Rural Agricultural Livelihoods Survey

2015 Survey Report

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Comments and questions should be directed to:

The Executive Director
Indaba Agricultural Policy Research Institute
26A Middleway, Kabulonga
Lusaka, Zambia.
Telephone +260 211 261194
Telefax +260 211 261199
Email: info@iapri.org.zm

**INDABA AGRICULTURAL POLICY RESEARCH INSTITUTE
TEAM MEMBERS**

The Zambia-based Indaba Agricultural Policy Research Institute research team is comprised of Antony Chapoto, Brian Chisanga, Cliff Dlamini, Munguzwe Hichaambwa, Chance Kabaghe, Stephen Kabwe, Auckland Namubi Kuteya, Rhoda Mofya-Mukuka, Thelma Namonje-Kapembwa, Paul Chimuka Samboko, Nicholas Sitko, Solomon Tembo, Ballard Zulu and Olipa Zulu-Mbata, and Michigan State University-based researchers associated with IAPRI are Margaret Beaver, Eric Crawford, Steven Haggblade, T.S. Jayne, Nicole Mason, Chewe Nkonde, Melinda Smale, and David Tschirley.

Main Authors

Antony Chapoto, Research Director.

Olipa Zulu-Mbata, Research Assistant.

Other Contributors

Margaret Beaver, Independent Consultant

Brian Chisanga, Research Associate.

Stephen Kabwe, Research Associate

Auckland Namubi Kuteya, Research Associate.

Eustensia Munsaka, Former IAPRI Data Associate

Thelma Namonje-Kapembwa, Research Associate.

Solomon Tembo, Senior Research Associate

Nicholas Sitko, Assistant Professor, Michigan State University

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ACRONYMS

CAADP	Comprehensive Africa Agriculture Development Programme
CSO	Central Statistical Office
CFS	Crop Forecast Survey
FISP	Farmer Input Support Program
Ha	Hectares
HCI	Household Commercialization Index
HDDS	Household Dietary Diversity Score
MAL	Ministry of Agriculture and Livestock
PHS	Post-Harvest Survey
PSU	Primary Sampling Unit
RALS	Rural Agricultural Livelihood Survey
SEA	Standard Enumeration Area
SDG's	Sustainable Development Goals
SS	Supplemental Survey

1. INTRODUCTION

1.1   Motivation and objectives of survey

The Rural Agricultural Livelihood Survey (RALS) is a new panel survey designed to obtain a comprehensive picture of Zambia's small- and medium-scale farming sector using the 2010 census sampling frame. An earlier household panel survey for rural Zambia was the Supplemental Surveys (SS) of 2001, 2004 and 2008, which enabled the publication of a large set of important research outputs by IAPRI, Michigan State University and a range of Zambian and international partner organizations. However, the SS was based on the 2000 Census and considered to be increasingly unable to provide a statistically representative picture of rural livelihoods and the agricultural sector in light of major demographic changes between 2000 and 2010.

The Central Statistical Office (CSO) Post-Harvest Surveys (PHS) and Ministry of Agriculture and Livestock (MAL) Crop Forecast Surveys (CFS) provide reasonably solid information on crop production, sales, and input use for a wide variety of field crops, but these surveys contain limited or no information on: (i) crops known to have become an important source of smallholder crop income in recent years, such as fresh fruits and vegetables; (ii) sales of animal and fish products; (iii) off-farm and non-farm labour and small enterprise income; (iv) intergenerational transfers, including inheritances which might affect households' current livelihoods; iv) in and out migration which might affect household welfare; (v) natural resources use and management, such as forests, which are an important source of food and income for rural households and; (vi) a broader set of positive and negative shocks affecting households' current conditions.

In order to overcome these knowledge gaps, IAPRI works with the CSO and MAL to design, implement and analyse additional rural livelihood surveys to obtain a broader set of household livelihood activities and outcomes. The purpose of the RALS is to provide policy relevant information that is not practical to collect annually from the government agricultural surveys. For example, collecting comprehensive income data through RALS allows us to understand the effects of government policies and programs on rural incomes and poverty – something that is not possible with the PHS and CFS. The RALS also enable Zambian policy makers to accurately monitor progress toward achieving its national policy goals.

Also, there have been major changes in farm structure occurring in Zambia, though there is little information collected in existing surveys on the characteristics and productivity of larger farms greater than 20 hectares (Ha). Because of these gaps, Zambian policy makers and the public are not able to obtain a comprehensive picture of trends in livelihoods and welfare. It therefore becomes difficult to accurately monitor trends in Zambia's agricultural and rural sectors or assess progress toward achieving the country's Sustainable Development Goals (SDGs), Comprehensive Africa Agriculture Development Programme (CAADP), and other national policy goals.

Although, the RALS sample is based on households cultivating less than 20 Ha, as this is the definition used to classify farmers into small and medium-scale farmers in Zambia, the information collected allows us to know about households owning more than 20 Ha. This is because the survey collects comprehensive information on all types of land use including virgin, fallow, rented out and orchard land. Therefore, the RALS provides an opportunity to widen its focus to include farms larger than 20 Ha in order to get a more comprehensive picture of the agricultural sector in Zambia and better understand the contribution of the larger farms to the food security situation in Zambia. In addition, as a panel the RALS enables analysts to use analytical techniques that are unavailable with cross sectional data

1.2   Survey Design

1.2.1   Sample size and distribution

The RALS 2015 is a panel survey continuing from the RALS 2012 survey. The sampling frame for the RALS 2012 survey was based on the 2010 Census of Housing and Population. A stratified two-stage sample design was used for the RALS 2012 sampling. The first stage involved identifying the Primary Sampling Unit (PSU). The PSU was defined as one or more Standard Enumeration Areas (SEAs) with a minimum of 30 agricultural households. The SEA is the smallest area with well-defined boundaries identified on census sketch maps. At the second stage, all households in selected SEAs were listed and agricultural households identified. Listed agricultural households were then stratified into three categories, A, B, and C, on the basis of total area under crops; presence of some specified special crops; numbers of cattle, goats and chickens raised; and sources of income[1]. Systematic sampling was then used to select 20 households distributed across the three strata in each SEA.

The RALS 2012 covered 442 Standard Enumeration Areas (SEAs) across the 10 provinces and a total of 8,840 households. With the RALS 2015 an additional 34 SEAs (17 in Eastern, 8 in Muchinga and 9 in Lusaka province) were added. Listing was required only in the additional 34 SEAs. This brought the total households to be interviewed to 9,520. This sample was expected to yield reliable estimates at provincial and national levels except for Eastern province, whose estimates are statistically valid at the district level as well. Table 1.1 shows the distribution of SEAs, households' re-interviewed from the 2012 RALS sample and the total households interviewed in 2015 (panel households plus new sample households) by province. Figure 1.1., shows the coverage of the RALS 2015. The attrition rate of 17.9%, was mainly attributed to households that had moved out of the study area. Therefore, when using the panel data this should be taken into account.

Table 1.1:   Distribution of SEAs and households interviewed, by province

	Total SEAS	Panel SEAS	New SEAS	Total Panel Households	New households	Re-interviewed Panel Households	Total Interviewed Households
	(A)	(B)	(C)	(D)	(E)	(F)	(G=E+F)
Central	42	42	0	840	0	650	650
Copperbelt	34	34	0	680	0	549	549
Eastern	117	100	17	2000	340	1723	2063
Luapula	42	42	0	840	0	692	692
Lusaka	26	18	8	360	160	286	446
Muchinga	43	34	9	680	180	537	717
Northern	50	50	0	1000	0	791	791
Northwestern	32	32	0	640	0	516	516
Southern	52	52	0	1040	0	893	893
Western	38	38	0	760	0	617	617
National	**476**	**442**	**34**	**8840**	**660**	**7254**	**7934**

Source: RALS 2012 and 2015

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[1] See appendix 1 for details on farm categories

Figure 1.1: Distribution of Standard Enumeration Areas, RALS 2015
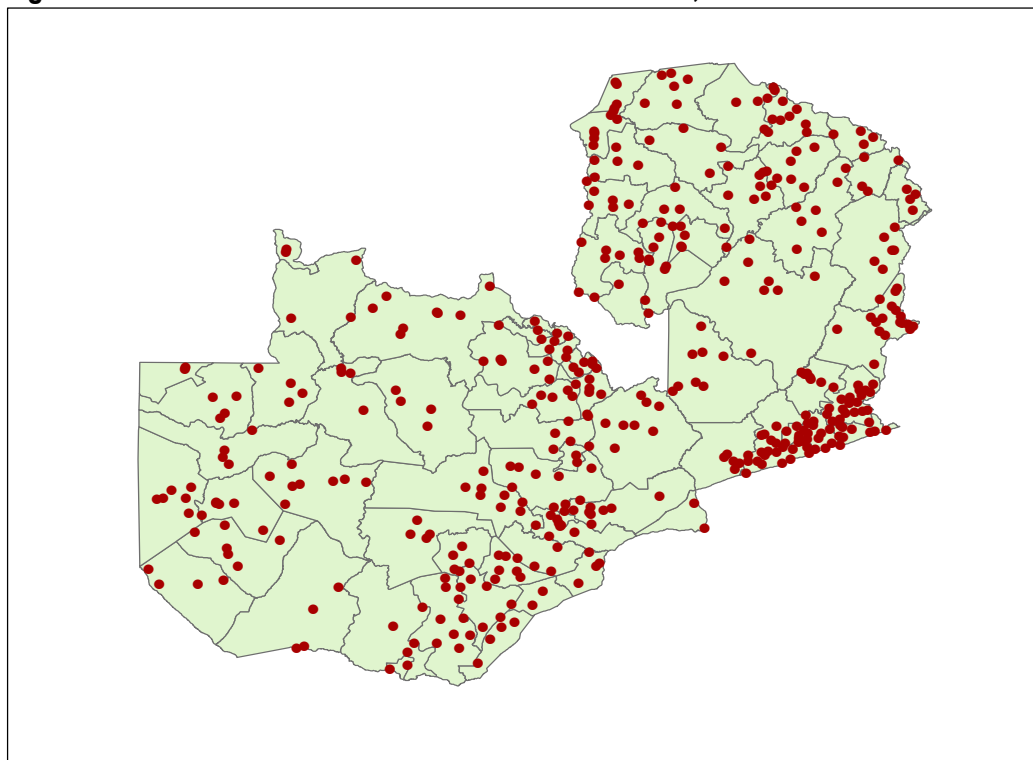
Source: RALS 2015

1.2.2   Sample weights

The first RALS was conducted in May/June 2012 and a follow-up survey in June/July 2015. Two sets of weights were generated from the RALS data, panel weights and the population weights. Panel weights are for analysis that utilize both RALS 2012 and 2015, while the population weights should be used for standalone cross-sectional surveys. This report mainly uses population weights because the focus is on the data collected in May/June 2015.

1.2.2.1 Panel weights

The panel weights were calculated by adjusting the final weights calculated for the RALS 2012, with the survey response information obtained for each of the three farm categories (Category A, B and C) as described above. The adjustment factor for non-response was calculated by dividing the number of households selected during the 2012 survey by the total number of households responding during the 2015 survey in each of the three farm categories.

> Example: Responding household 2015 = 16
> Selected households in 2012 = 20
>
> Adjustment factor in 2015 is given by 20/16 = 1.25
>
> The preliminary weights for panel analysis was then calculated as:
>
> W = W_{hi} * adjustment factor
>
> Where W = Preliminary weight and W_{hi} are the 2012 household sample weights.

3

The adjustment factors based on projected number of agricultural households were calculated by dividing the projected number of agricultural households in 2012 by the projected number of agricultural households for 2015 as recommended by Megill, 2009. The adjustment factors were then multiplied with the preliminary weights to obtain the final weight.

1.2.2.2 RALS 2015 cross-sectional weights

The RALS 2015 was a combination of two samples, 2012 RALS sample and 34 additional clusters from Eastern, Muchinga and Lusaka Provinces. The additional clusters were added to RALS 2015 in order to have statistically valid estimates for natural resources management issues in these Provinces.

In order to combine the two samples, the probabilities of selection of the original sample for all the strata districts identified with new clusters were re-calculated as additional Standard Enumeration Areas were added. The general procedure for calculating the weights made use of sampling probabilities at first-stage selection of SEAs and probabilities of selecting the households. The weights of the sample are equal to the inverse of the probability of selection. The probability of selecting a cluster i was calculated as

$$P^1{}_{hi} = \frac{a_h M_{hi}}{\sum_{i=1}^{N_h} M_{hi}} \qquad (1)$$

The weight or boosting factor is given by,

$$W_{hi} = \frac{1}{P^1{}_{hi}} \qquad (2)$$

where: $P^1{}_{hi}$ is the first stage sampling probability of (SEA), a_h is the number of SEAs selected in stratum h *(district)*, M_{hi} is the size of the ith SEA in stratum h (agricultural households according to the Census frame), and $\Sigma\ M_{hi\ i}$ is the total size of stratum h. The selection probability of the household was calculated as:

$$P^2{}_{hi} = \frac{n_{hi}}{N_{hi}} \qquad (3)$$

The corresponding second stage weight is calculated as:

$$W_{hi} = \frac{1}{P^1{}_{hi} x P^2{}_{hi}} \qquad (4)$$

where W_{hi} is the sample weight, $P^2{}_{hi}$ is the second stage selection probability of selecting households, n_{hi} =the number of households selected from ith SEA of stratum h, N_{hi} =the total number of agricultural households listed in ith SEA of stratum h.

