.1	33.3	11.1	100.0
White Sorghum	68.4	-	10.5	21.1	100.0
Pearl millet (Mhunga/ Nyawuti)	58.8	5.9	23.5	11.8	100.0
Finger millet (Rapoko/ Rukweza)	57.1	7.1	-	35.7	100.0
Rice	50.0	-	25.0	25.0	100.0
Sesame/Uninga	66.7	33.3	-	-	100.0
Tobacco	14.1	22.2	41.9	21.7	100.0
Cotton	60.0	5.5	16.4	18.2	100.0
Groundnuts	49.7	5.0	15.5	29.8	100.0
Sunflowers	28.6	28.6	-	42.9	100.0
Soybeans	32.0	4.0	52	12.0	100.0

The survey asked whether any household member sold any unprocessed crops harvested during the 2016/17 agricultural season. The percentages reported in Table 5.2 (b) are based on those households reporting that they sold a crop. In A1 farms 35.3 percent of households and 32.9 percent of households in Small Scale Commercial Farms sold white maize. About 29 percent and 12 percent of the households in Old Resettlement Areas and Communal

Lands respectively sold white maize. For the tobacco crop, 100 percent of the households in Communal Lands sold its, while this 81.8 percent of the households in Small Scale Commercial Farm Areas. About 98.1 percent and 93.8 percent respectively sold tobacco in A1 farms and Old Resettlement Areas.

Table 5.2 (b) (new): Proportion of Households who Sold Produce Across Sectors by Type of Crop

Crop Name	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
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 (Mhunga/ Nyawuti)	4.2	-	9.1	4.0
Finger millet (Rapoko/ Rukweza)	6.2	10.0	-	9.8
Rice	9.5	-	16.7	14.3
Sesame/Uninga	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
Soybeans	25.8	.	51.9	42.9

Table 5.3 (a) depicts the average income received from sale of crops. The highest average amount of $3,175.90 was received from selling tobacco in the Old Resettlement Areas and tobacco had the highest in all sector.

Table 5.3 (a): Average income received from sale of crop by type of Crop and Sector

Crop Name	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
	Value in $US	Value in $US	Value in $US	Value in $US
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
Wheat	-	-	-	-
Pearl millet (Mhunga/ Nyawuti)	49.0	75.0	61.3	48
Finger millet (Rapoko/ Rukweza)	23.3	252	-	45.6
Rice	13.5	-	8.0	7.0
Sesame/Uninga	72.0	50.0	-	-
Other grain crops	-	-	-	-
Tobacco	1,161.1	3,312	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
Soybeans	99.6	12.0	403.6	130.7

Table 5.3 (b) shows total income per crop received by households who sold produce across sectors by type of crop. Households in A1 farms received the highest average income of $250,583 followed by households in Old Resettlement Areas which received $211,223 for the tobacco crop. Households in Old Resettlement Areas received $63,849 total income, followed by households in A1 Farms which received average income of $63,182 for selling

white maize. The households in Communal Lands received the highest total income of $13,610 for the cotton crop whilst households in Small Scale Commercial Farms received only a total income of $247.

Table 5.3 (b): Total Income Per Crop Received by Households who Sold Produce across Sectors by Type of Crop.

Crop type	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
	$	$	$	$
Tobacco	32,524	27,938	250,583	211,223
White Maize	17,528	14,181	63,182	63,849
Cotton	13,610	247	4,883	4,230
Groundnuts	4,819	360	1,654	4,009
Sugar beans	3,077	125	3,933	3,344
Sweet Potatoes	2,509	95	2,847	3,038
White Sorghum	1,161	-	252	383
Soybeans	807	.	5,269	394
Roundnut (Nyimo or Ndlubu)	648	36	859	1,612
Pearl millet (Mhunga/ Nyawuti)	490	-	320	96
Yellow Maize	600	-	-	60
Finger millet (Rapoko/ Rukweza)	188	252	-	232
Red Sorghum	74	-	58	11
Sunflowers	32	24	73	73

The Table 5.4 below highlights the percentage of households who stored their produce by sector. The highest was in A1 farms where 79.5 percent of the households stored their produce. The lowest on the other hand was in Old Resettlement Areas where 76 percent of the households stored their produce.

Table 5.4: Percentage of Households who Stored Their Produce by Sector

Land Use Sector	Stored Produce
	%
Communal Lands	78.5
Small Scale Commercial Farms	77.6
A1 Farms	79.5
Old Resettlement Areas	76.0

Table 5.5: shows the distribution of households that stored produce by type of crop. This table shows that the majority of households in the smallholder agricultural sector stored the crops they grew. The proportion of households which stored white maize ranged from 80.7 to 88.5 percent while those that stored white sorghum ranged from 80 to and 87.6 percent.

Table 5.5: 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 (Mhunga/ Nyawuti)	76.4	100.0	89.1	76.0
Finger millet (Rapoko/ Rukweza)	96.1	100.0	92.0	100.0
Rice	100.0	100.0	83.3	100.0
Sesame/Uninga	60.0	-	66.7	100.0
Tobacco	-	-	-	-
Cotton	1.4	-	-	-
Groundnuts	86.8	97.6	88.2	86.5
Sunflowers	79.5	66.7	79.4	82.0
Soybeans	87.1	-	81.5	100.0

Table 5.6: shows the distribution of households that treated produce by type of crop. The table shows that 64.8 percent of the households in Communal Land areas practiced the traditional method of treating produce. About 54 percent of the households in Small Scale Commercial Farms practiced the traditional method while 55.1 percent of the households in Old Resettlement Areas practiced the same method. Chemical Application was practiced by between 30.9 percent and 43.6 percent in the smallholder agricultural sector.

Table 5.6: Distribution of Households That Stored Produce

Land Use Sector	Chemical Application	Traditional Method	Other	Total
	%	%	%	%
Communal Lands	30.9	64.8	4.4	100.0
Small Scale Commercial Farms	40.4	53.9	5.6	100.0
A1 Farms	43.6	45.6	10.8	100.0
Old Resettlement Areas	38.8	55.1	6.1	100.0

Table 5.7 depicts the crop treating techniques employed by households by type of crop. About 68 percent of the households used chemical application on 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 of white sorghum while 46.9 used chemical application.

Table 5.7: 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 (Mhunga/ Nyawuti)	9.8	80.4	9.8
Finger millet (Rapoko/ Rukweza)	5.9	94.1	-
Rice	-	100.0	-
Groundnuts	12.3	83.6	4.1
Sunflowers	14.3	71.4	14.3
Soybeans	-	66.7	33.3

In Table 5.8 shows storage structure by type of crop. The majority of households were using ordinary rooms as their storage structure (ranging from 82.4 to 100 percent). Very few households (percentage ranging from 0 to 14.3 percentage) were using granaries. Only three crops were reported being stored in barns while only white maize was stored in silos.

Table 5.8: 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 (Mhunga/ Nyawuti)	13.7	-	-	86.3	-	100.0
Finger millet (Rapoko/ Rukweza)	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
Soybeans	-	-	-	100.0	-	100.0

Chapter 6: Livestock Production, Livestock Holdings and Animal Costs

6.1 Introduction

Chapter 6 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. Note that the reference period for animal holdings is from January 1, 2017 to August 31, 2017. This chapter also presents information on pastures.

This Chapter further reports on information on cost of raising animals, the production systems and use of animal vaccines. In this section the animals were grouped into large ruminants (cattle or bovines), small ruminants, pigs, other poultry and rabbits.

Some additional terms used in this chapter are defined below:

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.

6.1 Animal Holdings

Table 6.1 shows the percent of households owning livestock by type of livestock and sector between January 1 and August 31, 2017. The proportion of households which owned cattle in Communal Lands was 49.8 percent while in Old Resettlement Areas they 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 Land areas 60.9 percent of the households owned goats compared to 53.9 percent of the households in Old Resettlement Areas and 43 percent of the households 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 among households with A1 Farms.

Table 6.1: Percent Households Owning Livestock by Type of Livestock and by Sector between January 1 and August 31, 2017

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/Indigenous	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

Table 6.2 shows the percentages of households owning pastures and the size of pasture in hectares for raising livestock by sector. About 2.7 percent of households in Communal Land areas grazed their livestock and owned an average of 2 ha of pasture. In A1 Farms, 16.94 percent owned pastures with an average size of 15.7 hectares. In Old Resettlement Areas about 8.67 percent of households owned pastures with an average size of 8.4 hectares, while 56.6 percent in Small Scale Commercial Farms owned an average of 27.7 hectares.

Table 6.2: Proportion of households Owning Pastures and Average Size of Pasture in Hectares for raising Livestock by Sector

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

Tables 6.3 shows the average value (US$) of inputs used per household by type of input and livestock group in Communal Lands for the period January 1 to 31 August 2017. In Communal Lands, the highest average cost of $11.00 per household was incurred for animal feed including salt. This was followed by veterinary services (incl. vaccination deworming, and medicine) which had an average cost of $6.00. In Small Scale Commercial Farms households spent an average value of animal feeds and salt of $80.00 compared to $18.00 for Old Resettlement Areas and $16.00 in A1 Farms. Households in the Smallholder agricultural sector incurred between $6.00 and $16.00 on the average value of veterinary Services.

Table 6.3: Average Value (US$) of Inputs Used Per Household by Sector

Animal Group	Animal Feed Including Salt	Vet Services (Incl. Vaccination Deworming, and Medicine)	Transport of Animal To and From Farm	Building Or Maintenance of Pens And Stables	Transport of Animal Feed	Other Related Costs	Number of Responding Households
Communal Lands	11.07	6.38	0.34	1.87	0.22	1.5	577
Small Scale Commercial Farms	79.78	15.73	3.37	6.21	5.16	5.28	47
A1 Farms	15.96	11.46	0.26	5.66	0.16	1.82	248
Old Resettlement Areas	17.58	10.82	0.53	1.27	0.54	1.17	374

Table 6.4 shows average value (US$) of inputs used per household in the small holder agricultural sector. An average cost of $15.58 per household was spent on animal feeds including salt, followed by $10.28 spent on veterinary services for the households that own livestock. The least amount of $0.11 was spent on commission on sale of animals. Households spent $332.11 per household on chicken layer animal feeds, $251.34 on broiler chicken animal feeds and $56.56 on chicken layer veterinary services.

Table 6.4: Value (US$) of Inputs Used Per Households in the Small Holder Agricultural Sector

Animal Group	Animal Feed Including Salt	Vet Services (Incl. Vaccination, Deworming, and Medicine)	Transport of Animal To And From Farm	Building or Maintenance of Pens and Stables	Transport of Animal Feed	Commission on Sale of Animals	Compensation for Damages	Other Related Costs	Number of Responding Households
Large Ruminants (Cattle)	13.72	22.44	0.24	3.26	1.31	0.31	0.72	3.71	1,096
Donkeys	11.64	1.07	-	0.37	0.16	0.04	-	-	153
Goat/Sheep	0.88	4.22	0.14	1.00	0.11	-	0.29	0.04	701
Pigs	116.81	22.44	1.20	13.10	1.64	-	0.00	0.60	50
Chicken - Local/Indigenous	7.95	2.54	0.04	1.23	0.57	-	0.01	0.03	1,026
Chicken - Broiler	251.34	14.81	3.84	30.48	9.47	-	-	0.69	58
Chicken - Layer	332.11	56.56	24.33	3.89	11.22	-	-	-	9
Other Poultry	9.31	2.47	0.05	0.19	0.43	-	-	-	107
Rabbit	9.83	2.46	-	1.38	0.63	-	-	-	24
Total	**15.58**	**10.28**	**0.28**	**2.51**	**0.90**	**0.11**	**0.31**	**1.30**	**3,224**

Table 6.5 shows the proportion of farm households using a particular livestock production systems. The extensive production system was the most practiced across all sectors and animal groups. Households in Small Scale Commercial Farms practiced extensive production system (98.7 percent) followed by Communal Lands (97.1 percent Old Resettlement Areas 95.3 percent and A1 Farms 90.2 percent. Across all sectors households that practiced a Semi-

Intensive production system ranged from 5.7 to 13.3 percent. Between 3.4 percent and 8.0 percent of the households practiced the intensive production system.

Table 6.5: Production System Used by Land Use Sector (multiple response)

Land Use Sector	Intensive	Semi-Intensive	Extensive	Number of Responding Households
Communal Lands	3.4	5.7	97.1	1,066
Small Scale Commercial Farms	6.7	13.3	98.7	75
A1 Farms	8.0	8.0	90.2	450
Old Resettlement Areas	5.9	7.8	95.3	576

Table 6.6 shows the percentage of households by production system and animal type. Of the households that produced large ruminants, about 4 percent held these in an intensive production system while 13.3 percent and 82.6 percent used Semi-Intensive and Extensive systems respectively. About 91 percent of the households produced Goats/sheep under intensive production system while 72 percent produced pigs under the same system.

Table 6.6: Distribution of livestock production across the different production Systems per type of livestock

Animal and Poultry Group	Intensive	Semi-Intensive	Extensive	Total	Number of Households in Sample that Owned Animals
	(Percent)	(Percent)	(Percent)		
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	12	72	100.0	50
Chicken-Local/Indigenous	2.4	11.8	85.7	100.0	1,024
Chicken - Broiler	62.1	6.9	31	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

Livestock Pastures

Table 6.7 shows type of pasture used to feed livestock. 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. The same pattern was observed in Communal Lands, A1 Farms and Old Resettlement Areas. In Small Scale Commercial Farms 57.1 percent of the households fed their livestock on own pasture.

Table 6.7: Percent Distribution of Type of Pasture by Land Use Sector

Land Use Sector	Other Households Pasture	Pasture Provided by the Government	Pasture Provided by the Community	Own Pasture	Other	Total	Number of Responding Households
	Percent	Percent	Percent	Percent	Percent	Percent	
Communal Lands	0.6	2.1	96.1	0.8	0.4	100.0	849
Small Scale Commercial Farms	21.4	3.6	16.1	57.1	1.8	100.0	56
A1 Farms	1.6	31.7	58.2	8.2	0.3	100.0	306
Old Resettlement Areas	2.9	24.8	63.6	8.6	0.2	100.0	456
Total	2.1	13.8	77.6	6.2	0.4	100.0	1,667

Animal Costs

This sub-section presents costs of raising animals and the production system employed. Table 6.8 shows the highest monthly expenditure by households on animal inputs was in the broiler chicken animal group with 23.9 percent in Communal Lands and the least was on goats and sheep with 0.27 percent. The average monthly expenditure by households on chicken layers was 91.9 percent in Small Scales Commercial Farms.

Table 6.8: Percentage Distribution of Average Household Expenditure on Animal Inputs (US$) by Animal Group and by Sector for Households Owning Animals

Sector	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas	
Animal Group	Average Expenditure	Number of Households	Average Expenditure	Number of Households	Average Expenditure	Number Of Households	Average Expenditure	Number of Households
Large ruminants (Cattle)	2.28	577	8.26	47	4.18	248	3.77	374
Donkeys	0.44	140	-	4	0.33	54	0.32	42
Goat/sheep	0.27	709	0.46	39	0.59	228	0.28	327
Pigs	7.11	48	32.07	2	22.67	18	6.95	13
Chicken - local/indigenous	0.86	976	2.17	67	1.11	398	1.05	513
Chicken - broiler	23.87	15	35.61	8	24.12	6	36.74	10
Chicken - layer	4.37	5	91.86	1	11.9	3	.	.
Other poultry	0.76	180	0.51	9	0.98	56	1.39	96
Rabbit	0.51	27	1	2	0.6	12	0.7	18

Table 6.9 shows the percentage of households that took animals for dipping from 1 January 2017 to 31 December 2017. 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 the same sector. In Old Resettlement Areas 24 percent of the households took goats and sheep for dipping.

Table 6.9: Percentage Distribution of Households that Took Animals for Dipping by Animal Group and by Sector

Animal Group	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas	Total	Number of Households who Took Animals for Dipping
	Percent	Percent	Percent	Percent	percent	Households
Large Ruminants (Cattle)	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/Indigenous	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

Table 6.10 depicts the proportion of households vaccinating animals against any disease by animal type and sector and the number of households that vaccinated. About 24.1 percent of the households in Communal Lands vaccinated large ruminants compared to 40.4 percent in Small Scale Commercial Farms, 37.1 percent in A1 Farms and 35.3 percent in Old Resettlement Areas. 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 6.10: Proportion of Households Vaccinating Animals against any Disease by Animal Type and Sector and the number of households vaccinating

Animal Type	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas	
	% HH Vaccinating	Households Owning	% HH Vaccinating	Households Owning	% HH Vaccinating	Households Owning	% HH Vaccinating	Households Owning
Large ruminants (cattle)	24.1	577	40.4	47	37.1	248	35.3	374
Donkeys	1.4	140	0.0	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	0.0	2	5.6	18	23.1	13
Chicken - local/indigenous	5.1	976	20.9	67	10.8	398	9.2	513
Chicken - broiler	13.3	15	12.5	8	33.3	6	30.0	10
Chicken - layer	0.0	5	100.0	1	-	3		-
Other poultry	1.1	180	-	9	3.6	56	4.2	96
Rabbit	0.0	27	-	2	8.3	12	0.0	18

Table 6.11: shows the proportion of households that vaccinated animals by type of disease and animal category and sector. Households who vaccinated large ruminants, 34.5 percent and 31.8 percent vaccinated against foot and mouth disease in Communal Lands and Old Resettlement Areas respectively. Households which vaccinated against black leg had the highest proportion in all sector except in Small Scale Commercial Farms with percentage ranging from 40.2 to 47.7 percent. The households that vaccinated against lumpy skin disease ranged from 22.0 percent to 47.4 percent across all land use sectors.

Table 6.11: Proportion of Households That Vaccinated Animals by Type of Disease and Animal Category and Sector (For Households that have the animal)

Large Ruminants (Cattle)

Disease	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
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
Other (Specify)	7.2	15.8	10.9	16.7
Tick-Borne Disease	11.5	31.6	10.9	11.4
Internal Parasites	4.3	5.3	6.5	6.1

Table 6.12 shows that between 40.4 percent and 46.5 percent of the households vaccinated their indigenous chickens against new castle disease. About 44 percent of the households in Communal Lands vaccinated indigenous chickens against bird flu compared to 50 percent in Small Scale Commercial Farms, 41.9percent in A1 Farms and 53.2 percent in Old Resettlement Areas.

Table 6.12: 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 Fams	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 6.13 shows the distribution of animal vaccinations across the types of vaccine and by animal type. Of the households that vaccinated their cattle, 27.4 percent vaccinated them against black leg, while 23.9 percent vaccinated their cattle against foot and mouth disease. About 46 percent of the households that kept donkeys indicated that they vaccinated them against internal parasites and 33.3 percent of the households that kept pigs vaccinated them against swine flu.

Table 6.13: Distribution of Vaccinations across vaccination type by Type of Animal and Type of Disease (Percentage)

Type of Disease	Cattle Percent	Donkeys Percent	Goat/Sheep Percent	Pigs Percent
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 6.14 presents the percent Distribution of vaccinations across the various diseases/ vaccination type by land-use sector. About 23.0 percent of the vaccinations in Communal Areas were against black leg, 16.4 percent against lumpy disease and 16.6 percent against foot and mouth disease. About 19 percent of vaccinations in Small Scale Commercial Farm areas were against lumpy skin disease while 17.7 of the households vaccinated their households against tick borne disease. About 20 percent of the vaccinations in A1 Farms vaccinated were against lumpy skin disease while another 16.3 percent was against black leg.

Table 6.14: Distribution of Households that Vaccinated Their Animals by Type of Disease and Sector (Percentage)

Disease	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
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

Table 6.15 shows the percentage of households practicing deworming by sector between 1 January 2017 and August 31, 2017. From Table 6.18 it was observed that households residing in Old Resettlement Areas had the highest percentage of deworming large ruminants which are cattle.

Table 6.15: Proportion of Households Practicing Deworming by Animal Category between January 1 and August 31, 2017.

Animal Group	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas	
	Percent	Number of Households Deworming	Percent	Number of Households Deworming	Percent	Number of Households Deworming	Percent	Number of Households Deworming
Large Ruminants (Cattle)	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/Indigenous	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	1148	10.8	1,067

Table 6.16 shows the average cost per household for hired labour for all livestock between January 1 and August 31 2017 for households hiring labour. In all small holder agricultural farms, the highest average cost of hired labour was US$523.70 per household in Old Resettlement Areas followed by US$250.80 in Small Scale Commercial Farms. The least amount of US$177.30 was paid by households in Communal Lands.

Table 6.16: Average Cost (US$) for Hired Labour for All Livestock for Households Hiring Labour

Sector	US$	Number of Households Who Hired Labour for Livestock
Communal Lands	177.30	106
Small Scale Commercial Farms	250.80	36
A1 Farms	186.70	92
Old Resettlement Areas	523.70	15

Agricultural Products and By Products

The APM survey 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 6.17 depicts percent households producing animal by-product by sector. About 17percent of the households in Communal Lands produced cattle milk compared to 34.1 percent in Small Scale Commercial Farms, 26.9 percent in A1 Farms and 31.5 percent in Old Resettlement Farms. Furthermore, 36.8 percent of the households in Communal Lands produced eggs compared to 38.5 percent in Small Scale Commercial Farms, 44.2 Percent in A1 Farms and 46.5 percent in Old Resettlement Areas. Manure was produced by between 41.1 percent and 53.2 percent of the households across all land use sectors.