At household selection level (second stage of selection), households were categorised by the agricultural strata (category) A, B and C. The probabilities of selection were calculated using equation 4 for each category separately. Therefore, three category weights were calculated by multiplying each one with the first stage cluster level weights. The non-response adjustment factor and adjustment based on projections as in the earlier panel sample were used to adjust the household weights.

2.   DEMOGRAPHIC CHARACTERISTICS

This chapter presents key results from section 1 of the questionnaire that deals with the demographic characteristics of the households interviewed. We first present the characteristics of the household heads followed by the demographic characteristics of the household in general. We end the section by looking at the household heads' parents characteristics.

2.1   Characteristics of heads of household

Table 2.1 summarizes the demographic characteristics of household heads by province. The average age of smallholder household heads is 48 years. Figure 2.1 shows the age distribution of the household heads. In terms of the age group distribution used in Figure 2.1.A those greater than 65 years constitute the highest percentage (15.3%) than any other age group. However, as shown in Figure 2.1.B we find that most household heads fall within the 30 to 45 age group followed by the 46 to 60 age group, 40% and 30% respectively.

Figure 2.1: Age Distribution of household heads
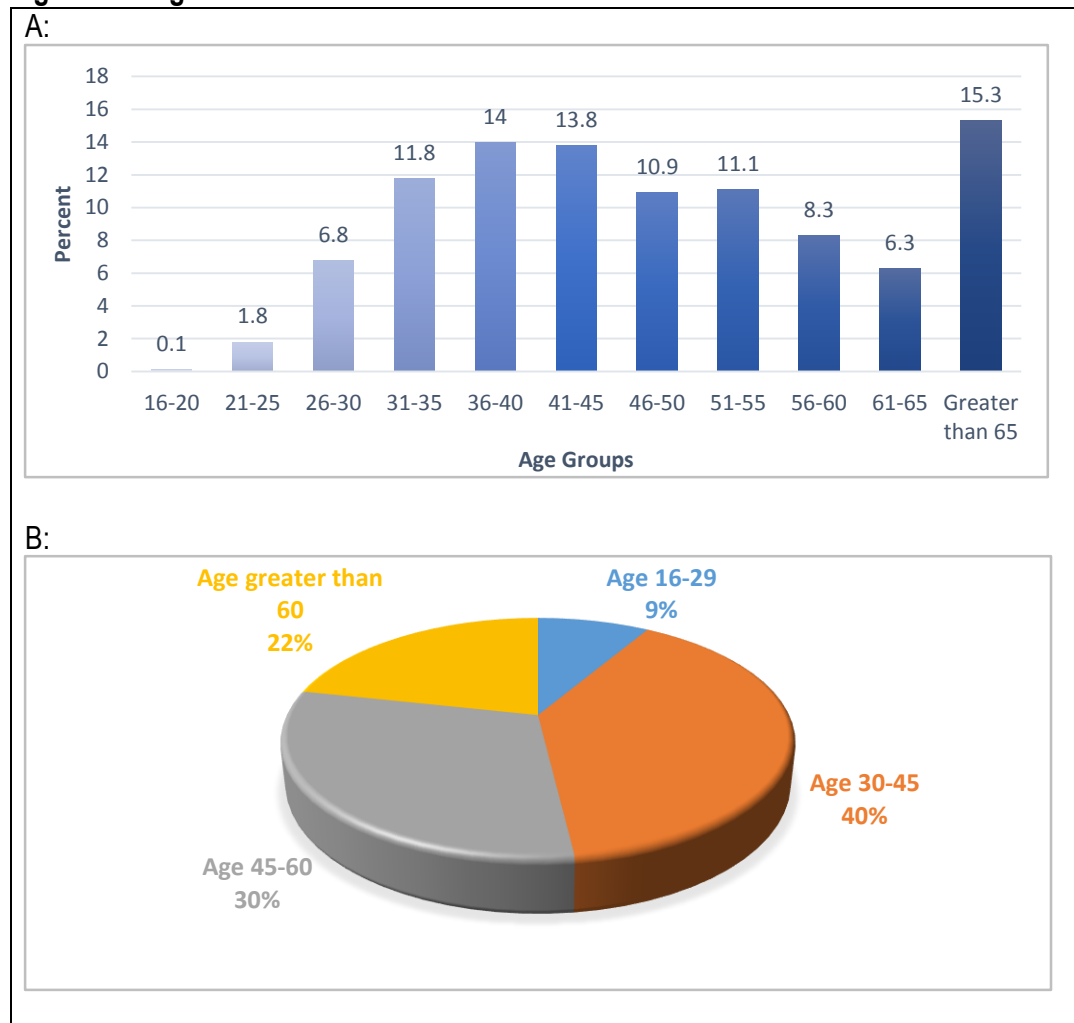
Source: RALS 2015

In terms of gender of household head, Table 2.1 shows that the majority of small and medium farm households are headed by men while 26% is headed by women. Western province has the highest percentage of households headed by women, about 35.1% followed by Southern province (30%). Luapula and Lusaka provinces have the least percent of households headed by women, 19.4 and 19.6% respectively. On average, more than 60% of the household heads were married with the exception of Eastern province where only about 36% reported to be currently married. About 50% of household heads in Eastern Province are either widowed, separated or divorced. Western Province is second with about 33% of the households headed by widows or those who were either divorced or separated. In terms of heads who are polygamously married, Southern Province tops the list with 21% followed Eastern Province with about 14%. The national average is about 10%.

A look at education levels shows that on average household heads had about 6 years of formal education. More than 50% of the household heads had some level of primary education and about 24% had secondary education. The story is consistent across all provinces with the exception of Eastern province which has 14% more household heads with no education compared to other provinces.

Table 2.1: Household head demographic characteristics

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Number of households	1,512,378	173,812	77,988	281,672	156,634	48,508	125,151	184,101	106,563	206,397	151,553
Household head characteristics											
Mean age	48.0	49.0	49.0	47.0	47.0	50.0	46.0	48.0	48.0	48	50.0
Years of education	5.7	5.9	6.0	4.5	6.3	7.3	6.5	5.5	6.0	6.0	5.4
Female headed households (%)	25.6	21.5	27.4	25.4	19.4	19.6	24.5	23.8	26.0	30.2	35.1
Marital status (%)											
Single	1.5	0.9	1.4	0.7	0.4	1.3	0.4	0.9	4.6	2.1	3.5
Married	59.9	66.7	71.9	35.5	74.0	75.3	69.4	69.1	65.1	53.2	57.7
Polygamously married	10.0	11.2	2.8	13.9	6.1	3.1	7.6	8.2	3.2	21.1	5.7
Widowed/divorced/separated	28.6	21.2	23.9	49.9	19.5	20.2	22.6	21.8	27.2	23.6	33.1
Education (%)											
No education	13.7	9.5	10.5	26.0	8.6	9.5	8.2	11.7	14.0	10.5	14.8
Primary (1-7 years)	59.0	62.0	58.5	54.4	60.5	53.0	57.7	60.4	55.4	61.7	63.4
Secondary school (8-12 years)	23.8	26.0	28.6	18.2	25.0	25.5	29.0	26.8	24.1	24.1	19.4
Tertiary education (> 13 years)	3.40	2.50	2.40	1.50	5.80	12.00	5.10	1.10	6.50	3.8	2.50

Source: RALS 2015

2.2   General household characteristics

Table 2.2 shows the demographic characteristics of the household. On average, each household consists of about 6 members. The educational attainment of household members and age of school going children do not differ considerably among the provinces. However Lusaka Province has both the highest level of education and the largest percentage of school going children aged 6-12 attending school followed by Copperbelt with an average of about 8.5 years of education in the household and approximately 80% of children going to school. Eastern province is lagging behind in terms of general educational attainment and the percentage of children going to school. The average years of formal education for household members is 6.7 years and 57.2% of the children were reported to be going to school compared to the national average of 7.8 years and 69.1% respectively.

The age group composition is similar in all the provinces and is characterized by a large number of household members belonging to the 12 to 59 age group with very few members being 60 years or older. In terms of the prevalence of chronic illness and mortality, Table 2.2 shows that on average, approximately 4% of households had members who were chronically ill with 2.6% of the households experiencing prime age mortality rates.

Table 2 2: Demographics of the household

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Average household size	6	6	6	6	7	6	6	6	6	6	6
Highest level of education	7.8	8.1	8.5	6.7	7.9	9.3	8.2	7.2	8.5	8.2	7.7
Households with chronically ill members (%)	3.8	2.9	4.2	2.7	5.0	4.2	5.8	3.5	2.7	4.5	3.7
School going children age 6-12 attending school (%)	69.1	72.7	79.1	57.2	61.8	80.5	75.0	65.9	73.6	74.3	73.6
HH with prime age mortality (15-59) (%)	2.6	4.6	2.3	2.3	3.2	1.2	1.9	2.0	1.8	2.7	2.7
Age groups of households											
0 to 5	14.5	15.1	11.7	14.6	15.7	13.3	15.0	14.8	13.3	14.2	15.4
6 to 11	20.4	20.3	19.1	20.5	20.7	17.9	20.9	20.6	21.3	20.9	20.5
12 to 59	59.7	58.8	62.3	59.2	59.2	61.6	59.4	59.6	60.2	60.5	57.7
60 and older	5.5	5.8	6.9	5.7	4.5	7.1	4.7	5.1	5.3	4.5	6.4

Source: RALS 2015

2.3   Household head family characteristics

Parents' characteristics have been found to influence the livelihood of their children. Figure 2.2 shows that the majority of the household heads' parents had very few years of education, with a national average of 4 years for the father and 2 years from the mother. Luapula Province had the highest average number of years (about 6 years) of education for the father of the head while Western Province had the lowest with only about 2 years. As for the household heads' mothers, the highest average number of years of education was about 3 years in Luapula and the lowest was about just 1 year in Western Province.

Figures 2.3 shows the proportion of the household head's parents who reported having farming as a full-time occupation and the average landholding size they owned respectively. In general, the proportion of household head parents involved in full-time farming does not vary much from one province to another with just about half of the household heads' parents having been involved in full-time farming. In terms of landholdings owned by the parents, Figure 2.3 shows an average of 3.6 Ha nationally. Notably, household head parents in Central had the largest landholding sizes averaging 5.6 Ha followed by Copperbelt and Northern Provinces with about 4.8 and 4.5 Ha respectively. Household heads' parents in Northwestern and Eastern provinces owned the least, 1.9 Ha.

Figure 2.2: Years of education attained by parents of household heads
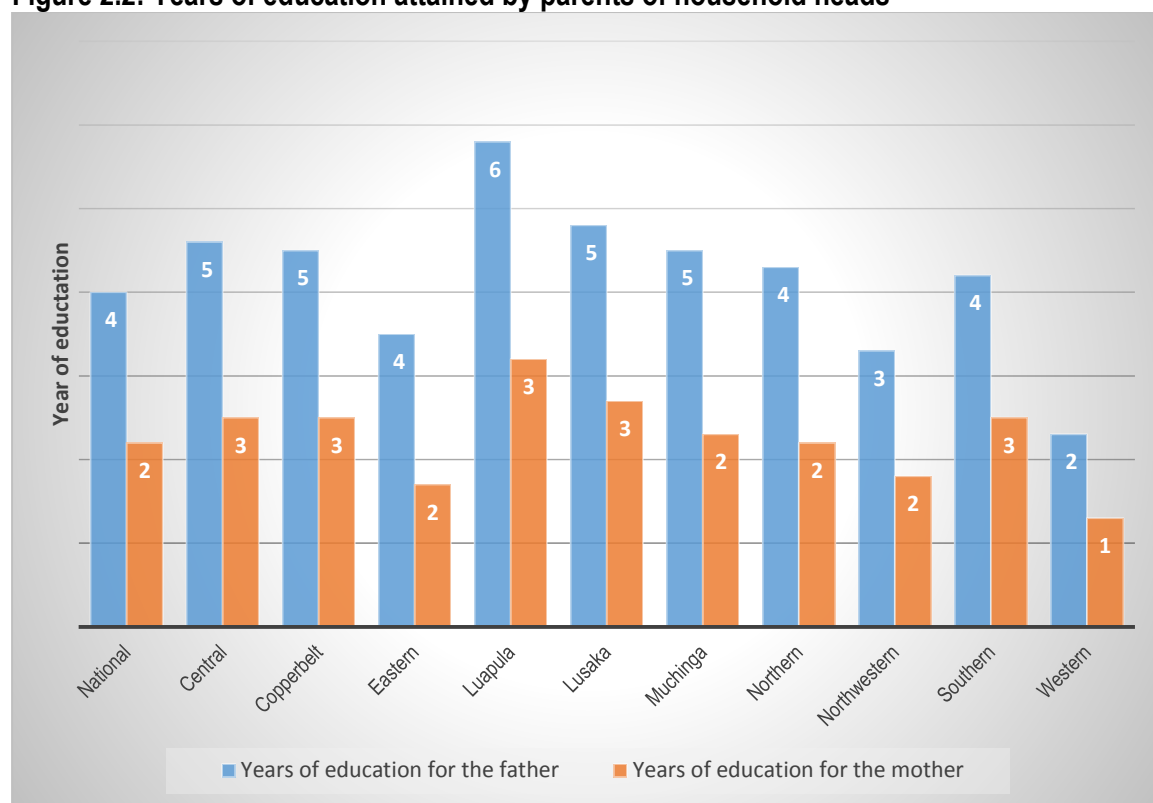
Source RALS 2015

Figure 2.3: Average landholding size of household heads' parents and the percentage of parents that were fulltime farmers
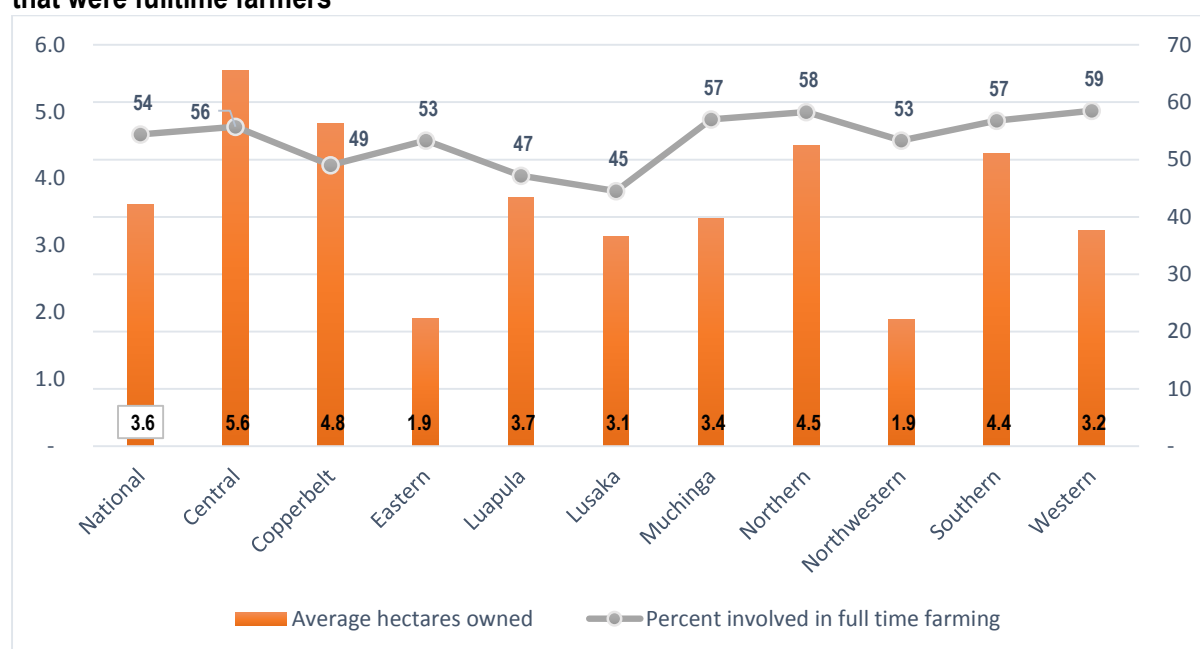
Source: RALS 2015

3. FARM LAND AND USE

This chapter presents key results from section 2 of the questionnaire that deals with farm land and use of the households interviewed.

3.1 Land Use

Smallholder farmer's livelihood is mainly dependent on land. Figure 3.1 shows land use in Zambia among 67.3% of the land controlled by the farmers was own cultivated land with 11.8% under fallow, 8.7% still virgin, 6.8% under gardens and the remaining 5.5% under the other land use such as rented/borrowed in, rented/borrowed out, orchards, personal woodlots or managed on behalf of an absentee landowner.

Personal woodlot, fields cultivated on behalf of an absentee owner and other land managed on behalf of an absentee owner were the smallest proportion with 0.1% each at national level. The percent of land managed on behalf of absentee owners is highest in Lusaka Province.

Figure 3.1: Land use in Zambia by Province
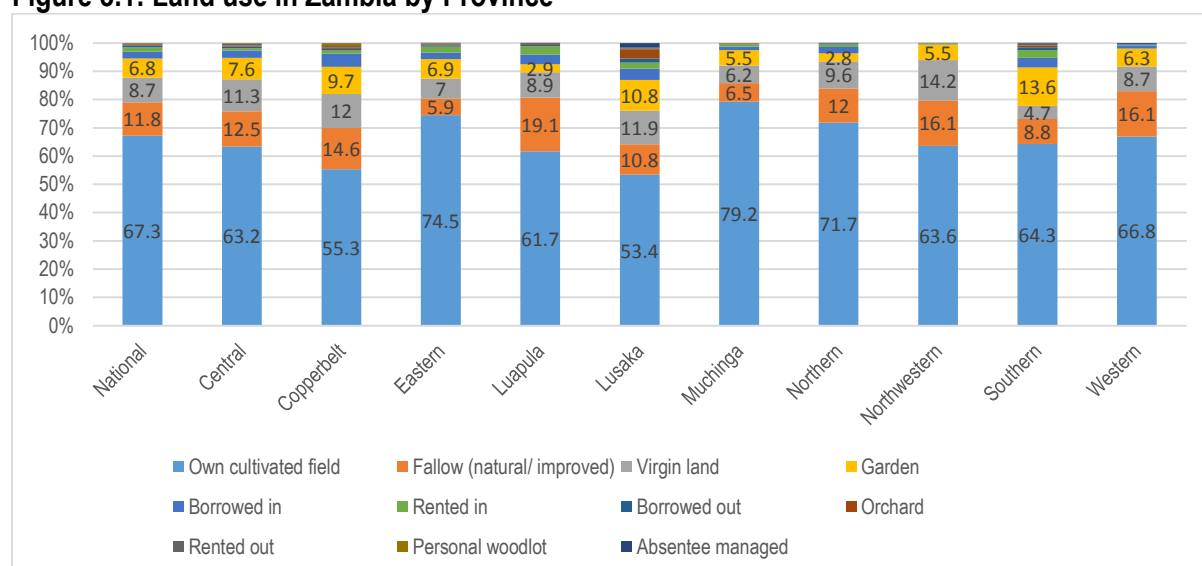
Source: RALS 2015

3.2 Land holding size by field type

Table 3.1 shows the landholding size by field type. Own cultivated fields average about 2.1 Ha nationally. Smallholder households in Central province had larger own cultivated field averaging about 3.3 Ha, followed by Southern province with 3.1 Ha and Eastern province with 2.3 Ha. The average size of own cultivated fields is less than 2 Ha in all the other provinces.

Households in Central, Copperbelt, Northern and Northwestern Provinces have on average more than 2.5 Ha that is virgin well above the national average of 1.8 Ha. On average, households in Eastern Province have the least land that is virgin, 1.3 Ha less than the national average. The rest of the other Provinces have virgin land averaging between 1.1 and 1.5 Ha Although, many people doubt the finding that most smallholder farmers are land constrained, the results in Figure 3.1 and Table 3.1 does not suggest that a lot of land owned by the smallholder farmers is lying idle, either left fallow or virgin.

Table 3.1: Landholding size by type of field (Ha)

	Own cultivated field	Virgin land	Fallow (natural/ improved)	Garden	All other land use types[a]
	--hectares--				
National	2.1	1.8	0.6	0.1	0.2
Central	3.2	3.3	1.0	0.6	0.3
Copperbelt	1.6	3.8	1.1	0.1	0.2
Eastern	2.3	0.5	0.2	0.1	0.2
Luapula	1.5	2.6	1.0	0.0	0.2
Lusaka	1.7	1.1	0.5	0.1	0.8
Muchinga	1.7	1.5	0.2	0.0	0.1
Northern	1.9	2.9	0.6	0.0	0.1
Northwestern	1.6	3.4	1.1	0.0	0.0
Southern	3.1	1.3	0.7	0.1	0.5
Western	1.9	1.2	0.7	0.0	0.1

Source: RALS 2015

Notes: All the other land use types include land borrowed or rented in, land borrowed or rented out, land under orchards, and personal woodlots

3.2.1   Does the land use pattern differ by gender

The percentage of landholding size by gender of the household head is shown in Figure 3.2. Own cultivated field accounted for roughly 46% of landholding size at the country level. By gender of head of the household, female headed households had a slightly higher percentage of own cultivated land compared to households headed by men, 51% and 45% respectively. There is not much difference in terms of the percentage of land that was fallow in the 2013/14 agricultural season. There is a slight difference in terms of the proportion of land that is borrowed out. Female headed households borrowed out 1.3% of their land compare to about 1% among male headed households. There are very minor differences in the proportion of land allocated to the remaining uses by gender of household.

Figure 3.2: Land use patterns differ by gender
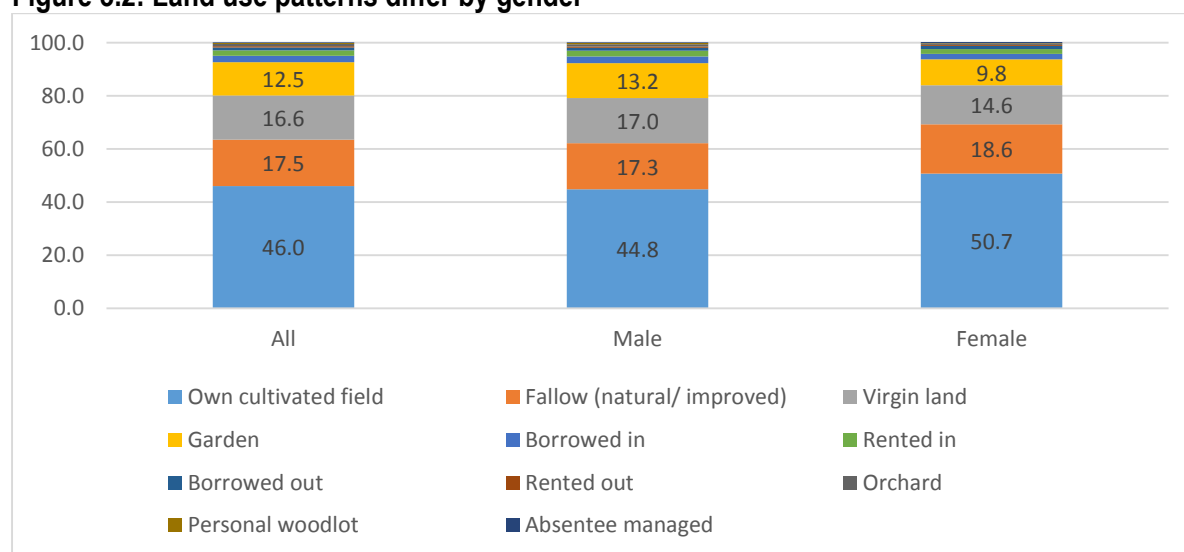
Source: RALS 2015

3.3 Field Characteristics

Table 3.2 shows the household field characteristics, including location of the field, the tenure status and mode of land acquisition.

3.3.1 Distance to fields and location of fields

The results in Table 3.2 show that on average households have to travel about 2.9 km to the nearest field. This distance was much greater in Luapula were farmers travel at least 6.2 km whilst farmers in Central travel the least distance of 1.3km to get to their fields. In terms of fields that are irrigated, 5.1% of the fields were reported to be irrigated at the national level, with the highest irrigated fields in Southern (8.9%) and Lusaka (8.4%) Provinces. The majority of the irrigated fields were gardens. Western and Muchinga Provinces had the highest percentage of fields (mostly gardens) on wetland/dambos, at 22% whilst the national average was about 13%.

More than 36% of the fields in Eastern province were reported to be prone to soil erosion, this is more than double the national average of 17.7%. Southern and Lusaka Provinces have the second and third largest percentage of fields that are prone to soil erosion and the rates are above the national average at 21.1% and 19.9% respectively.

3.3.2 Model of land acquisition and tenure status

Table 3.2 presents the mode of land acquisition and the tenure status of each field controlled by the household. When asked about the mode of land acquisition of various fields, two main modes of land acquisition emerged to be very important, first, allocated by the traditional leaders and the second most important mode of acquisition was through inheritance from relatives.

This is consistent across all the provinces, with Luapula and Copperbelt Provinces having a greater percentage of households reporting that their field were inherited than any other provinces. Nationally, only about 5.7% of the smallholder field were reported to have been purchased. However, Lusaka and Copperbelt Provinces have highest proportion of households reporting that they purchased their fields, at 16% and 12% respectively.

The results on tenure status follow closely the mode of acquisition. In general, the majority of households (89.6%) have land that is customarily owned with no title with approximately 6% of the households reporting that their fields had a chief's certificate. Land ownership with title is very limited among the smallholder farmers in Zambia. The results show that on average only 2% of the field nationally are owned with title. However, the rates are much higher in Lusaka (14%) and Copperbelt (5%). IAPRI's study on land tenure have shown that the process of obtaining title deeds in Zambia is very tedious and only very few people especially those who are relatively better-off, more educated and live in urban areas are able to weave through the long and expensive process (see Sitko et al, 2014).

In terms of the average land size by tenure status, Table 3.3 shows that countrywide, the average land size was higher among households owning land with title (already given or still being processed). The average land size under title is six times higher in Luapula than the national average. Also, among households that still have their title being processed, Copperbelt Province had households with fields averaging more than 10 Ha. These averages in Luapula and Copperbelt Provinces are much higher than the national averages, hence would require additional analysis to understand why they are higher than any other province.