Table 6.17: Proportion of Households Producing Animal By-Product by Type of By-Product and Sector for Households Owning Animals

By-Product	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
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

Table 6.18 shows the amount of livestock by-product produced by type of sector per household. In smallholder agriculture sector an average of 110 litres of cow milk was sold, valued at an average of $165.00. Households in Old Resettlement Areas sold an average of 218.8 litres valued at an average of $284.60. Households in the smallholder agriculture sector produced an average of 41.1 dozens of eggs valued at an average of $128.40.

Table 6.18: Average Sales Value in (US$) of By-Product by Sector and Type of By Product from 1 January 2016 to 31 December 2016

By-Product	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Area		Total	
	Average Quantity	Average Value in US$	Average Quantity	Average Value in US$	Average Quantity	Average Value in US$	Average Quantity	Average Value in US$	Average Quantity	Average Value in US$
Cattle Milk (Litres)	29.2	149.6	74.6	137.4	153.9	162.2	218.8	284.6	111.0	165.0
Eggs (Dozens)	41.0	83.5	63.7	236.2	10.1	64.8	2.5	15.0	41.1	128.4
Honey (Litres)	24.6	54.8	23.1	52.6	19.6	68.4	20.0	110.0	22.0	61.1
Hide/Skins (Pieces)	1.0	3.0	-	-	-	-	-	-	1.0	3.0
Manure (Cubic Metres)	19.0	17.3	1.0	10.0	1.0	5.0	6.0	30.0	10.8	16.2

Table 6.19 displays the proportion of households producing by-product who sold produce by type of by-product and by sector. About 7 percent of the households in Communal Lands 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. About 32 percent of the households in Communal Lands sold honey compared to 20.0 in Small Scale Commercial Farms, 52.6 percent in A1 Farms and 32.3 percent in Old Resettlement Areas.

Table 6.19 Percent of Households Producing By-Product who Sold By-Product By Type of By-Product and by Sector

By-Product	Communal Lands	Small Scale Commercial	A1 Farms	Old Resettlement Areas
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

Table 6.20 shows the distribution of households producing product/ by-product by type of product across sectors. Of the households that produced milk, 39.4 percent were in the Communal Lands followed by 34.3 percent who were 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 who were 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 6.20: Distribution of Households Producing Product or By-Product by Type of Product.

Product	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Area	Total Small Holder	Number of Responding Households
	Percent	Percent	Percent	Percent	percent	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	0	11.1	27.8	100.0	18
Manure (Cubic Metres)	52.5	4.2	16.7	26.7	100.0	570

Table 6.21shows the average distance from farm gate to the market by sector and by-product. In Communal Lands and A1 Farms the average distances travelled to sell eggs were 1.2km and 0.3 km respectively. The average distance travelled to the market for eggs in the Smallholder Agriculture Sector was 0.9 km. The average distance travelled to the market to sell honey by households residing in Communal Lands was 17.1km while in A1 farms the distance to the market to sell honey was 2.6 km. In Small Scale Commercial Farms eggs and honey were sold at farm gate. The least average distance of 0.1 km was travelled for to the market to sell honey in the old resettlement areas. Across all the four sectors the average distance for honey was 7.9 Km

Table 6.21: Average Distance from Farm Gate to the Market by Sector and by-Product

Land Use Sector	Cattle Milk	Eggs	Honey
	Average Distance in Km	Average Distance in Km	Average Distance in Km
Communal Lands	0.3	1.2	17.1
Small Scale Commercial Farms	3.2	-	-
A1 Farms	4.7	0.3	2.6
Old Resettlement Areas	7.0	-	0.1
Total	4.4	0.9	7.9

Chapter 7: Agricultural Capital

7.0 Introduction

This chapter presents results on agricultural equipment ownership by the surveyed households. These agricultural capital items include tractors, ploughs, trailers, planters, sprayers, etc., and are important determinants of agricultural productivity and subsequently household welfare and standards of living. The reference period for data collection was January 1, 2017 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 in this chapter also help to understand agricultural capital accessibility and their relevance to increasing agricultural productivity among rural smallholder households in the country.

7.1 Households owning agriculture equipment

Table 7.1 shows the percentage of households' ownership of agricultural equipment by type and land use sector over the reference period of 1 January 2017 to 31 August 2017. 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 and yoke was similar in Small Scale Commercial Farms, A1 Farms and Old Resettlement Areas. The table also shows that 49.4 percent of households in Small Scale Commercial Farms owned animal drawn implements, compared to 64.8 percent of households in Old Resettlement Areas. The ownership of scotch carts ranged from 25.2 percent in Communal Lands to 43.6 percent of the households in Old Resettlement Areas. In general, for households in the smallholder agricultural areas, tractors happen to be major productive assets needed for agriculture production. Although 7.7 percent of the households in Small Scale Commercial Farms owned a tractor while 3 percent and less of the households in other land use sectors owned a tractor.

Table 7.1: Percentage of Households Owning Agricultural Equipment by Type and Sector

Equipment	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
	Percent	Percent	Percent	Percent
Tractor	0.1	7.7	0.2	0.3
Tractor-drawn implements/equipment	1.1	10.3	1.5	1.7
Animal-drawn implements/equipment*	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

Table 7.2 shows the percentage of households' acquiring agriculture equipment by type and land use sector over the reference period. The table indicates that about 18.2 percent of households in A1 Farms acquired a pick-up truck during January 1, 2017 to August 31, 2017. Similarly, over the same reference period, about 15.4 percent of the households in Old Resettlement Areas and 14.3 percent in Communal Lands acquired a pick-up truck. Slightly above 11 percent acquired a sprinkler in Communal Lands, while 12.5 percent of the households in A1 Farms and 27.3 of

households in Old Resettlement Areas acquired a sprinkler. 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 7.2: Percentage of Households Acquiring Agriculture Equipment by Type and Sector during January 1, 2017 to August 31, 2017

Equipment	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
Tractor	-	14.3	-	-
Tractor-drawn implements/equipment	-	-	-	10.0
Animal-drawn implements/equipment*	1.9	2.3	4.4	3.3
Pickup truck	14.3	-	18.2	15.4
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

Table 7.3 shows the percent distribution of households disposing agriculture equipment by type and sector for the period January 1 to 31 August, 2017. The agriculture equipment which were disposed of in Communal Lands includes scotch carts, knapsack sprayers, wheelbarrows yokes and other agriculture equipment. Above 2 percent of

the households in Small Scale Commercial Farms disposed of animal-drawn implements and equipment. About 4 percent of the households in Old Resettlement Areas disposed of water pumps.

Table 7.3: Percentage Distribution of Households Disposing Agriculture Equipment by Type and Sector

Equipment	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
Animal-drawn implements/equipment	-	2.3	0.8	0.3
Water pump	-	-	-	3.8
Scotch carts	0.7	-	0.6	0.8
Knapsack sprayer	1	-	-	0.5
Wheelbarrow	1.2	-	-	2.0
Yoke	1.3	2.6	0.8	1.0
Other equipment	0.8	-	1.4	0.7

Table 7.4 shows the percent distribution of households renting out agriculture equipment by type and sector. It was observed that households in smallholder agriculture sector practiced some renting out of agricultural equipment. In Communal Lands 25 percent, 14.3 percent and 4.2 percent of the households mostly rented out tobacco bailers, pick-up trucks and water pumps respectively. The situation in Small Scale Commercial Farms was different as 42.9 percent, 22.2 percent and 16.7 percent of the households rented out tractors, tractor drawn implements and pick-up trucks. 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 some of households rented out tobacco balers (50 percent), water bowsers (40 percent) and Tractor drawn implements/ equipment (14.5 percent). About 39 and 31.4 percent of the households in Old Resettlement Areas mostly rented out pick-up trucks and tobacco bailers.

Table 7.4: Percentage Distribution of Households Renting Out Agriculture Equipment by Type and Sector

Equipment	Communal lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
Tractor	-	42.9	-	-
Tractor-drawn implements/equipment	-	22.2	14.3	-
Animal-drawn implements/equipment	1.1	2.3	2	1.0
Pickup truck	14.3	16.7	9.1	38.5
Water pump	4.2	-	2.9	-
Sprinkler	-	-	12.5	-
Scotch carts	3.4	-	4.7	3.4
Water bowser	-	-	40	-
Tobacco baler	25	-	50	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	-

Table 7.5 shows the average amount of income received per item for renting out agriculture equipment by type of equipment for all sectors for the period 1 January to 31 August 2017. The highest average income earned by households per pick-up truck in Small Scale Commercial Farms was $100, followed by $78.33 in Old Resettlement Farms. On the other hand, households in Small Scale Commercial Farms received $63.89 from Tractor and $24.17 from a Tractor –drawn implements/equipment.

Table 7.5: Average Income from Renting-Out Agriculture Equipment by Type of Equipment and Sectors

Livestock	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas	
	$	Number of households	$	Number of Households	$	Number of households	$	Number of households

Tractor	-	-	63.89	3*	-	-	-	-
Tractor-drawn implements/equipment	-	-	24.17	2*	3	1*	-	-
Animal-drawn implements/equipment	5.66	6*	25.00	1*	17.14	5*	-	4*
Pickup truck	21.67	1*	100.00	1*	33.33	1*	78.33	5*
Water pump	0.71	1*	-	-	30.00	1*	-	-
Sprinkler	-	-	-	-	5.00	1*	-	-
Scotch carts	2.56	10*	-	-	5.33	8*	1.76	9*
Water bouser	-	-	-	-	17.00	2*	-	-
Tobacco baler	7.5	1*	-	-	7.62	2*	11.26	5*
Sheller - Mechanical	-	-	-	-	9.00	1*	-	-
Knapsack sprayer	-	3*	-	-	0.32	3*	1.67	3*
Wheelbarrow	-	4*	-	-	-	2*	0	3*
Yoke	1.00	3*	-	-	1.00	1*	0	2*
Other equipment	-	-	-	-	93.75	1*	-	-

N.B. There were few observations households renting out equipment.

Table 7.6 shows the percentage of households' using agriculture equipment by type and sector. Use of tractors services in the small holder agricultural sector was low. About 19 percent of the households in the Small Scale Commercial Farms used a tractor, followed by 10 percent of the households in A1 Farms while 3.3 percent and 1.9 percent of the households in the Old Resettlement Areas and Communal Lands respectively used a tractor. Across all the four sectors, the percentages of households that used animal-drawn implements/equipment ranged from 69.3 to 83.4 percent.