Table 3.2: Field characteristics, tenure status and mode of land acquisition

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Average distance to plots (mean)	2.87	1.26	2.2	2.07	6.2	1.63	2.12	3.2	5.76	1.3	2.59
Percent of plots in wetland	12.8	7.6	8.3	14.6	6.8	11.4	21.7	12.1	9.5	13.2	22.3
Percent of irrigated plots	5.1	5.1	6.7	5.4	1.8	8.6	5.2	2.3	3.9	8.9	6.4
Percent of plots prone to soil erosion	17.7	14.6	12.8	36.4	10.7	19.9	10.4	10.2	9.9	21.1	15.3
Tenure status (percent)											
State land titled (title already given)	2.2	1.1	5.6	2.8	0.8	14.0	0.9	0.8	2.5	3.6	0.1
State land titled (title still being processed)	0.6	0.1	5.4	0.2	0.2	4.2	0.1	0.0	0.0	0.6	0.7
State land (not titled)	2.2	0.9	9.5	2.2	0.2	6.2	2.8	0.4	4.2	3.1	1.1
Former customary land titled (title already given)	1.5	1.1	1.8	1.6	3.6	3.3	1.4	1.8	0.5	0.4	0.2
Former customary land titled (title still being processed)	0.4	0.0	0.3	0.3	0.5	1.6	0.2	0.9	0.1	0.8	0.2
Customary no title	86.9	71.6	58.3	91.9	88.3	69.1	90.6	89.6	91.9	91.0	96.5
Chief certificate	6.1	25.1	19.0	0.8	6.4	1.6	3.9	6.4	0.8	0.4	1.2
I do not know	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Mode of land acquisition (percent)											
Purchased	5.7	9.1	12.0	2.2	9.9	16.2	2.5	5.9	6.0	3.5	1.9
Inherited	20.5	17.0	29.1	25.0	30.1	10.7	16.0	12.6	11.6	16.3	31.1
Allocated/given	68.9	72.9	53.3	71.3	54.9	67.8	73.7	73.9	65.6	76.6	66.4
Just walked in	4.9	1.1	5.6	1.5	5.0	5.4	7.7	7.7	16.8	3.6	0.6

Source: RALS 2015

Table 3.3: Average land size by tenure status (Ha)

	State land titled (title already given)	State land titled (title still being processed)	State land (not titled)	Former customary land titled (title already given)	Former customary land titled (title still being processed)	Customary no title	Chief certificate
National	2.6	2.1	1.0	2.3	1.7	1.0	1.9
Central	2.4	1.8	3.1	1.8	13.8	1.6	2.1
Copperbelt	1.0	1.0	0.8	10.7	2.8	1.8	2.7
Eastern	1.2	2.0	0.6	0.8	1.4	0.8	1.1
Luapula	12.2	13.6	0.3	1.9	2.7	0.8	1.3
Lusaka	1.6	1.3	0.6	1.7	1.0	1.0	2.1
Muchinga	0.8	0.8	0.5	0.6	2.1	0.8	2.5
Northern	7.1	7.7	0.6	1.3	2.2	1.0	1.4
Northwestern	1.5	1.1	0.6	2.6	0.6	1.3	0.8
Southern	3.1	3.3	1.6	11.5	0.6	1.0	0.7
Western	2.0	2.7	1.9	1.2	1.1	1.0	1.0

Source: RALS 2015

3.4   Land management decision by gender

Figure 3.3 shows the proportion of land management decision makers by province and gender. For each field, households were asked to indicate the person responsible for making decisions about the use of the field. This information was then used to determine the gender of the decision maker by linking it to the demographic characteristics of household members.

In general, the majority of the decision makers with regards to management of fields are males at 70%. This story is consistent across the country. These findings are in line with what would be expected in the Zambian culture where males are usually treated as household decision makers. When we consider the gender of household head, we find that in male headed households, the males dominated decision making on management of fields at 89% whilst in 96.2% of the cases a women makes the decision in female headed households. This was not very surprising as most of the decisions were made by the household heads. .

Figure 3.3: Management of fields by gender
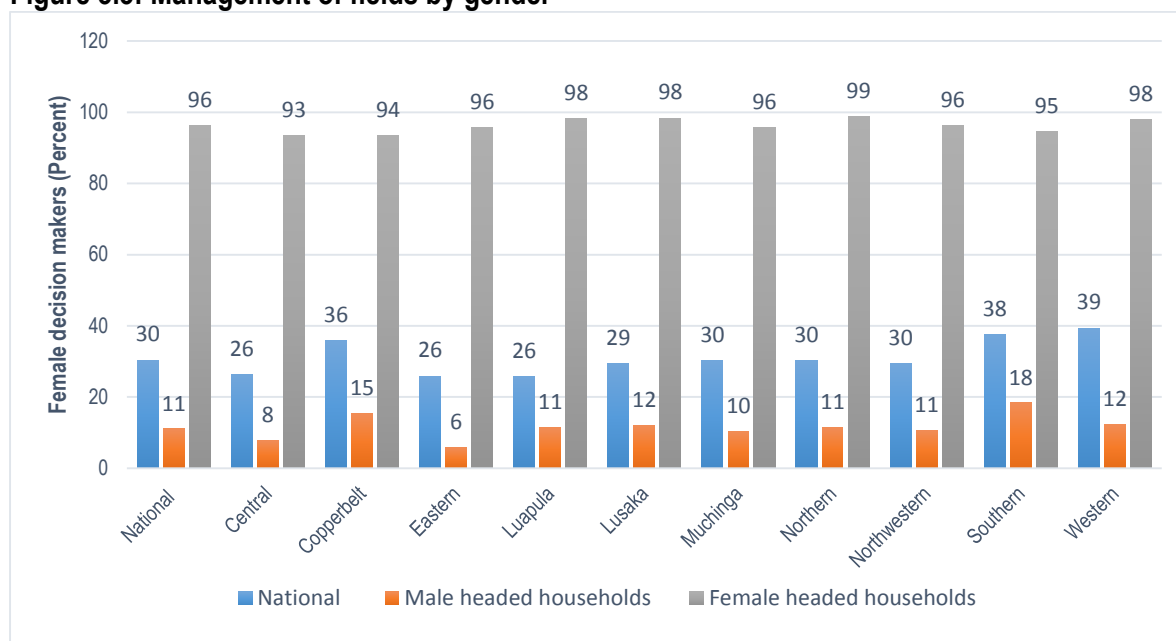
Source: RALS 2015

3.5   Tillage methods

Smallholder farmers in Zambia practice various tillage methods. Table 3.4 shows that on average the majority of the households, about 95%, use only one tillage method in a field, with about 5% using more than one method. In terms of the tillage methods, there are three methods that are mostly popular nationally: ridging (31%), ploughing (30%) and conventional hand hoeing (28%). By province, ridging is least popular in Central, Lusaka, Southern and Western provinces while, most of the fields in Southern province are ploughed followed by Central and then Western provinces. This is likely because these provinces have the highest population of cattle in the country. The conventional hand hoeing still remains the most widely practiced method across all districts with parts of Northern and Northwestern having the highest percentage of farmers using hand hoes. Conventional hand hoeing is still being practiced on more than 30% of the field in Zambia with the exception of Luapula (12%), Southern (13%) and Eastern (18%) provinces.

These results corresponds very well with the percentage of area under the difference tillage methods in the provinces (Table 3.5). Nationally, 35% of the area cultivated by smallholder farmers is ploughed followed by ridging (27%) and 22.3% cultivated through conventional hand hoeing.   More than 90% of the cultivated land in Southern province is ploughed unlike less than 1% in Muchinga and Luapula and 4% in Northwestern provinces. These results may not be too surprising because this is part of the cassava belt hence ridging is more prevalent in these provinces.

Conservation farming, involves dry-season land preparation using minimum tillage methods (zero tillage, ripping and/or planting basins). Of these three practices, ripping is the least practiced method with most districts in Western, Northwestern, Northern, and Luapula provinces reporting less than 0.5% of households practicing it. Zero tillage is mainly practiced in the Northern and Eastern parts of the country with very little being practiced in the other provinces. Planting basins are more common compared to zero tillage or ripping. Planting basins are mostly used in Central and Eastern provinces.

Table 3.4: Tillage methods by province

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Number of tillage methods											
One	94.5	97.6	97	94.5	97	94.7	92.2	96.9	97	90.2	89.2
Two	5.4	2.4	3	5.4	2.9	5.3	7.2	3	3	9.6	10.6
Three	0.1	0	0	0.1	0.1	0	0.6	0.1	0.0	0.2	0.2
Tillage methods											
Conventional hand hoeing	27.8	32.9	45.8	18.1	11.8	42	46.3	36.2	20.3	13	50.7
Planting basins (potholes)	1.8	1	1.4	2.8	0.1	6.4	2.2	0.8	0.4	0.9	6.0
Zero tillage excluding chitemene	2	0.3	1.1	4.9	0.2	3.3	6.1	1.1	1.1	0.1	0.6
Ploughing	29.5	56.7	13	25.4	0	42	0.8	4.7	2.2	89	53
Ripping	2	3.2	2.4	4.2	0.3	2.8	0.8	0.8	0.2	3.1	0.3
Ridging (before planting)	31.1	4.4	30.4	49.5	35.1	4.6	46.9	52.5	53.8	0.7	0.2
Bunding	7.1	3.3	7.3	0.5	38.6	3	2.7	3.5	10.7	0.9	0.2
Mounding	3.8	0.6	1.8	0.1	16.9	1.3	0.2	2.1	13.9	2.3	0
Did not till (broadcasted seed)	0.5	0	0	0	0.1	0	2.4	1.5	0.3	0.1	0

Source: RALS 2015

Table 3.5: Percent of area in the province using the tillage method

Tillage method	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Conventional hand hoeing	22.3	15.0	35.5	12.2	10.0	26.3	40.2	27.0	16.9	4.5	35.6
Planting basins (potholes)	1.5	0.6	0.6	2.4	0.2	6.0	1.0	1.3	0.3	0.3	2.2
Zero tillage excluding chitemene	1.5	0.1	2.8	4.4	0.1	1.4	3.7	0.7	0.9	0.1	0.9
Ploughing	35.8	74.3	31.4	26.8	0.0	58.7	0.9	11.1	4.2	91.0	59.8
Ripping	2.9	6.4	4.8	5.6	0.1	5.0	0.4	2.3	0.3	3.4	0.5
Ridging (before planting)	27.0	2.2	20.5	48.4	37.4	1.7	49.8	52.4	57.6	0.2	0.1
Bunding	5.6	0.9	3.6	0.2	37.2	0.8	2.3	2.2	8.5	0.2	0.0
Mounding	3.1	0.5	0.8	0.0	14.9	0.2	0.1	1.8	11.2	0.4	0.8
Did not till (broadcasted seed)	0.5	.	.	0.0	0.0	.	1.5	1.1	0.2	.	0.0

Source: RALS 2015

3.6 Crop production and management practices

This section shows different field management practices including use of fertilizer and mechanization, hybrid seed use, application of lime, manure, intercropping and retention of crop residue.

3.6.1 *Adoption of improved technology*

Adoption of improved agricultural technology by farmers can contribute to an economically efficient farm sector and the financial viability for farmers through improved production and productivity. Table 3.6 shows the adoption of improved technologies at national and provincial level. Nationally, 25.6% of farmers used fertilizer in their fields, with Lusaka province having the highest fertilizer use (45.7%) and Western Province (5.8%) having the lowest use. The percent of land cultivated that is fertilized follows a similar pattern with the percent of fertilizer use. Western province showed the least cultivated land that is fertilized (7.6%) and Lusaka province had the highest (72.1%). The average fertilizer applied per hectare is 160kg. The rate of fertilizer application is higher in Northern Province (175.9kg/Ha) and lowest Southern Province (111.3kg/Ha). Herbicide use is relatively low, with about 14% of households using herbicides in their fields. Copperbelt province had the highest herbicide use at 26.6% and the lowest herbicide was in Southern Province (4%).

Mechanization still remains low among the smallholder farmers. The percent of households using mechanical power stands at 1.8% nationally, while animal draft power was at 36.5%. Southern, Central and Western provinces had the highest percent of animal draft power use at 93.8%, 67.6% and 60.2% respectively.

Table 3 6: Adoption of improved technology

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Percent of Fertilizer Use	25.6	35.0	32.9	24.9	12.5	45.7	28.9	18.5	21.2	30.6	5.8
Percent of Herbicides Use	14.1	18.4	26.6	4.6	7.1	15.5	17.6	25.3	15.9	4.0	5.9
Mechanization											
Mechancal Power	1.8	2.1	1.6	0.5	0.4	10.4	0.7	0.0	0.1	1.1	1.1
Animal Draft Power	36.5	67.6	17.3	56.6	0.3	39.4	0.9	7.6	3.6	93.8	60.2
Percent of land cultivated that is fertilized	43.1	60.4	58.8	41.0	21.4	72.1	50.9	31.7	36.8	49.9	7.6
Fertilizer kg/ha	160.2	149.6	176.0	157.3	175.9	163.5	166.1	180.9	163.6	111.3	157.6

Source: RALS 2015

Figure 3.4 shows the adoption of improved technology by gender of the household head. Nationally, male headed households tend to adopt more improved agricultural technologies than their female counterparts. However, female heads in Lusaka, Muchinga and Northwestern provinces use more fertilizer than males and also have more cultivated fertilized land.