Table 7.6: Percentage of Households that Used Agriculture Equipment by Type and land use Sector

Equipment	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
Tractor	1.9	18.7	10.0	3.3
Tractor-drawn implements/equipment	2.9	15.9	10.7	5.4
Animal-drawn implements/equipment*	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
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

Table 7.7 shows the percentage distribution of households who rented-in agriculture equipment by type and sector from January 1 to August 2017. While the usage of agriculture equipment was high (from Table 7.6 above), it is important to note that some of the equipment used was rented- in. It should also be noted that the renting-in of certain agricultural equipment was not existent or had very low response rates. 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. Above 24 percent and 14.1 percent of the households in A1 Farms and Old Resettlement Areas rented-in animal drawn implements. Further, 18.2 percent and 16.7 percent of the households residing in Communal Lands rented-in a scotch-cart and a yoke respectively. In Small Scale Commercial Farms 25.6 percent and 20.4 percent of the households rented-in a scotch-cart and a yoke respectively. About 19

percent and 16.6 percent of the households residing in A1 Farms and Old Resettlement Areas rented-in a scotch-cart respectively.

Table 7.7: Percentage of Households Who Rented-In Agriculture Equipment for those who used Equipment by Type and Sector

Equipment	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
Tractor	82.6	64.7	84.4	95.0
Tractor-drawn implements/equipment	38.2	50.0	58.3	36.4
Animal-drawn implements/equipment	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

Tables 7.8 shows the average amount paid and average number of days for renting-in agriculture equipment by type of equipment and sector. In Communal Lands, the cost of renting in a pick-up truck was $134.58 per day which was rented in for about 2 days, while in A1 Farms, the rental cost of a pick-up truck was $75.89 per day. In Old Resettlement Areas, however, the rental cost of same item was $58.02 per day and rented-in for about 2 days

throughout the season. Households in Old Resettlement Farms paid the highest rental cost for tractor services, averaging about $71.33 per day, rented-in for about 2 days throughout the season. Tractor-drawn equipment was also rented in at an average cost of $56.93 per day and the equipment was hired for an average of 1 days in Small Scale Commercial Farms.

Table 7.8: Average Amount Paid Per Day for Renting-In Agriculture Equipment by Type of Equipment and Sector

Equipment	Communal Lands	Small Scale Commercial	A1 Farms	Old Resettlement Areas
	Cost per day	Cost per day	Cost per day	Cost per day
Tractor	30.82	56.09	61.21	71.33
Tractor-drawn implements/equipment	19.35	56.93	46.43	47.00
Animal-drawn implements/equipment	8.22	9.72	12.92	5.57
Pickup truck	134.58	.	75.89	58.02
Scotch carts	4.53	4.35	5.03	3.99
Water bouser	0.00	7.50	.	.
Tobacco baler	13.05	7.98	13.96	15.08
Sheller - Mechanical	.	36.33	35.38	47.75
Sheller - Manual	2.00	.	.	.
Knapsack sprayer	1.49	0.00	0.58	2.41
Wheelbarrow	0.18	0.00	0.12	0.56
Yoke	2.00	2.20	4.02	2.07
Other equipment	5.00	0.00	61.67	15.00

Table 7.9: depicts the average number of days for renting-in agriculture equipment by type of equipment and sector for those households which 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 of 13.7 days whilst households in Small Scale Commercial

Farms rented-in animal drawn implements for an average of 9.4 days compared to 13.7 days in the Old Resettlement Areas. Households in the smallholder agricultural sector rented-in a wheelbarrow for an average ranging from 5.3 to 6.8 days.

Table 7.9: Average Number of Days for Renting-in Agriculture Equipment by Type of Equipment and Sector for Those Households which used Equipment

Equipment	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
	Average Days	Average Days	Average Days	Average Days
Tractor	1.1	1.6	1.6	1.9
Tractor-drawn implements/equipment	1.8	1.4	1.9	1.8
Animal-drawn implements/equipment*	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.

In Table 7.10, the proportion of households using agriculture equipment by type of equipment and sex of head of household over the reference period is presented. The table shows that across the land sectors, the usage of tractors in female-headed households was low compared to male-headed households. In Communal Lands, 2 percent and 1.9 percent of male-headed and female- headed households respectively used a tractor. In Small Scale Commercial Farms 24.1 percent of the male-headed households used a tractor compared to 11.1 percent for the female-headed households. In A1 Farms, 11.4 percent of male-headed households compared to 6.1 percent of female-headed households used a tractor. In Old Resettlement Areas, however, 3.9 percent and 2.2 percent of male-headed and female-headed households used a tractor. The usage of animal drawn implements by female-headed households was high across all land use sectors. In Communal Lands 79.6 percent of the male-headed households compared to 71.6 percent of the female-headed households used an animal drawn implement. In Old Resettlement Areas 91.9 percent of the male-headed households compared to 83.9 percent of female-headed households used an animal drawn implement. The same pattern was observed on the usage of the yoke and scotch carts between male-headed and female-headed households.

Table 7.10: Proportion of Households Using Agriculture Equipment by Type of Equipment, Sex of Head of Household and Sector (Percent)

Capital Equipment	Communal Lands		Small Scale Commercial Farms			A1 Farms			Old Resettlement Areas		
	Male-headed	Female-headed	Both sexes	Males - headed	Female-headed	Both sexes	Male-headed	Female-headed	Both sexes	Male-headed	Female-headed
Tractor	2.0	1.9	1.9	24.1	11.1	17.6	11.4	6.1	8.8	3.9	2.2
Tractor-drawn implements/equipment	3.8	1.5	2.6	19.6	11.1	15.4	12.3	5.3	8.8	6.5	3.6
Animal-drawn implements/equipment*	79.6	71.6	75.6	66.7	72.2	69.4	85.5	78.1	81.8	91.9	83.9
Pickup truck	1.3	0.2	0.7	5.9	-	2.9	6.3	-	3.2	6.0	4.0
Water pump	2.3	0.6	1.4	7.8	5.6	6.7	8.4	3.5	6	8.4	5.4
Sprinkler	1.3	0.6	1.0	2.0	-	1.0	0.6	0.9	0.7	2.3	1.3

Equipment											
Scotch carts	46.1	34.5	40.3	43.1	44.4	43.8	63	50.9	56.9	74.2	53.6
Water bowser	0.6	0.6	0.6	7.8	2.8	5.3	1.2	0.9	1	1.3	1.8
Tobacco baler	2.4	0.4	1.4	5.9	11.1	8.5	19.9	3.5	11.7	13.3	5.4
Sheller - Mechanical	-	0.2	0.1	5.9	-	2.9	2.4	1.8	2.1	1.0	-
Sheller – Manual	0.3	0.2	0.2	3.9	-	2.0	0.6	-	0.3	0.3	-
Knapsack sprayer	27.7	11.8	19.8	45.1	36.1	40.6	61.4	30.7	46.1	45.7	30.4
Wheelbarrow	45.8	42.1	44	66.7	61.1	63.9	46.4	39.5	42.9	52.2	44.2
Yoke	74.4	62.3	68.4	58.8	66.7	62.7	81.3	68.4	74.9	88.3	78.6
Other equipment	21.2	24.8	23	25.5	22.2	23.9	15.7	21.9	18.8	27.4	25.9

N.B.* Includes oxen and donkeys

Table 7.11 shows the proportion of households owning agriculture equipment by type of equipment and sex of head of household for the period 1 January to 31 August 2017. 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 male and female head of households. There were small disparities in the ownership of animal drawn implements between male and female head of households across all land use sectors. In Communal Lands 53.0 percent of male compared to 40.2 percent of female head of households owned an animal drawn implement. In Small Scale Commercial Farms 46.0 percent and 54.1 percent of male and female headed households respectively owned an animal drawn implement. In A1 farms the ownership of an animal drawn implement by male and female head of households was the same at about 56 percent. In old resettlement areas 66.6 percent of male head of households compared to 60.4 percent of female head of households owned an animal drawn implement. There were marginal differences in the ownership of wheelbarrows between male and female head of households.

Table 7.11: Proportion of Households Owning Agriculture Equipment by Type of Equipment and Sex of Head of Household

Equipment	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Farms	

	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/equipment	1.3	0.8	14	5.4	2.1	-	1.8	1.3
Animal-drawn implements/equipment*	53.0	40.2	46	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

Chapter 8: Command Agriculture

Please note that for this chapter the number of observations is not enough for coming up with conclusions. It is therefore recommended that the chapter be removed from the report and that it be used as an internal document not published. It is also important to note that A2 Farms and Large

Commercial Farms were not included in the APM module due to lack of funding to cover these farming sectors.

8.0 Introduction

This chapter focuses on the Command Agriculture program, 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 case of the 2016/17 agriculture season, the targeted crops under the command agriculture were maize and wheat.

8.1 Share of Households under the Command Agriculture Programme

Table 8.1 shows the percentage of households that received inputs under the command agriculture programme by sector. The inputs included fertilizers, herbicides, lime, diesel, pesticides, maize seed and wheat seed. From the table, it was noted that 8 percent of the households in A1 Farms received inputs under the Command Agriculture programme and about 7.7 percent of households in Small Scale Commercial Farms received inputs from the Command Agriculture programme. It was also noted that 6.2 percent of the households in Old Resettlement Areas and 1.9 percent of the households and Communal Lands received inputs under the Command Agriculture programme.

Table 8.1: Percent Households that Received Inputs under the Command Agriculture Programme by Sector (based on input use data, first round)

Land Use Sector	Received Inputs
Communal Lands	1.9
Small Scale Commercial Farms	7.7
A1 Farms	8.0

Old Resettlement Areas	6.2

Table 8.2: Shows the percentage of households that participated in command agriculture by sector based on the plot-level data gathered in the second round where the question was: "Was this [crop] on this [plot] under command agriculture during the agricultural season 2016/2017?" It was only asked for maize and wheat. The participation of households in command agriculture based on the plot-crop results was similar to those based on the inputs access data (Table 8.1). About 8 percent and 7.1 percent of the households in A1 farms and Small Scale Commercial farms, respectively participated in Command Agriculture. Households in communal lands (2.5 percent) had the lowest proportion in terms participation in Command Agriculture while 6.2 percent of the households in old resettlement areas participated in the programme.

Table 8.2: Percentage of Households Participating in Command Agriculture by Sector (based on Plot-Crop Level Data, second round)

Land Use Sector	Participation
Communal Lands	2.5
Small Scale Commercial Farms	7.1
A1 Farms	7.5
Old Resettlement Areas	6.2

Table 8.3 shows the distribution of households that received inputs under the Command Agriculture programme by sector. The table indicates that households in the smallholder agricultural sectors did not receive all the inputs earmarked for the Command Agriculture programme. In Communal Lands 2.2 percent of the households received maize seeds, 1.1 percent of the households received ammonium nitrate fertilizer from the Command Agriculture programme. About 8 percent of the households in A1 farms and 4.7 percent in Small Scale Commercial farms

received maize seeds and fertilizer compound D from the Command Agriculture programme respectively. Further, about 1.2 percent and 3.5 percent of the households in Small Scale Commercial Farms received land preparation and diesel from the Command Agriculture programme respectively. Also, 7.8 percent and 6.6 percent of the households in A1 farms and old resettlement areas received maize seeds from the Command Agriculture programme.