Figure 3.4: Adoption of improved technology by gender
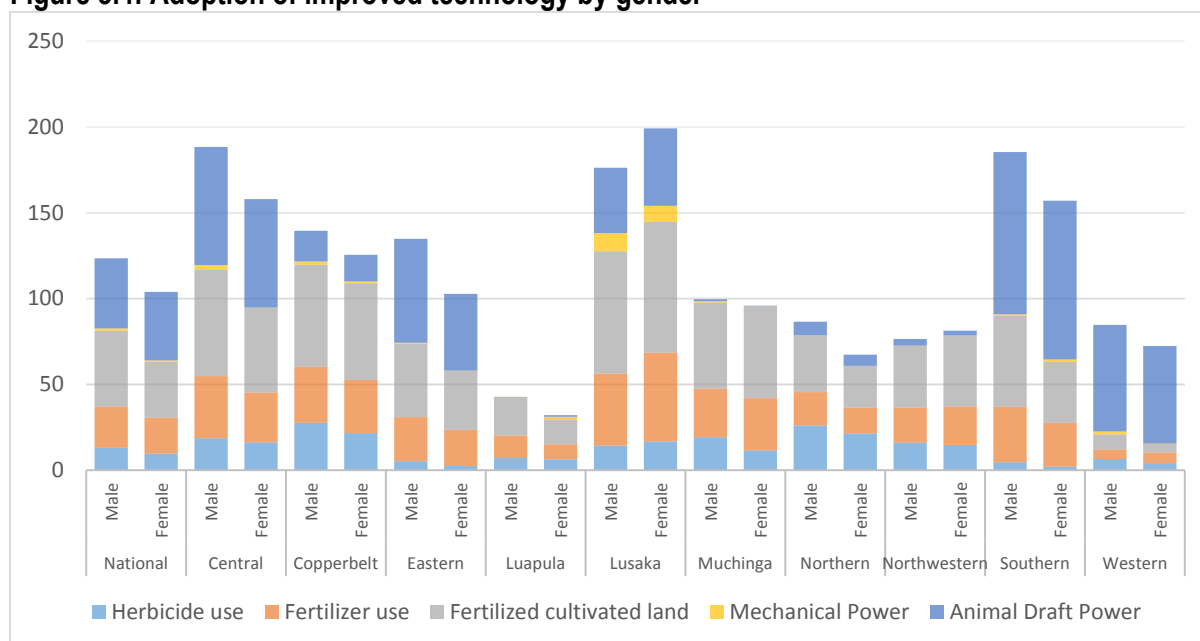
Note: Figure is based on numbers presented in Table A3.1 in the appendix.

Improved seed use was relatively high for most of the major crops grown in the country (Figure 3.5). Nationally, 67% of farmers used improved seed for maize, while 62% used improved seed for groundnuts. Soya bean seed was mostly improved (96%) and 76% of cassava cuttings planted were improved varieties. At provincial level, the use of improved seed use varies with some provinces using more and others using mostly local seed. Maize improved seed use was highest in Central, Northern and Lusaka provinces at 87%, 82% and 77% respectively, while Eastern (42%) and Western (38%) provinces had the lowest use of improved seed.

Figure 3. 5: Percent of households using improved seed
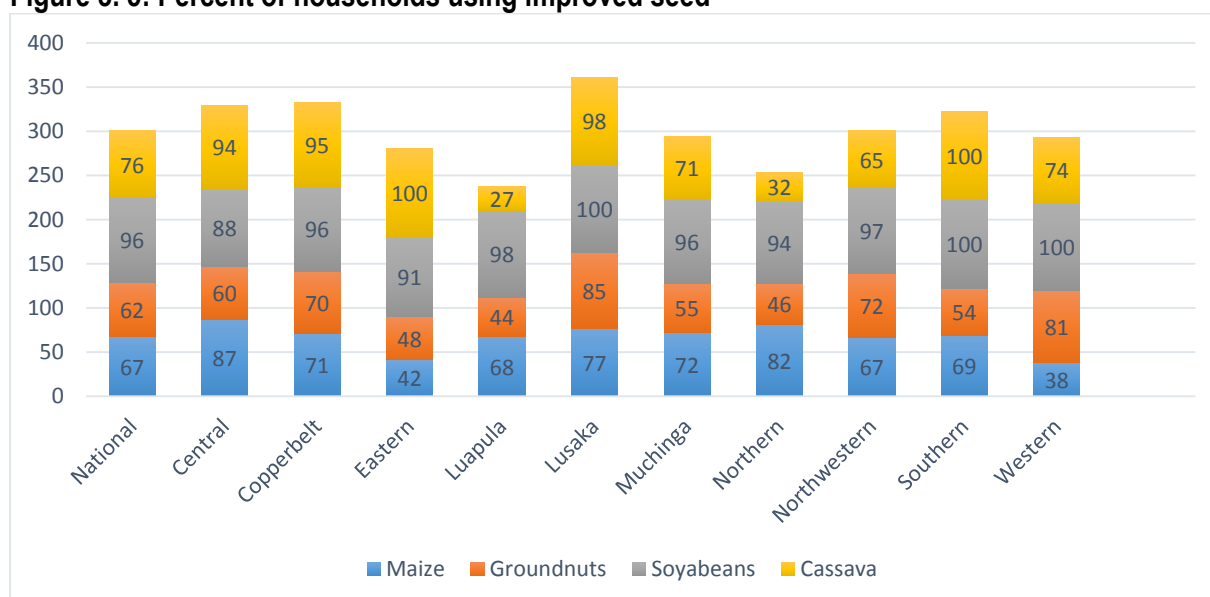
Groundnut improved seed use was highest in Western Province (81%) and lowest in Luapula Province (44%). Use of improved seed of cassava stems was least common in two provinces where cassava is

considered the staple food, that is, Luapula (27%) and Northern (32%) provinces. Use of improved seed of cassava stems was highest in Southern and Eastern provinces at 100%.

3.6.2 Intercropping, crop residue retention, manure and lime use

In general, there is very limited use of lime in the country, with a national average of less than 1% (Table 3.7). The only two provinces with more than 1% of households using lime are Central and Lusaka. On the other hand, crop residue retention is more practiced in the country, with approximately half of the smallholder farmers reporting that they retained crop residue in their fields. The practice is more popular in Southern Province, with 74.1% of the households having retained crop residue in their field followed by Lusaka (67.8%), Western (61.7%) and Eastern (60.6%) provinces.

Table 3.7: Field management practices

| | Percent of households that ----- | | | | |
	Applied lime	Applied manure	Intercropped their field	Intercropped with nitrogen fixing (legume) crops	Retained crop residue
National	0.30	5.40	5.70	3.30	49.40
Central	1.20	3.10	0.80	0.70	38.00
Copperbelt	0.40	4.40	2.80	2.50	32.80
Eastern	0.10	5.60	1.30	1.20	60.60
Luapula	0.30	1.10	13.90	7.40	31.40
Lusaka	1.70	14.20	1.90	1.60	67.80
Muchinga	0.10	1.50	5.10	3.50	41.40
Northern	0.00	2.00	12.30	5.10	33.00
Northwestern	0.10	1.60	5.20	2.10	49.50
Southern	0.50	14.90	1.60	1.30	74.10
Western	0.00	9.80	8.70	5.80	61.70

Source: RALS 2015

The use of manure and intercropping is also limited in Zambia. Nationally, only 5.4% and 3.3% of the households applied manure or intercropped their fields with nitrogen fixing crops respectively. However, they are some noteworthy exception where use of these land management practices is moderately used. For manure use, approximately 15% of households in Southern and Lusaka Provinces used manure during the 2013/14 agricultural season. Unlike Southern Province which is endowed with livestock, it is not very clear where households in Lusaka Province source their manure.

In terms of intercropping, Luapula, Northern and Western Provinces have the highest percentage of households using this practice, 13.9%, 12.3% and 8.7% respectively. However, the percentage is much lower if we considered intercropping with nitrogen fixing crops.

3.6.3 Agroforestry

Agroforestry is the intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic, and social benefits. The practice of agro forestry is relatively low in Zambia, with only about 5 percent of agricultural households adopting this practice. The practice is more prevalent in Southern, Lusaka, Central and Eastern provinces. Western and Northwestern provinces have the least households practicing agro forestry (Map 2)

Figure 3. 6: Percentage of households practicing agroforestry
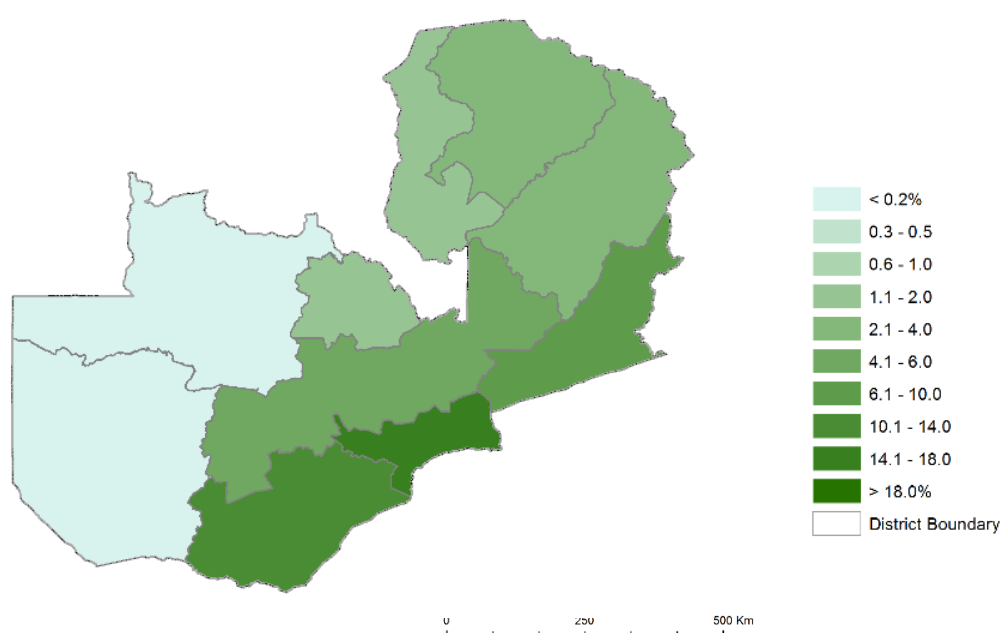
Source: RALS 2015

The percentage of fields with trees that can be regarded as practicing agroforestry and source of seed/seedlings is shown in Figure 3.7. In general, 14.7% of all the smallholder crop fields were reported to have agroforestry trees growing in them countrywide. Muchinga had the highest proportion of fields with at least one agroforestry tree growing in the crop fields (56.2%), while Northern (1.2%), Northwestern (1.7%), Copperbelt (2.3%) and Western provinces had the lowest percentage of fields with agroforestry trees. In terms of the source of the seeds/seedlings, government is reported to be the major source in Central Province whilst Non-governmental organization provided 55% of the seed or seedlings in Lusaka provinces. Across all provinces, most households could not state a specific source of the planting material hence we coded this as other sources.

Figure 3.7: Percentage of households practicing agroforestry and source of seed/seedlings
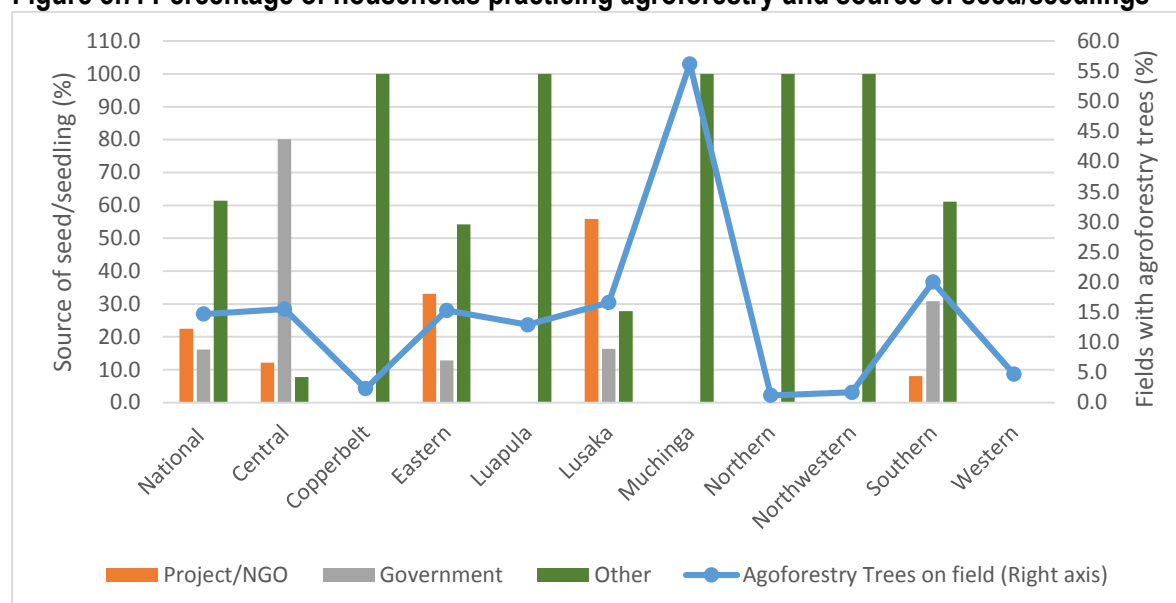
Source: RALS 2015

Note: Figure is based on numbers presented in Table A3.2 in the appendix.

3.7 Use of hired labour

Table 3.8 presents the percent of households that used hired labor by farm activity. In general, the results show that the most common activities with a higher percentage of households hiring labour include land clearing, manual tillage (hand hoeing), manual weeding and harvesting. These results are consistent across all the provinces. Hand hoeing tops the list in Copperbelt, Luapula, Muchinga Northern and Northwestern whilst manual weeding comes second. The reverse is true in Central, Eastern, Southern and Western provinces.

In terms of cost for hiring labour (Table 3.9), hand hoeing was on average more expensive than all other activities at K310 per hectare, while pesticide application was K72 per hectare. Hand hoeing in Copperbelt, Luapula and Northern provinces is 25-28% more expensive than the national average and is least expensive in Southern province.

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Table 3.8: Percent of hired manual labour per practice

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Land clearing (stumping)	11.3	6.9	10.4	7.5	19.2	9.3	15.7	11.8	14.1	8.2	14.8
Manual tillage	26.3	20.3	42	13.1	47.1	14.6	32.9	40.3	44.5	9.6	19.7
Planting	5.7	4	5.4	5.3	5.2	6.4	7.5	8.3	3.3	4.8	6.6
Fertiliser application	3	0.5	2.2	2	4.4	3.8	7	4.5	3.3	2.7	1.2
Chemical weeding	0.7	1.1	3.1	0.4	0	1	2.4	0	0.4	0.5	0.3
Manual Weeding	24.4	23	19.1	27	27.6	35.8	20.1	19.4	26.1	18.3	33.5
Pesticide application	0.4	0.4	0	0.7	0.2	0.4	0.6	0	0.1	0.7	0
Harvesting	13.4	11.5	12.6	15.6	13.5	16.5	18.6	18.3	14	8.4	7
Shelling and Packing	6.8	7.6	8.1	7	9.3	10.4	10.3	9.2	3.3	3.7	1.7

Source: RALS 2015

Table 3.9: Mean cost of hired labour (ZMW/Ha)

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Land clearing (stumping)	221	162	253	170	265	244	228	178	295	195	232
Manual tillage	310	254	397	218	337	275	272	343	421	194	208
Planting	189	234	346	170	147	302	191	122	230	229	170
Fertiliser application	165	315	236	170	100	286	196	144	165	134	188
Chemical weeding	211	262	392	117	200	105	41	.	690	50	380
Manual Weeding	232	335	237	251	166	376	200	203	202	185	216
Pesticide application	72	50	.	75	45	157	58	.	95	80	.
Harvesting	255	257	406	247	239	347	235	253	248	240	194
Shelling and Packing	241	280	375	295	195	314	138	201	198	214	335

Source: RALS 2015

3.7.1   Gender and hiring labour

Figure 3.8 shows the differences in hired labour by gender of household head and activity. In general, the proportion of households hiring labour across all activities was found to be higher among households headed by males than those headed by females.

Figure 3.8: Percent of hired manual labour per practice by gender of household head

	Land clearing (stumping)	Manual tillage	Planting	Fertiliser application	Chemical weeding	Manual Weeding	Pesticide application	Harvesting	Shelling and Packing
Total	11.3	26.3	5.7	3	0.7	24.4	0.4	13.4	6.8
Male	11.9	26.9	5.9	3.5	0.7	25.9	0.3	14.8	7.4
Female	9.8	24.7	4.9	1.5	0.8	19.9	0.5	9.2	5
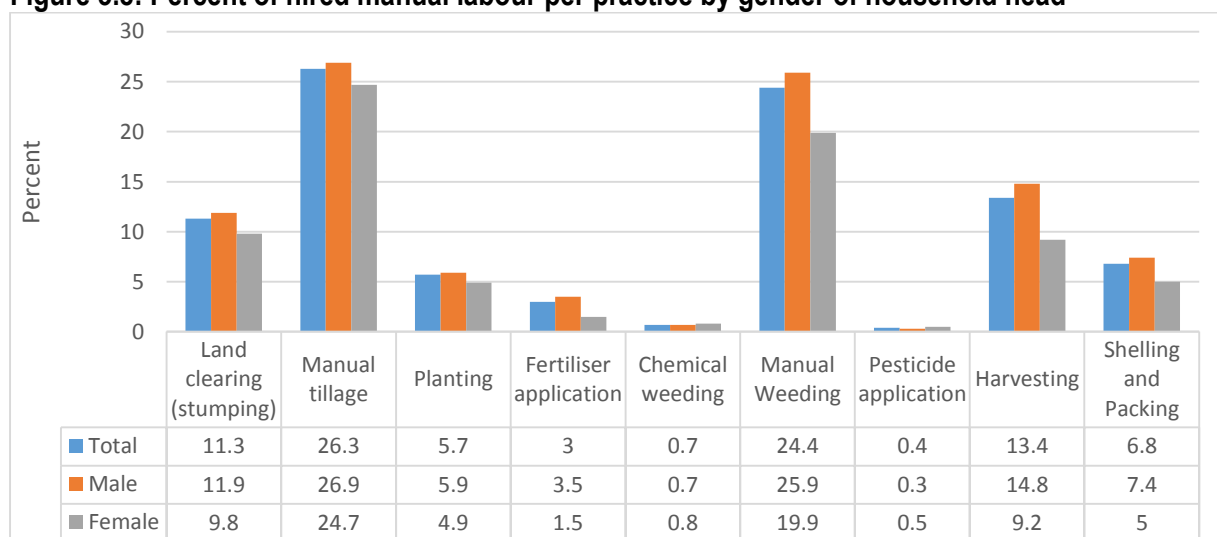
Source: RALS 2015

3.8   Crop Production

Table 3.10 shows that the majority of households in Zambia grow maize, with a national average of 89.4%. The proportion of households growing maize was below the national average in Luapula, Northern and Western provinces as cassava is the leading staple in these provinces. Nationally, groundnuts have the second most number of households growing the crop, followed by cassava, mixed beans and then sweet potatoes. These results to some extent correspond to the proportion of land devoted to the different crops (Table 3.11). Maize tops the list with 53.6% of the cultivated area to maize followed by cassava with 10.6%. Groundnuts show an even distribution across the country and accounts for about 7.5% of the total cropped land.

Soya beans is mainly grown in the eastern and central parts of the country, while cotton is mostly concentrated in eastern, central and southern parts of the country. In terms of cropped land, only 1.5% of the total cropped area is under soya beans and 3.3% under cotton. There are minor variations by gender of household head. Table 3.12 shows that on average, a higher proportion of male headed households produced cash crops than female headed households. Notably, 6% more female headed households produced groundnuts than male headed households.

Table 3.10: Percentage of households growing each crop

Crop grown	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Maize	89.4	95.0	100.0	99.5	67.5	99.8	94.4	71.7	91.3	94.7	86.0
Sorghum	3.7	2.2	1.8	0.4	0.3	0.5	8.1	1.0	4.5	10.2	6.7
Rice	4.9	0.0	0.0	2.3	3.4	0.0	11.6	11.1	1.9	0.0	16.3
Millet	10.1	7.4	1.0	0.9	3.4	1.3	27.4	30.6	3.6	4.5	17.2
Sunflower	10.2	2.6	0.0	39.9	0.0	4.1	2.9	1.8	0.0	12.7	0.0
Groundnuts	50.9	47.9	43.0	64.5	60.7	43.0	51.0	57.2	38.3	54.0	22.1
Soya beans	6.9	19.7	5.4	12.0	2.2	2.5	5.7	7.8	3.5	0.8	0.0
Seed cotton	11.5	18.5	0.1	38.4	0.0	1.3	11.6	0.0	0.0	8.1	0.0
Irish potato	0.3	0.0	0.7	0.2	0.1	0.1	0.3	0.0	2.7	0.1	0.0
Virginia tobacco	0.5	1.1	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.7	0.2
Burley tobacco	0.7	0.2	0.0	3.3	0.0	0.0	0.4	0.0	0.0	0.2	0.0
Mixed beans	16.9	13.5	13.6	4.1	23.2	7.9	34.1	46.0	30.1	5.0	0.6
Bambara nuts	3.4	0.9	1.9	0.4	15.1	0.6	2.2	3.3	1.8	4.6	2.6
Cowpeas	2.5	2.8	1.5	0.8	0.8	3.0	0.4	0.2	0.5	6.7	7.6
Velvet beans	0.1	0.0	0.0	0.0	0.2	1.3	0.0	0.0	0.0	0.1	0.0
Sweet potato	15.3	21.0	28.8	3.0	28.5	16.9	15.8	11.3	23.3	20.5	2.5
Cassava	33.6	13.0	11.1	0.4	91.7	3.5	34.5	75.7	58.7	1.0	56.7
Paprika	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Sweet potato-Orange fleshed	0.7	0.9	0.8	0.3	0.7	0.7	1.1	1.1	0.7	1.0	0.0
Popcorn	0.8	4.0	2.5	0.1	0.0	2.1	0.0	0.0	1.5	0.1	0.0
Sugarcane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Pigeon peas	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Sesame seeds	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: RALS 2015

Table 3.11: Proportion of cultivated area devoted to various crops by province

Crop	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Maize	53.6	65.7	75.4	58.9	17.9	84.7	49.5	27.1	48.1	72.1	36.4
Sorghum	1.1	0.3	0.6	0.1	0.0	0.1	1.9	0.1	0.9	5.2	1.8
Rice	1.8	0.0	0.0	0.4	0.4	0.0	3.4	6.1	0.4	0.0	7.2
Millet	2.1	1.5	0.1	0.1	0.6	0.4	4.8	4.8	0.9	1.7	5.7
Groundnuts	7.5	6.6	9.0	12.0	7.3	6.3	8.1	6.9	6.4	7.9	4.0
Cassava	10.6	1.8	2.5	0.1	34.0	0.5	9.0	19.9	16.7	0.1	21.3
Soya Beans	1.5	6.4	1.3	3.2	0.3	0.9	0.9	1.1	1.0	0.4	0.0
Seed cotton	3.3	9.6	0.0	14.1	0.0	1.0	4.3	0.0	0.0	4.1	0.0
Mixed Beans	3.2	1.6	1.7	0.6	2.3	1.0	6.1	12.1	5.3	0.7	0.1
Cowpeas	0.3	0.3	0.2	0.1	0.0	0.5	0.1	0.0	0.2	0.7	1.1
Sweet Potatoes	2.0	1.7	5.1	0.4	2.2	1.7	1.9	1.0	2.5	2.6	0.5
Orange Sweet Potato	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Gardens	6.15	2.69	2.54	8.40	34.99	1.90	9.81	20.65	16.78	4.19	21.81
All other Crops	6.90	1.70	1.30	1.50	0.00	0.90	0.10	0.00	0.80	0.30	0.10

Source: RALS 2015

Figure 3. 9: Proportion of cultivated area devoted to various crops by Province
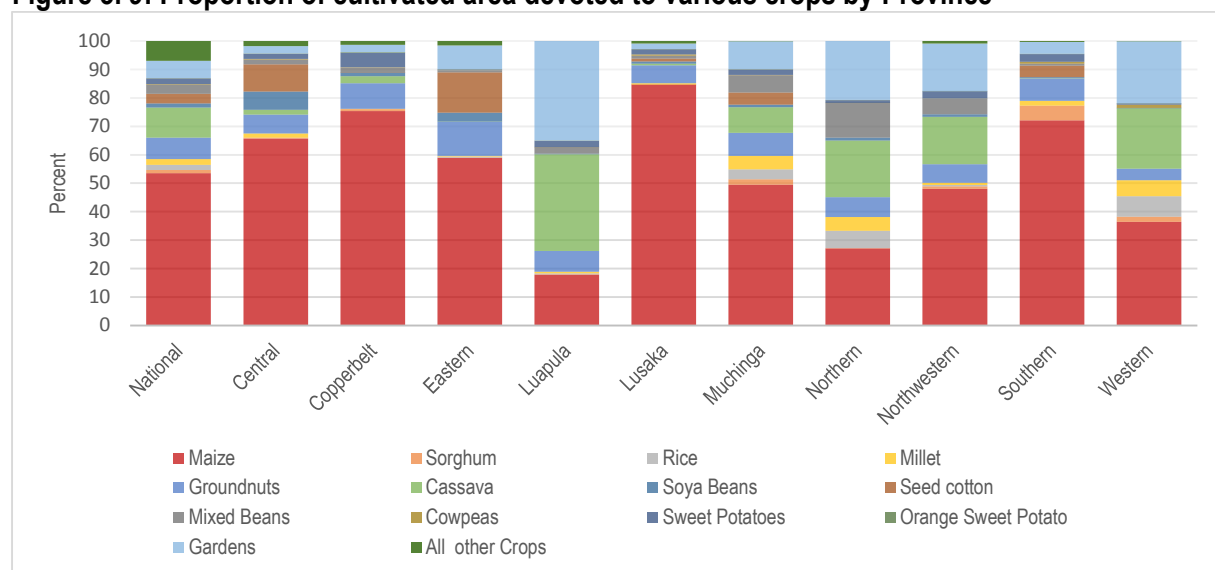
Source: RALS 2015

Table 3.12: Percentage of households growing crops by gender of household head

Crop grown	National	Male	Female
Maize	89.4	90.4	86.3
Sorghum	3.7	3.7	3.5
Rice	4.9	4.5	5.9
Millet	10.1	10.2	9.8
Sunflower	10.2	11.4	6.7
Groundnuts	50.9	49.6	54.7
Soya beans	6.9	7.7	4.5
Seed cotton	11.5	12.8	7.6
Irish potato	0.3	0.4	0
Virginia tobacco	0.5	0.6	0.2
Burley tobacco	0.7	0.8	0.4
Mixed beans	16.9	18	14
Bambara nuts	3.4	3.4	3.5
Cowpeas	2.5	2.6	2.2
Velvet beans	0.1	0.1	0
Sweet potato-white or yellow-fleshed	15.3	16.3	12.3
Cassava	33.6	34.8	30
Paprika	0	0	0
Sweet potato-orange fleshed	0.7	0.7	0.7
Popcorn	0.8	0.8	0.9
Sugarcane	0	0	0
Pigeon peas	0	0	0
Sesame seeds	0	0	0.1

Source: RALS 2015

3.9   Crop Yields

On average, farmers in Zambia produce about 2 metric tonnes (mt) of maize (Table 3.13). Maize yields are lowest in Western province, with yield rates averaging 1.1 mt followed by Southern Province with 1.6 mt. Groundnut yields do not vary a lot across the provinces though households in Eastern province obtained the least output per Ha, about 580kg compared to the national average of approximately 670 kg. Soya beans yields equally vary, with Central and Lusaka provinces having relatively higher yields. In terms of cotton yields, Copperbelt province has the highest yields (3.53 mt), while parts of Lusaka, Central and Eastern provinces record slightly higher yields than other cotton growing provinces. In general, Zambia is lagging behind in terms of crop yield. For example, the country is still far off from the CAADP target of 5 mt /Ha for maize. The same applies for all the other crops.