Table 8.3: Percentage of Households that Received Inputs under Command Agriculture by Sector

Land Use Sector	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
	Percent	Percent	Percent	Percent
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 |

Table 8.4 shows the percentage of households that participate in maize production under Command Agriculture by sector. This table shows 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. About 4 percent of the households in Small Scale Commercial Farms and 1.3 percent in Small Scale Commercial Farms and Communal Lands respectively produced maize under the Command Agriculture programme.

Table 8.4: Percentage Household Participation in Maize Production under Command Agriculture by Sector (From Field Crop Harvest)

Land Use Sector	Maize Crop
	Participation
Communal Lands	1.3
Small Scale Commercial Farms	3.6
A1 Farms	6.4
Old Resettlement Areas	7.2

Maize Production among Smallholder Agricultural Sector - Command Agriculture Recipients

Table 8.5 shows the yield (kg/ha) for maize from command agriculture 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 and non-standard units were converted to standard units using conversion factors from a market survey conducted as part of the PICES 2017. 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. The total area under maize production was given by the household when the interviewer requested for the area of cultivated crops. The farmer provided estimates of area planted and the interviewer went on to measure the area under crop in plots using the GPS measurement device. The data on area was collected in square metres. The area of plots were all converted into hectares.

The information from the table shows that maize yield under Command Agriculture measured in kilogrammes per hectare was generally low across all sectors as compared to the standard of 5 tonnes per hectare. While the maize yield in Communal Lands was as low as 1.5 tonnes per hectare, the rest of the smallholder agriculture sectors had a maize yield of about 2.0 tonnes per hectare. It should be noted that the results shown here are indicative only as the number of households who participated in Command Agriculture across land use sectors was very low. It should be noted further that the expected yield per hectare under command agriculture was 5 tonnes per hectare and above.

Table 8.5: Yield (Kg/Ha) for Maize under Command Agriculture and Non Command Agriculture by Sector

Land Use Sector	Non -Command Agriculture			Command Agriculture		
	Production (Tonnes)	Total area (Hectare) of surveyed farmers	Yield (kgs)/Hectare)	Production	Total area (Hectare) of surveyed farmers	Yield (kgs/Hectare)
				(Tonnes)		
Communal Land	536	742	722	16	9	1,713
Small Scale Commercial Farms	106	76	1382	9	3	3,014
A1 Farms	564	504	1118	61	35	1,752
Old Resettlement Areas	497	589	844	96	48	1,995

Table 8.6 shows that in all the four smallholder farming sectors, the average area per farmer under maize Command Agriculture in the 2016/17 agricultural season was 1.1 hectares. The A1 farming sector had the highest average area per household of 1.6 hectares followed by the Small Scale Farming Sector, with an average of 1.2 hectares. For wheat, only two sector were involved that is, the Small Scale Commercial Farms and A1 Farms. The national average area per household for wheat in the two sectors was 0.8 hectares.

Table 8.6 Average Area under Command Agriculture across Crops and Sectors in the 2016/17

Land Use Sector	Average Area	No of Households
Communal Lands	0.7	21
Small Scale Commercial Farms	1	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.

8.3 Interest Shown by Farmers in Command Agriculture

Table 8.7 depicts comparison between 2016/17 and 2017/18 household interest on Command Agriculture Programme and intention to apply in 2017/2018. The table shows 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. About 9 percent and 8.2 percent of the households in Small Scale Commercial Farms and Old Resettlement Areas respectively applied to join the Command Agriculture Programme in the 2016/17 agricultural season. The applications to join the Command Agriculture Programme increased by 6.2 percent in Old Resettlement Areas and 4.4 percent in Small Scale Commercial Farms in the 2017/18 agricultural Season. .

Table 8.7: Comparison between 2016/17 and 2017/18 Household Interest on Command Agriculture Programme and Intention to Apply in 2017/2018

Land Use Sector	Applied 2016/17	Already applied 2017/2018	Still intend to Apply 2017/2018	Number of Households in Sample
	Percent	Percent	Percent	
Communal lands	3.5	3.2	12.2	1,186
Small Scale Commercial Farms	8.8	13.2	5.5	91
A1 Farms	9.8	11.4	8.0	449
Old Resettlement Areas	8.2	14.4	11.6	612

Table 8.8: depicts the proportion of the area under maize in Command Agriculture as a proportion of the farmers' total area under maize by land-use sector. Farmers who benefited from inputs provided under the Command Agriculture program also had other portions of land under maize which was not under Command Agriculture. It was noted that in Communal Lands 45.3 percent of the households had maize compared to the total area under maize within their farms. In Old Resettlement Areas 65.0 percent of the households had maize compared to the total area under maize within their farms while in A1 Farms 52.1 maize compared to the 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.

Table 8.8: Average Proportion of Area Under Maize that Uses Inputs Provided through Command Agriculture as a Proportion of the Farmers' Total Area Under Maize, by Land-Use Sector

Land Use Sector	Mean Proportion

Communal Lands	45.3
Small Scale Commercial Farms	37.0
A1 Farm	52.1
Old Resettlement Areas	65.0

Chapter 9: Agricultural Productivity

9.0 Introduction

Agricultural productivity measures the relationship between agricultural output and corresponding inputs. In simple terms, agricultural productivity is the ratio of agricultural *outputs* 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.

9.1 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 9.1 Shows the yield in kilogrammes per hectare (kg/ha) by crop and sector. The table further shows that in Communal Lands and Old Resettlement Areas, white maize and yellow maize have the highest yields. The yield for white maize in Communal Lands was 734.9 kilogrammes per hectare. The highest yield for the white maize was in Small Scale Commercial Farms with 1,443.0 kilogrammes per hectare, followed by 1,158.4 kilogrammes per hectare in A1 Farms. The yield for white maize for the Old Resettlement Areas was 931.0 kilogrammes per hectare which compares favourably with the national average yield for maize. In general the yield for most crops was less than expected. For the white maize, farmers are expected to have a yield of at least 5 tonnes per hectare. There is the need to boost white maize productivity in the smallholder agriculture sector through provision of inputs, agriculture credit, and extension services. It has been observed that the yield for soya beans is low 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 9.1: Average yield by Crop and Land use Sector (Kg/Ha)

Crop Type	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas		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	2076

Yellow Maize	764*	38*	380*	1*	653	12*	1615*	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 (Mhunga/ Nyawuti)	169	240	700*	1*	494	52	566*	47*	259	340
Finger millet (Rapoko/ Rukweza)	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
Soybeans	644*	29*	-	.	1,130*	27*	1,124*	7*	1,001	63
Roundnut (Nyimo or Ndlubu)	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 (Nyemba)	150	373	620*	23*	138	113	143	141	155	650

N.B. * means less than 50 observations on the number of households

9.2 Labour Productivity

Labour productivity is also one of the performance indicators of agricultural production. Since agricultural production is a labour intensive sector, it can be argued that the work force is the dominant productive resource. Labour productivity is often closely linked to household welfare and, the development of technologies that enhance labour productivity, such as tractors, planters, herbicides etc. and their promotion among smallholder farming households are important.

Table 9.2 shows labour productivity in kilogrammes per hour (kg/hr) by crop and sector. Given that the labour information was collected at the plot level, the denominator in the labour productivity uses only the labour supplied to the plot on which the particular crop was grown, and not the total labour hours supplied by the household. In addition, both household and hired labour were included in the formula.

Table 9.2 shows labour productivity in kilogrammes per hour per plot by crop and sector. The labour productivity of white maize was 2.6 kilogrammes per hour for the smallholder sector as a whole. The highest labour productivity for white maize cultivation was on A1 Farms with 4.0 kilogrammes per hour, followed by Old Resettlement Areas with 3.1 kilogrammes per hour. The labour productivity for white maize was 2.5 kilogrammes per hour in Small Scale Farms and 1.8 kilogrammes per hour in Communal Lands. The highest productivity rate was shown in groundnut production with 19.4 kilogrammes per hour in Small Scale Commercial Farms.

Table 9.2: Average labour Productivity per Plot by Crop and sector in kilogrammes per hour (kg/hr)

Crop Name	Communal Lands		Small Scale Commercial Farms		A1 Farms		Old Resettlement Areas		Average Smallholder Sector	
	Kg/hour	No. of Plots	Kg/hour	No. of Plots	Kg/hour	No. of Plots	Kg/hour	No. of Plots	Kg/hour	No. of Plots
White Maize	1.8	2,297	2.5	197	4.0	973	3.1	1,455	2.6	4,922
Yellow Maize	0.5*	46*	-	2	0.3*	22*	1.7*	24*	0.8	94
Red Sorghum	0.7	160	0.1	2	0.7*	45*	0.3*	35*	0.7	242
White Sorghum	0.8	453	1.0	5	0.4	80	0.6	129	0.7	667
Pearl millet (Mhunga/ Nyawuti)	0.3	381	0.3	2	0.7	68	0.7	62	0.5	513
Finger millet (Rapoko/ Rukweza)	0.8	159	0.6	13	0.3*	26*	0.3	57	0.6	255
Rice	4.1*	24*	0.3	3	3.7*	6*	1.9*	7*	3.1*	40*
Tobacco	0.3	57	6.2	20	0.8	166	0.9	137	0.9	380
Cotton	2.3	76	0.2	5	0.4*	22*	0.4*	33*	1.5	136

Groundnuts	1.9	678	19.4	60	1.5	233	2.1	298	2.9	1,269
Sunflowers	1.9	96	6.3	3	0.6*	42*	6.3	68	3.1	209
Soybeans	2.2*	31*	-		4.9*	34*	1.1*	7*	3.7	72
Roundnut (Nyimo or Ndlubu)	1.0	439	0.8	32	1.1	175	2.1	198	1.2	844
Sweet Potatoes	3.6	244	7.0	23	6.5	181	6.5	154	5.4	602
Sugar beans	1.2	166	0.2	15	0.7	71	1.3	117	1.1	369
Cowpeas (Nyemba)	0.6	512	4.6	28	0.6	146	1.2	191	0.8	877
Tomatoes	0.4	51	2.1	5	9.9*	28*	0.1	32	5.3	116

N.B. * means less than 50 plot observations

Chapter 10: Agricultural Credit and Extension Services

This chapter covers the survey findings regarding agricultural support services. These include extension services received as well as credit and loans accessed for agricultural activities during the agricultural season 2016/2017.