Figure 3.10 shows the variation in maize yields obtained with and without fertilizer application. On average, maize yields with fertilizer application are more than 1000kg/ha higher than the yields obtained with no fertilizer application. The provinces show a similar pattern. The highest yield gap was in Northern province (1482kg/Ha) and Southern province had the lowest yield gap (687kg/Ha).

Figure 3.10: Maize yield with and without fertilizer

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northweste	Southern	Western
Yield With Fertilzer	2596	2526	2702	2605	3021	2466	3054	3043	2818	1898	1960
Yield Without Fertilizer	1401	1694	1569	1584	1936	1308	2187	1561	1457	1212	887
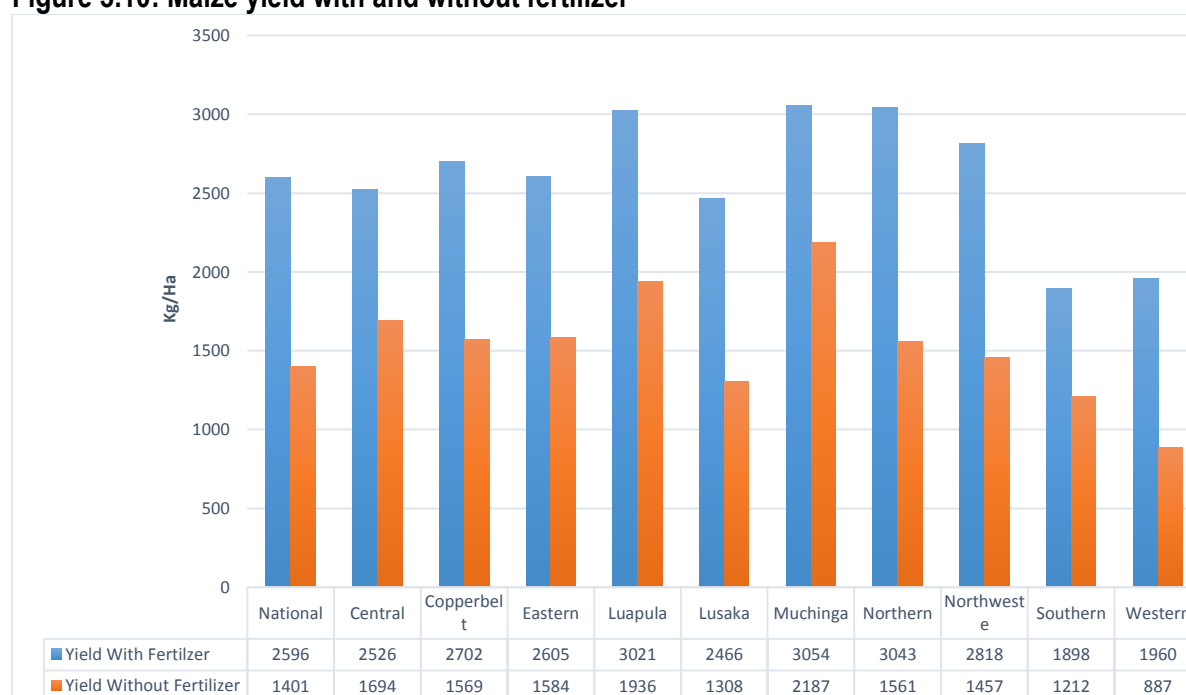
Source: RALS 2015

In terms of gender, Figure 3.11 shows that there is not much differentiation with respect to crop yields. Average crop yields for male headed and female headed households were relatively the same apart for yields of sweet potatoes. Female headed households had high yields when it came to orange fleshed sweet potatoes as compared to male headed households.

Figure 3.11: Average yield (mt/Ha) by gender of household head
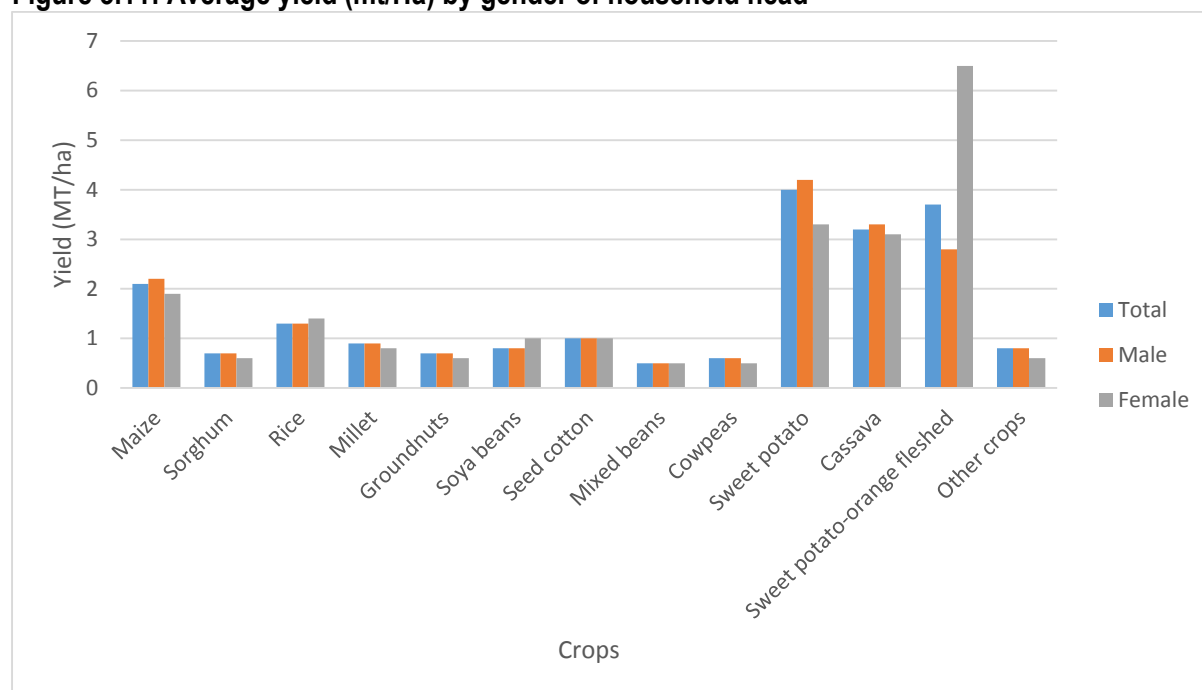
Source: RALS 2015

Note: Figure is based on numbers presented in Table A3.3 in the appendix.

Table 3.13: Average yield (mt/Ha) per household by crop

Crop grown	Average	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Maize	2.13	2.37	2.3	2.12	2.51	2.19	2.7	2.69	2.24	1.6	1.06
Sorghum	0.68	0.84	0.82	0.53	0.8	1.42	1.02	0.88	1.44	0.4	0.46
Rice	1.3	.	.	1.71	1.38	.	1.36	1.25	1.58	.	1.14
Millet	0.86	0.97	1.41	0.45	0.85	1.13	1.03	1	1.76	0.46	0.31
Groundnuts	0.67	0.76	0.71	0.58	0.77	0.79	0.75	0.61	0.73	0.63	0.61
Soya beans	0.85	1.06	0.84	0.77	0.48	1.18	0.57	0.82	0.73	0.64	0.2
Seed cotton	0.98	0.76	3.52	1.02	.	0.78	1.33	.	.	0.83	.
Mixed beans	0.51	0.57	0.52	0.46	0.47	0.45	0.47	0.5	0.64	0.49	0.45
Cowpeas	0.56	0.94	0.39	0.39	0.52	0.31	3.64	0.49	0.23	0.5	0.44
Sweet potato-white or yellow-fleshed	4.03	4.85	4.8	2.45	3.87	9.55	2.83	3.69	3.76	3.42	3.02
Cassava	1.61	1.04	2.21	1.47	1.93	1.41	0.87	1.35	2.69	1.49	1.22
Sweet potato-orange fleshed	3.75	2.97	4.55	0.86	3.87	4.45	1.51	3.53	2.72	7.12	6.45
Other crops	0.76	0.86	1.27	0.69	0.9	1.56	0.61	0.73	2.88	0.43	0.6

Source: RALS 2015

3.10 Distribution of smallholder households by land category

This section looks at the distribution of smallholder farm households by different land cultivated categories. The majority of smallholder farm households in Zambia are land constrained (Jayne et al. 2008 and Sitko et al. 2014). The results in figure 3.12 show that on average 66.5% of smallholder households in Zambia cultivate less than 2 Ha. About 27% cultivate between 2 to 5 Ha of land and only 5% of the households cultivated between 5 to 20 Ha of land. Table 3.14 shows the distribution of cultivated land by province. Generally, the proportion of households with less than 2 Ha ranges between 50 to 80%. Lusaka and Copperbelt have the highest number of households with less than 2 Ha, while Southern province has the least number of households cultivating less than 2 Ha (49%) followed by Central province with 54%. It also follows that Southern and Central has more than 10% of the smallholder farmers cultivating greater than 5 Ha compared to 5.8% nationwide.

Figure 3.12: Percent of land cultivated by category
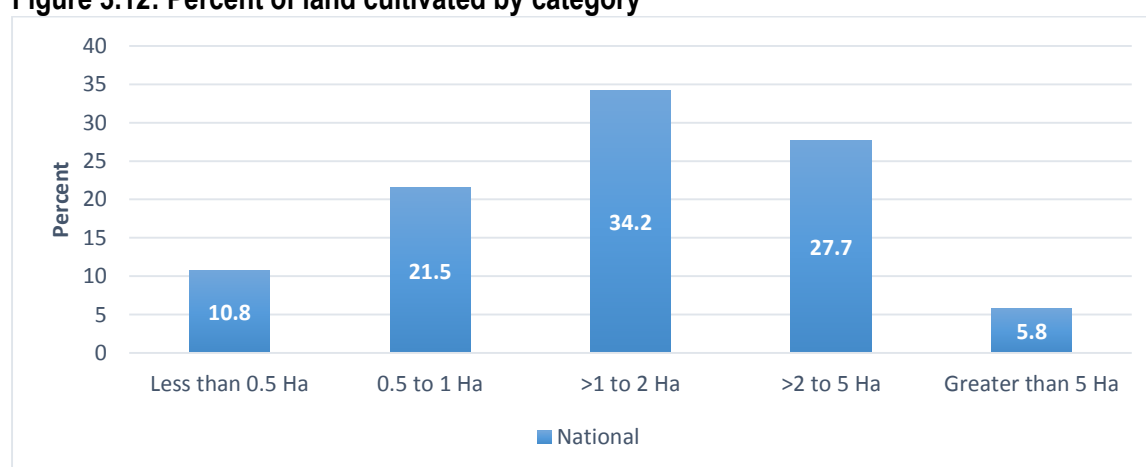
Source: RALS 2015

Table 3.14: Percent of households in land category for cultivated land

	Less than 0.5 Ha	0.5 to 1 Ha	>1 to 2 Ha	>2 to 5 Ha	Greater than 5 Ha
National	10.8	21.5	34.2	27.7	5.8
Central	7.4	16.4	31	32.6	12.5
Copperbelt	18.8	31.6	28.7	16.1	4.8
Eastern	6.1	14.6	38.2	37.2	3.9
Luapula	17.1	27.4	35.2	19.3	1
Lusaka	22.7	24.1	34	16.3	2.8
Muchinga	8.9	30	37.9	19.9	3.4
Northern	12.5	21.2	37	24.8	4.6
Northwestern	11.1	30.3	36.5	19.4	2.7
Southern	5.5	14	29.8	37.7	13.1
Western	16.4	26	30.1	24.1	3.4

Source: RALS 2015

In terms of differences by gender, close to 80% of the female headed households have less than 2 Ha of land compared to 61% among male headed households. Figure 3.13 shows that they are much more female headed households in the first two categories less than 0.5 ha and between 0.5 and 1 Ha. The

story reverses beyond 1 Ha where a higher proportion of male headed households control slightly large land sizes than households headed by females.