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 10.1 shows the distribution of household use of the credit for those who received agricultural credit and the rationale of access. Eighty one percent of the households who received credit indicated that the main reason for accessing loans was to purchase crop inputs. (The reason to pay labour wages constituted 8 percent, while reasons to pay for land preparation and purchase agricultural land constituted 4 percent each.

Table 10.1. Percent Distribution of Households use of Agricultural Credit for those that accessed it

Type of Agriculture Credit	Percent
Purchase Agriculture land	4.0
Purchase Crop inputs	81.0
Purchase Livestock inputs	2.0
Purchase Livestock	-
Purchase Capital Equipment	3.0
Pay for Labour Wages	8.0
Pay for Transportation	-
Pay for Land Preparation	4.0
Pay for Processing	-
Others	-

Table 10.2 shows the percentage distribution of households who accessed agricultural credit by source of loan. The figure shows that 51 percent of households received agricultural credits from contract farming, while 16 percent received from friends and relatives. Banks, money lenders and other institutions each gave less than 9 percent of the loans. The least financing source was accessed from saving associations, with 1 percent.

Table 10.2. Percent Distribution of Households Who Accessed Agricultural Credit by Source of Loan

Source of Loan	Percent
Contract Farming	51
Money Lenders	7
Friends and Relatives	16
Banks	8
Micro Finances	8
Saving Associations	1
Cooperative Societies	4
Others	8

Table 10.3 shows the average amount borrowed by agricultural sector. The average amount borrowed per household in the A1 farming sector was U$876, followed by US$600 in Small Scale Commercial Farms. The least average loan of about US$340 was accessed in by household in Communal Lands.

Table 10.3: Average Amount Borrowed (US$) by Source of Loan and Sector

Source of Loan	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas	Total
Cooperative Society	315.00	-	1,200.00	-	610.00
Savings Association	-	-	120.00	-	120.00
Micro Finance	719.00	-	-	120.00	419.50
Bank	200.00	500.00	1,351.00	300.00	842.20
Friends & Relatives	47.50	-	85.00	284.20	172.10
Money Lenders	36.70	-	660.00	60.00	166.00
Contract Farming	787.50	700.00	969.10	1,084.80	982.10
Other (Specify)	344.00	1,000.00	1,150.00	300.00	714.70
Total	338.90	600.00	875.80	543.20	582.60

Table 10.4 shows that the average amount borrowed by the age group of 15-35years old was of US$626 while the average was US$595 for those in the age group of 36 years and above. The average amount borrowed was about US$603 for the two age groups.

Table 10.4 Average Amount Borrowed By Age Group

Age	Average US$
36+ years	595

15-35 years	626
Average for two Age Groups	**603**

Table 10.5 shows the average amount borrowed by sex of the farmer. The average amount borrowed by male or female -headed households including group borrowers was US$641. The amount borrowed by male farmers was (US$765) which is higher than that of female farmers who borrowed US$360 on average. Female farmers who accessed loans through groups received a much better average amount of US$761 than those who borrowed as individuals. Borrowing as groups was advantageous to female borrowers who could have received much less as individual borrowers.

Table 10.5 Average Amount Borrowed (US$) by Sex

Sex	**Average $**
Male	765
Female	360
Group Borrowers	761
Average	**641**

About 41 percent applied but were denied access to loans due to lack of collateral security, while 39 percent applied but were unsuccessful for other reasons not specified. About 16 percent cited that they were not given because they lacked guarantors and did not qualify for a loan, while about 2 percent indicated that they had a bad credit history. See Table 10.6.

Table 10.6: Percentage of Loan Refusals by Reason for Refusal

Reasons of refusal	**Percent**
Lack of Guarantors	16.0
Items did not qualify for a loan	16.0

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Bad credit History	2.0
No savings/shares	6.0
Lack of collateral	41.0
Others	39.0

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 technical assistance/ advice or a demonstration of agricultural techniques given to a farmer or group of farmers to improve productivity.

Table 10.7 shows the proportion of households that received agricultural extension services by sector. It is found that between 68.8 percent and 78.0 percent of the households sought extension services from Government Agricultural Extension Services. Slightly above 45 percent of the households in Small Scale Commercial Farms received extension services from electronic media such as TV and radio services. Furthermore, 31.9 percent of the households in A1 Farms, 25.5 percent in Old Resettlement Areas and 22.0 percent in Communal Lands received extension services from electronic media.

Table 10.7 Proportion of Households that Received Extension Services by Sector

Main Extension Services Providers	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas

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

Table 10.8 shows the percentage of households that received advice by land use sector and type of information. About 40 percent of households in A1 Farm areas received advice on new seed varieties compared to 30 percent of the households in Communal Lands. In Small Scale Commercial Farm areas 33.0 percent of the households received advice on new seed varieties compared to 29.5 percent of the households in Communal Lands.

Table 10.8: Percentage of Households who Received Advice by Type and Sector

Type of Information	Communal Lands	Small Scale Commercial Farms	A1 Farms	Old Resettlement Areas
	YES %	YES %	YES %	YES %
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 (Specify)	2.0	.	1.5	1.7

Chapter 11: Food and Nutrition Security

11.1 Introduction

This chapter presents some of the findings regarding food and nutrition security. 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.

Peak Hunger Period

The questionnaires asked during which month if any the household did not have enough food to eat. Findings showed periods when the households were food insecure. Figure 11.1 shows that the peak hunger period for the 2016/17 farming was experienced from October 2016 to January. In March 2016, about 8 percent of households were food insecure, which steadily rose to about 13 percent in July of the same year. There was a sharp increase (40 percent to 45 percent) of the households who were food insecure during the months of October 2016 to January 2017. The main causes of food insecurity included drought, inadequate household food stocks due to pest damage or low production/ 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 11.1: Proportion of households who did not have enough food to eat during a particular month the past 12 months (percentage)
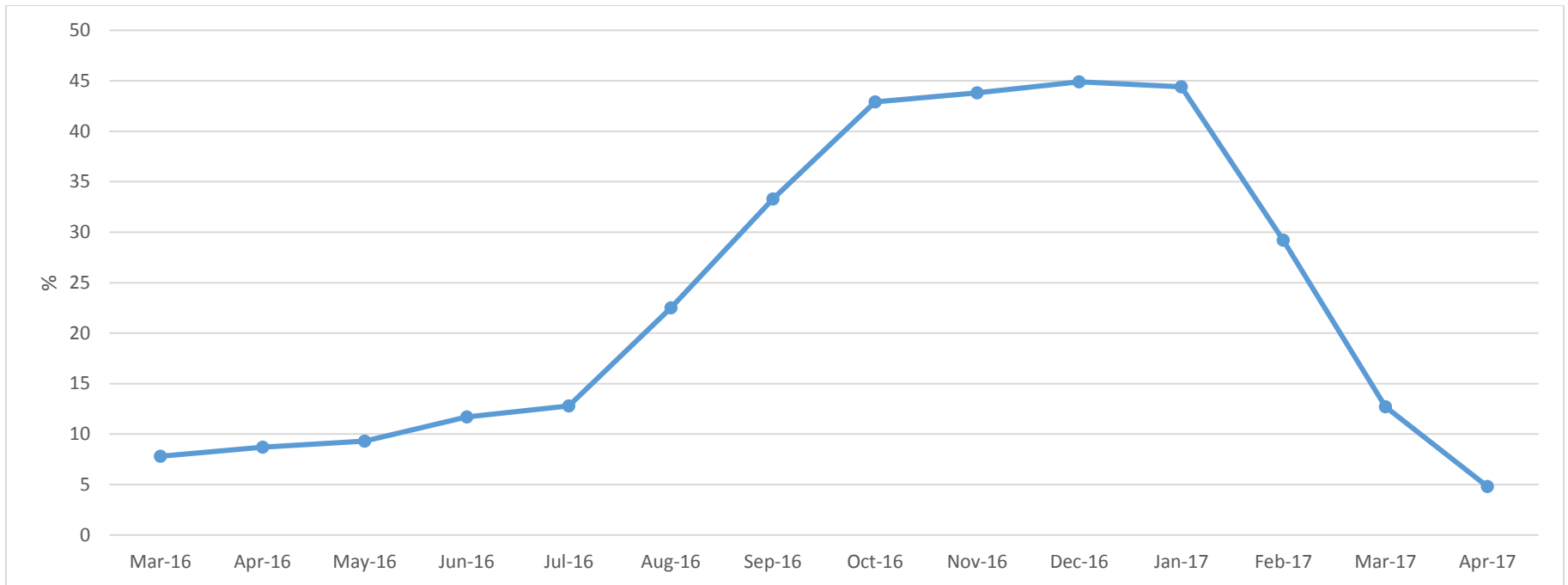
Food Availability

Table 11.1 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. The table also indicates that the Old Resettlement Areas had the least proportion with 29.1 percent of households indicating that they experienced food shortage

Table 11.1: Percent Households Who Faced a Situation Where They Did Not Have Enough Food

Farming sector	Food Available	Food Not Available

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Communal Lands	**43.2**	**56.8**
Small Scale Commercial Farms	**55.4**	**44.6**
A1 Farms	**58.9**	**41.1**
Old Resettlement Areas	**70.9**	**29.1**
Total	**48.5**	**51.5**

Figure 11.2 shows 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 about 60 percent of the households indicated that they experienced food shortages.

Figure 11.2: Proportion and Month in which Households Experienced Food Shortages
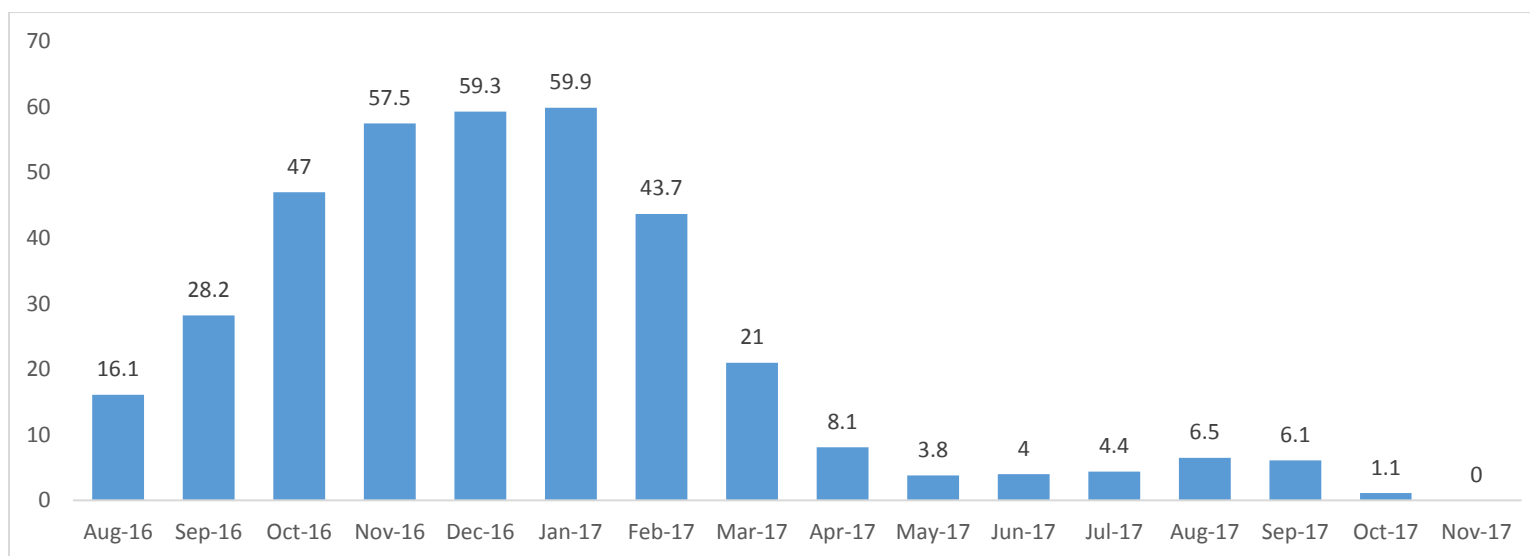
The definition of food consumption scores is presented in Figure 11.3

Figure 11.3 : Food Consumption Score Groups and Description of Scores

Food Consumption Score Groups	Score	Description
Poor	0-21	An expected consumption of staple during 7 days, 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 for 7 days, 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 11.3 shows the food consumption score of households March 2016 to November 2017.The figure indicates that 69 percent of households had acceptable consumption, while 26 percent had borderline consumption and 5 percent had poor consumption patterns.
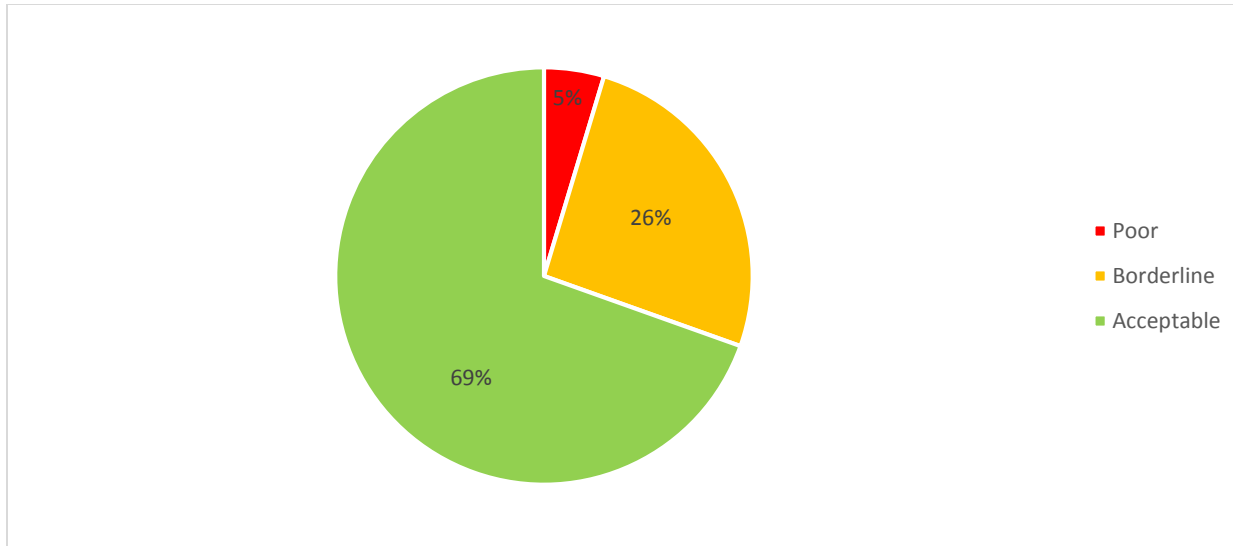
Figure 11.3: Food Consumption Score

Figure 11.4 shows the food consumption score by farming sector. The Old Resettlement Areas had the highest acceptable consumption with 82 percent of the respondents having a food consumption score above 35. Generally the consumption patterns for households were either borderline with average of 25.8 percent or acceptable with 69.5 percent. Only 4.7 percent of households had poor consumption patterns.

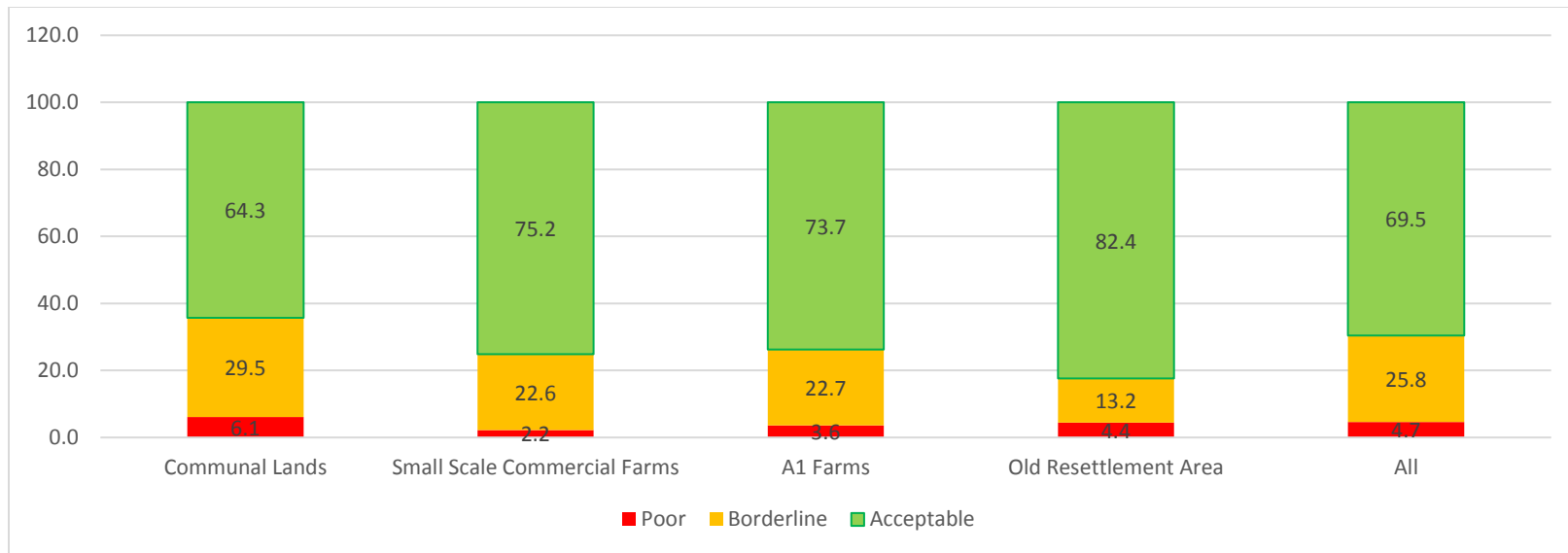**Figure 11.4: Food Consumption Score by Farming Sector**

Figure 11.5 below shows a comparison of food consumption score between the first and second round visits. The figure indicates that household food consumption scores were similar for both visits.

Figure 11.5: Food Consumption Score by farming sector Round One and Two
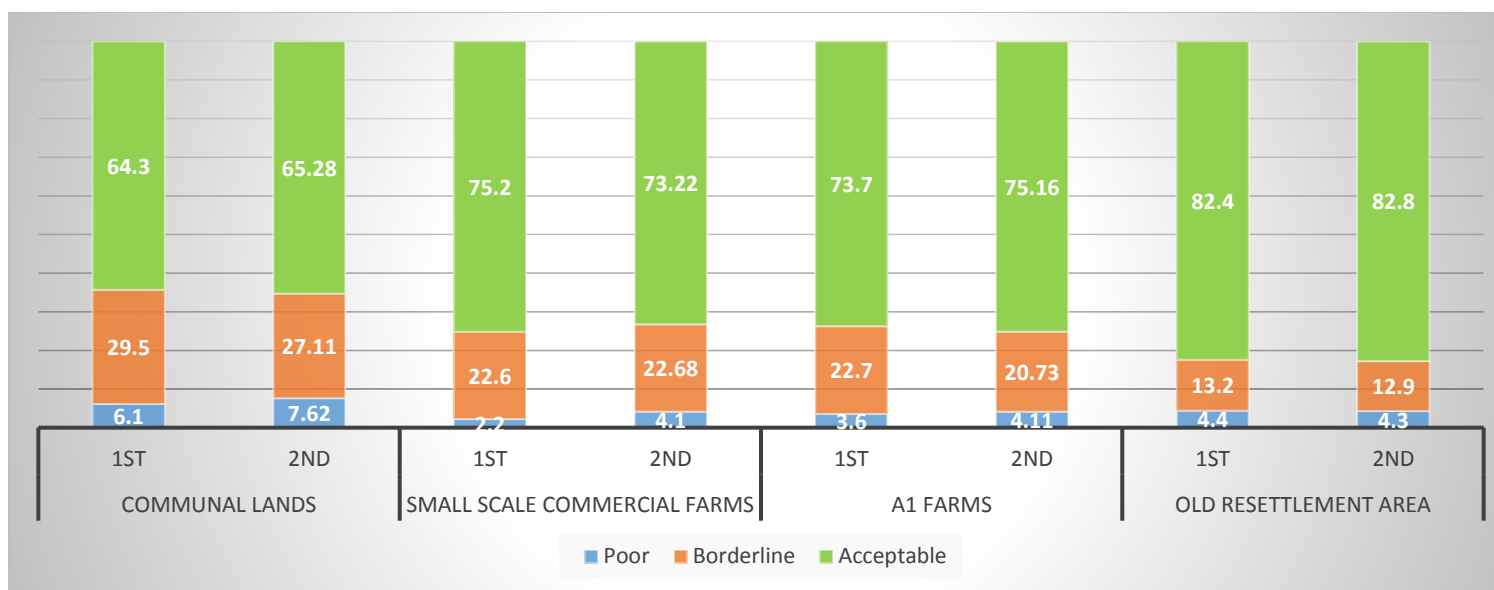
Table 11.2 shows the food consumption score by output. Households that had acceptable food consumption scores had higher cereal outputs across all the land-use sectors. In the Old Resettlement Areas sector, households which had a poor consumption score had a cereal output of only 192Kgs compared to 2,727kg for those with an acceptable score.

Table 11.2 Food Consumption Score by cereal and pulses output (second survey round)

Farming sector	FCS Score	Total Output of Cereals Kgs Classified by Food Consumption Score Groups	Pulses Kgs
Communal Lands	Poor	343	200
	Borderline	482	180
	Acceptable	906	381

Small Scale Commercial Farms	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
Old Resettlement Areas	Poor	192	1,142
	Borderline	489	122
	Acceptable	2,727	628

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 11.6 shows that households across all sectors consume an average of 4 food groups. Farm households in all the land-use 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 11.6.: Household Dietary Diversity Score in Round One and Round Two
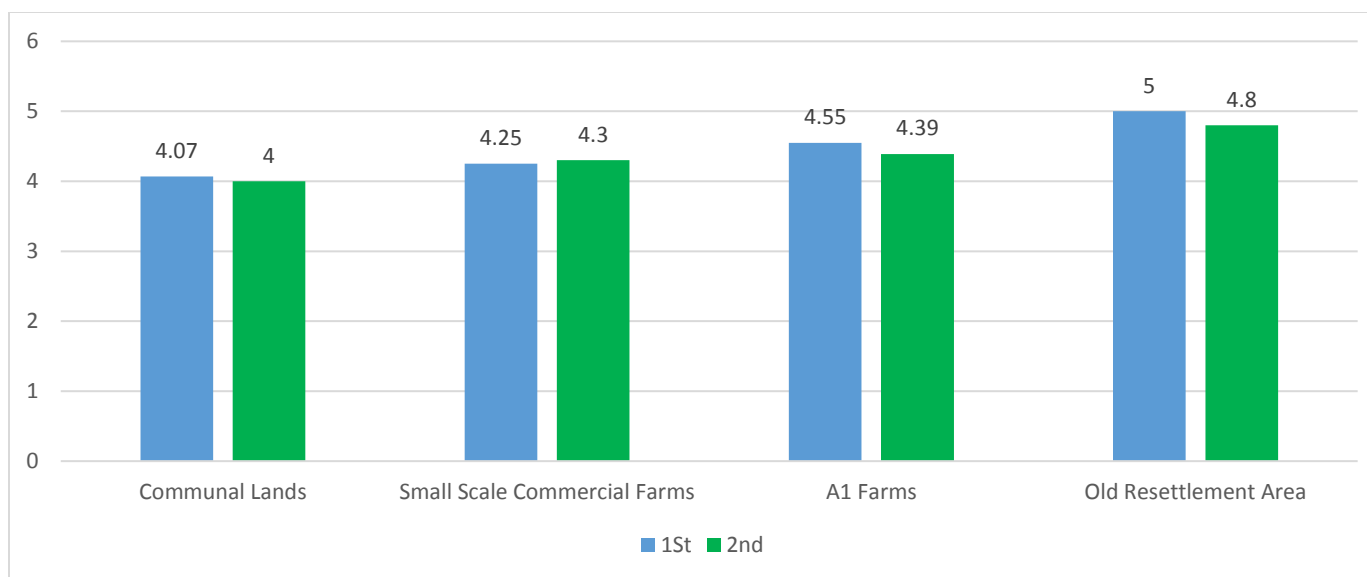
Table 11.3 shows that the average number of meals per day consumed by children aged between 0-59 months was 5.7 per day, while household members of five years and above consumed an average of 2.4 meals per day. Households in the Old Resettlement Areas had the highest average number of meals consumed (2.6) and the least average number of meals of 2.4 was recorded in Communal Lands.

Table 11.3: Average Number of Meals Consumed by Household Members by Sector and by Age Group

Land Use 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 11.4 shows that most household members of five years and above consumed two and three meals per day for all land-use sectors. Communal Lands had the highest proportion (55.2 percent) of households who consumed two meals while Small Scale Commercial Farms (56.0 percent) had the highest proportion of households consuming 3 meals.

Table: 11:4: Percent Distribution of Number of Meal Frequency by Land Use Sector for Persons Five Years and Above

Land Use Sector		Number of Meals							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Communal Lands	0.5	4.1	55.2	39.0	0.8	0.3		-
Small Scale Commercial Farms	-	2.2	39.6	56.0	2.2	-		-
A1 Farms	0.9	2.5	50.2	44.9	1.3	-		0.2
Old Resettlement Area	-	2.6	48.4	47.5	1.5	-		-
Sample Total	0.4	3.3	51.9	43.0	1.2	0.1		-

Note 6 is missing

Chapter 12 Appendix Tables and Methodology

Appendix Table 3.3a: Proportion of Carry-Over, Free or Purchased Seed by Crop Type and Sector

Crop Type	Communal Lands				Small Scale Commercial Farms			
	Retained Seed %	Free Seed %	Purchased %	Average Seed (kg)	Retained Seed %	Free Seed %	Purchased %	Average seed (kg)
White Maize	14	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	-	-	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 (Mhunga/ Nyawuti)	51.9	9.5	38.6	16	66.8	33.2	-	6.0
Finger millet (Rapoko/ Rukweza)	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	104.0
Cotton	0.6	69	30.4	28.9	-	100	0	35.0
Groundnuts	39.2	2	58.9	24.3	98	1.8	0.2	27.2
Sunflowers	84.3	10.5	5.2	2.3	100	-	-	1.4
Soybeans	93.4	5.8	0.9	8.6	-	-	-	-
Roundnut (Nyimo or Ndlubu)	20.3	2.7	77	20	77.1	0.6	22.3	46.8
Sugar beans	13.0	0.9	86.1	28.1	12.3	3	84.7	24.6
Cowpeas (Nyemba)	20.8	8.7	70.5	8.7	89	11	-	2.3

Crop Type	A1 Farms	Old Resettlement Areas

	Retained Seed %	Free Seed %	Purchased %	Average Seed (kg)	Retained Seed %	Free Seed %	Purchased %	Total Seed (kg)
White Maize	34.6	16.4	49	31.7	29.8	12.9	57.3	38.8
Yellow Maize	100	-	-	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 (Mhunga/ Nyawuti)	71.0	7.0	22.1	20.2	34.2	5.4	60.4	23.4
Finger millet (Rapoko/ Rukweza)	84.7	9.9	5.5	1.5	29.1	1.8	69.1	13.5
Tobacco	0.9	0	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	43.6	88.9	10.7	0.4	4.2
Soybeans	63.5	-	36.5	79.8	37.7	0.5	61.8	57.8
Roundnut (Nyimo or Ndlubu)	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 (Nyemba)	11.7	2.4	86	19.9	21.1	4.8	74.1	10.7

Appendix Tables: A 6.1 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	2.4	2.9
Steer	3.2	2	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	2.1	1	1.8
Sheep – ewe	3.3	4.4	5.1	5.4	4.1
Sheep – lamb	1.5	2.1	1.8	8	2
Pig – boar	1.6	1.3	1	1	1.4
Pig – sow	1.7	2.5	1.4	11	1.9
Pig – piglet	5	52.2	3.6	9.5	13.4
Pig – gilts	5.4	34.7	10	1	13
Chicken-layer	13.2	110	2.6	-	17.2
Chicken-local/indigenous	9.7	19.2	12.4	16.8	12.5
Chicken-broiler	32	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	1.6

Rabbit – does	2.9	3.7	1.7	1	2.8
Rabbit – bunnies	5.1	13.9	4.5	0	6.6
Guinea fowl	6	5.2	5.2	2	5.5
Other animals	14.6	11	14.6	30	14.5

Agricultural Labour Methodology

Analysis has been done for household, hired (casual) and exchange labour. All household members 5 years and above who worked on plot were selected, and for hired labour, was disaggregated into men (15 years and above), women (15 years and above), and children (5-14 years old). It should be noted that the APM survey was concerned with casual labour, but not permanent labour.

Finally, information on exchange labour or non-household members working on plot without pay was collected. This type of labour activities takes two forms. Firstly, non-household members can work on a household's plot in exchange for other services that the household might have rendered to those other households. In addition, a group of farmers can agree to assist each other on their farms at different but agreed days and times. Secondly, other households can decide to work on a household's plot for free (without pay) or to assist for no compensation.

Land Preparation and Planting Activities

The APM survey collected information on soil conservation and agricultural practices that the household has undertaken on the applicable plots with respect to land preparation for the agricultural season 2016/2017. The methods of land preparation and the means (in terms of implements used to conduct these activities) of preparing the land was explored. Moreover, the survey collected information on whether the manager practices crop rotation or continuous cropping on PLOT, which has implications for productivity.

Non-harvest activities between planting and harvesting

Non-harvest activities were work done on each plot between planting and harvesting during the 2016/17 agricultural season. Non-harvest labour activities consisted of weeding, ridging, spraying, and application of fertilizer and/or herbicide to the plot. Labour information collected was the number of weeks, number of days and number of hours. **Weeks** covered only weeks in the agricultural season 2016/2017. This can be a minimum of one week. **Days** cover a minimum of one to a maximum of seven days in a week. **Hours** can be a minimum of one (1) to a maximum of sixteen hours in general per day.

Household Labour for Harvesting

Information was collected for the total number of household members aged 5 years and older who worked on the plot during the agricultural season 2016/2017 for **harvesting** only.

Agricultural Labour – Post-Harvest Activities

The APM survey also collected information on agricultural labour for post-harvesting activities during the agricultural season 2016/2017. Information was collected for household members, hired labour and exchange labour. The information was collected from a knowledgeable member of the household about the farming activities of the household, preferably a head of household. The information was collected for the total number of household members aged 5 years and older who worked on **post-harvest activities** for each crop during the agricultural season 2016/2017. Examples of post-harvest activities included threshing, shelling and cleaning.

Calculation of Cost per Labour

The analysis was based on the Second Round Questionnaire which dealt with the following questions:

Q3 Did your household hire any labour to work on this [plot] for non-harvest activities between planting and harvesting during the agricultural season 2016/2017.

Q4. How many men did your household hire to work on this [plot] for non-harvest activities between planting and harvesting during the agricultural season 2016/2017?

Q5. How many days in total did your household hire men to work on this [plot] for non-harvest activities between planting and harvesting during the agricultural season 2016/2017?

Q7. Usually, how much in total did your household pay per day to the hired men to work on this [plot] for non-harvest activities between planting and harvesting during the agricultural season 2016/2017?

In order to derive a meaningful analysis on gender discrepancy it was important to compute per worker cost of labour. The computation of per worker cost of hiring workers for non-harvest activities between planting and harvesting during the agricultural season 2016/2017 the questions above were used. The cost per worker for men was derived from the total cost of hired men divided by the number of hired men. The total amount paid per day to hired men (question 7) was multiplied by number of days worked (Question 5) and the result was divided by number of men in question 4.