Figure 3.13: Percent of households in land category by gender of household head for cultivated land
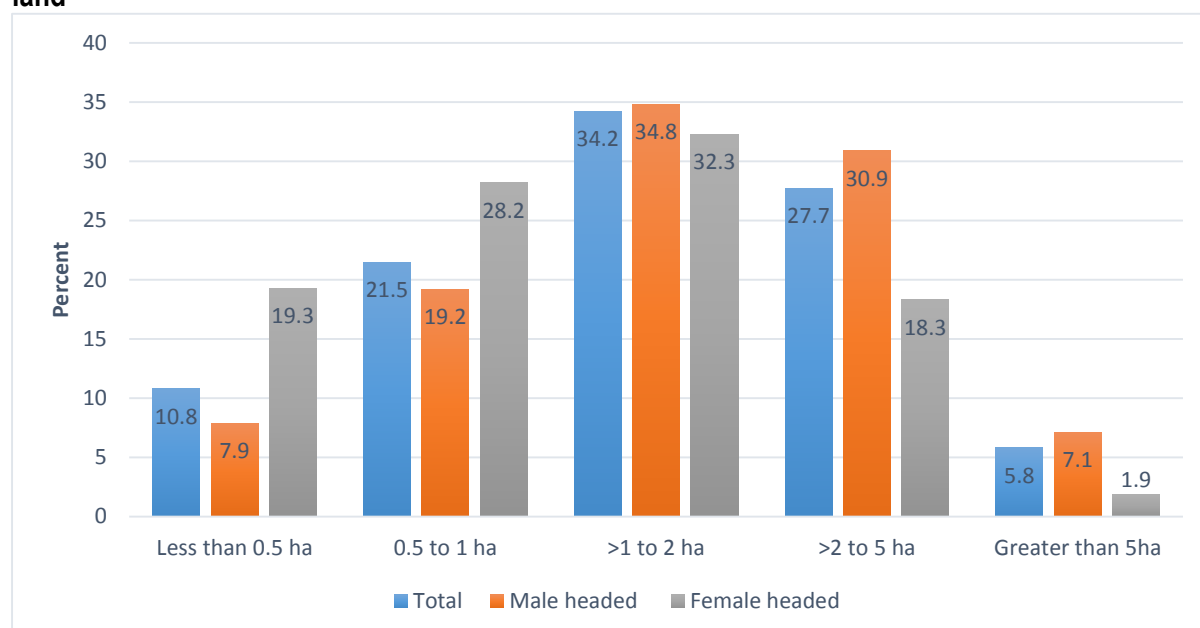
3.11   Land availability

As indicated earlier, there is a perception that Zambia is land abundant and it would be a paradox for the majority of the farmers in the country to cultivate an average of less than 2 Ha. Similar to RALS 2012, respondents were asked whether there was land in their communities that could be allocated to them for farming. Figure 3.14 shows the distribution of the households that indicated that there is no additional land that can be allocated to them for farming within their village or community. On average more than 50% of the smallholder households indicated that there was no additional land available for allocation to them to expand their farm production. Households in Eastern and Southern provinces seem to be more land constrained with more than 70% of the households indicating that there was no land available in their villages or communities. Muchinga province had the lowest percentage (27.7%) of households reporting unavailability of land in their villages followed by Northwestern and Western provinces with 31.9% and 40.2% respectively. These results suggest that land was still available for the households to expand their farming operations in these provinces which are further away from Lusaka and Copperbelt. Also, as shown in section 3.2, smallholder farmers countrywide did not have a lot of virgin or fallow land supporting most households' perception that there was no more land available in areas where they currently reside.

Figure 3.14: Percent of households indicating there is no land available to be allocated to them for farming in the village
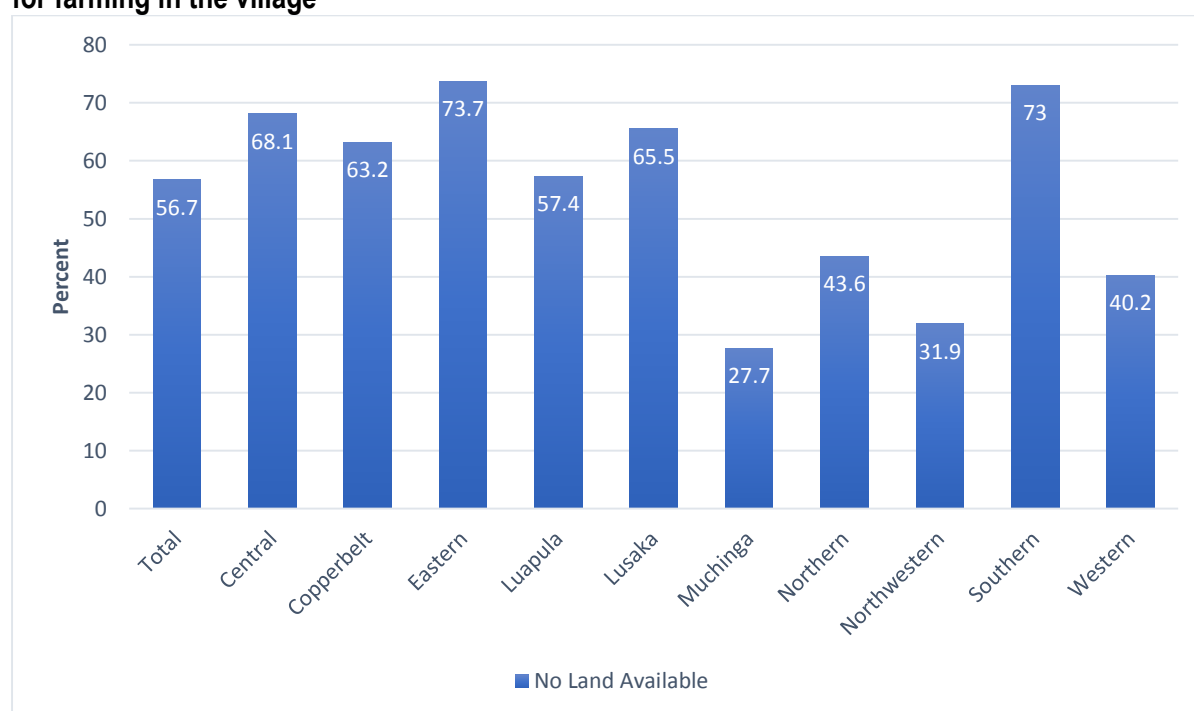
Source: RALS 2015

4.   CROP SALES FROM OWN PRODUCTION

This chapter presents key results from section 3 of the questionnaire that deals with crop sales from own production of the households interviewed. In order to examine the extent to which household crop production is oriented towards the market, we computed an index of crop commercialization herein after referred to as the Household Commercialization Index (HCI). We also compare the level of commercialization by province, land holding size and by gender. The last section discusses some key highlights for the smallholder maize market characteristics in Zambia.

4.1   Crop production and sales

Table 4.1 shows the total production of maize, cassava, soya beans, groundnuts, sorghum and millet by province. Nationally, the total production of maize (in the 2013/14 agricultural season was about 3.5 million mt, with cassava production at about 926, 000 mt and soya beans and groundnuts at about 50 thousand mt at provincial level, the top performing provinces in terms of maize production were, Central, Eastern and Southern provinces, while Western province had the least production as expected. Cassava production was highest in Luapula and Northern provinces and lowest in Lusaka province.

Table 4.1: Total crop production of key crops by Province (mt)

	Maize	Cassava	Soya beans	Groundnuts	Millet	Sorghum
National	3,532,440.2	926,975.6	50,187.9	50,187.9	42,358.4	19,610.9
Central	770,842.3	12,842.8	27,157.9	27,157.9	5,082.2	1,026.6
Copperbelt	197,850.1	5,421.2	1,347.6	1,347.6	120.4	479.4
Eastern	732,327.8	907.1	13,712.7	13,712.7	327.3	201.2
Luapula	169,708.9	392,266.1	576.4	576.4	1,269.4	90.7
Lusaka	121,136.5	658.3	591.5	591.5	335.2	51.4
Muchinga	286,717.8	26,149.7	951.6	951.6	9,680.8	3,950.5
Northern	306,097.7	186,022.5	3,748.9	3,748.9	16,307.9	348.0
Northwestern	193,673.9	171,309.6	1,412.8	1,412.8	2,304.2	2,989.7
Southern	648,536.2	1,736.4	686.1	686.1	3,384.1	8,964.3
Western	105,549.0	129,661.8	2.5	2.5	3,546.8	1,509.2

Source: RALS 2015

Table 4.2 shows the percent of households that grew and sold crops from own production. In general, the results highlight that for all crops there is a good proportion of farmers that produce for sale. As expected, cotton and soya beans are grown mostly for the market as cash crops hence, a higher proportion of households reporting that they sold the crop.

Nationally, sorghum, cassava, cowpeas, fruits and vegetables have the least number of households participating in the market at 14.6%, 22.3%, 35.0% and 35.7% respectively. However, there are some exceptions for each crop were the percentage of households that participated in crop marketing is above 50%. For example, for sorghum, approximately 70% of farmers in Lusaka province reported selling their crop, while in Central and Northwestern provinces, more than 50% of the households growing cowpeas sold the crop. Growing and selling of fruits and vegetables sales is highest in the Copperbelt province followed by Southern and Lusaka provinces.

Table 4. 2: Percent of households selling crops from own production

Crops	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Maize	52.5	68.6	63.8	40.8	59.8	42.4	59.2	70.3	64.4	48.8	21.3
Sorghum	14.6	33.8	46.6	30.4	-	70.9	16.2	14.9	36.7	8.5	1.2
Rice	67.2	-	-	50.6	72.3	-	58.4	76.5	72.5	-	68.1
Millet	43.5	50.6	62.5	32.4	65.9	45.5	52.0	53.9	54.3	22.6	2.6
Groundnuts	56.1	63.4	67.1	50.9	66.4	36.1	53.9	64.2	68.8	43.2	45.3
Soya beans	83.6	95.4	79.3	90.1	30.3	81.6	60.5	65.5	82.2	92.2	-
Seed cotton	99.1	99.3	100.0	99.7	-	100.0	93.3	-	-	100.0	-
Mixed beans	67.3	73.6	41.3	51.1	63.3	21.9	62.2	74.3	84.1	41.0	44.6
Cowpeas	35.0	62.9	21.8	38.4	9.1	20.3	11.0	-	56.6	43.2	18.4
Sweet potato-white or yellow-fleshed	60.8	66.6	84.2	61.8	61.0	47.6	54.5	43.9	66.9	56.2	29.7
Cassava	22.3	10.5	39.8	70.7	36.2	16.2	5.8	19.4	13.5	11.5	19.8
Sweet potato-orange fleshed	46.8	36.7	100.0	15.5	34.3	-	-	49.5	20.7	94.8	100.0
Fruits and vegetables	35.7	44.1	63.0	25.4	27.5	49.9	41.5	25.2	37.8	50.8	25.7
Other crops	53.4	78.4	82.6	57.1	46.1	22.2	37.7	51.6	78.7	38.4	21.6

Source: RALS 2015

4.1.1   Household Commercialization Index

In order to examine the overall crop commercialization of smallholder farmers in Zambia, we turn to the Household Commercialization Index (HCI). The HCI is defined as the ratio of total value of crop output sold to the total value of all crops produced including fruits and vegetables. A value of zero would signify a totally subsistence oriented household and the closer the index is to 100, the higher the degree of commercialization. First, we present the HCI distribution were we show five groups of households, fully subsistence farmers (HCI=0), households with HCI ranging: 0-10% (near subsistence), 10-25%; 25-50%; 50-75%, 75-90% and 90-100%. We then examined the level of commercialization by province, gender and landholding size. Results in Figure 4.2 shows that on average, the proportion of crop production that was produced for sale in 2013/14 agricultural season was 32% nationally. Central, Eastern, Muchinga and Copperbelt are the four top most commercialized Provinces with about 47%, 39%, 37% and 36% respectively. On the other hand, Western province is the lowest with 9% followed by Luapula and Lusaka provinces with about 21% and 23% level of commercialization respectively.

4.1.2   Household commercialization and gender

The differences of HCI by gender favor male headed households compared to female headed households. Figure 4.3 shows that 24% of crops produced by female headed households is for sale whilst for male headed households, the HCI is 10% higher at 34%, 2 percent above the national average. The pattern is consistent across all provinces with the exception of Western province where female headed households are more commercialized than male-headed households. From a closer look at the composition of crops grown, it is apparent that a greater proportion of female headed households produce food crops such as groundnuts, maize, mixed beans and cassava whilst cash crops such as cotton and soya beans are more common in male headed households. There is need to further interrogate gender differences in market participation in order to understand the constraints female farmers face and how the gap can be closed.

Figure 4.1: Distribution of household crop commercialization index
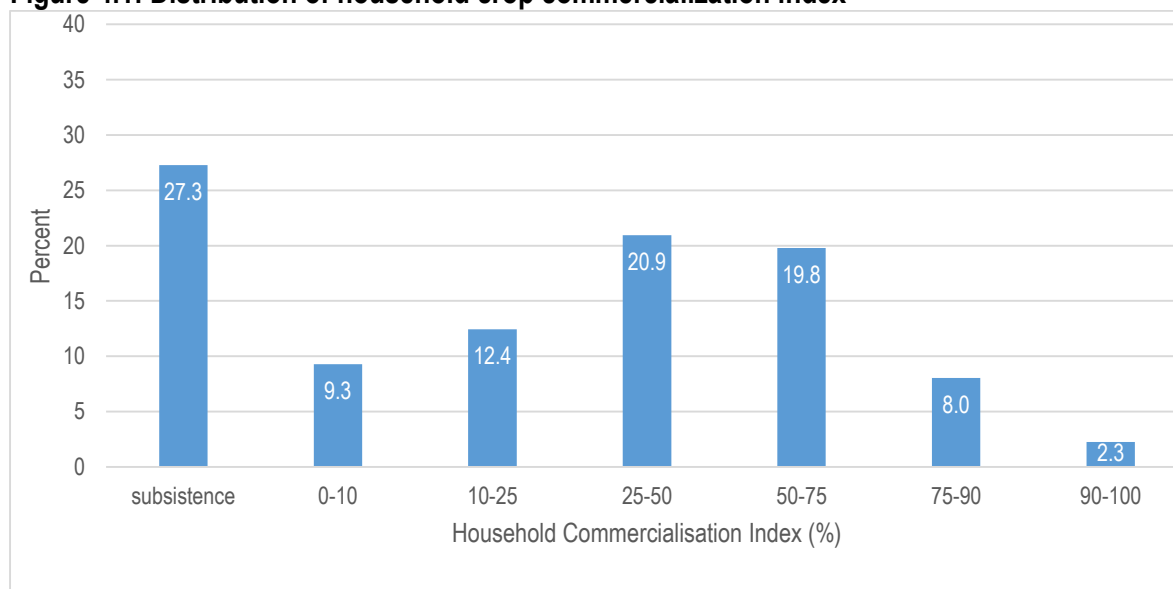
Source: RALS 2015

Table 4. 3: Distribution of household crop commercialization by province

	Subsistence	0-10	10-25	25-50	50-75	75-90	90-100	Average
National	27.3	9.3	12.4	20.9	19.8	8.0	2.3	31.6
Central	16.7	4.3	7.1	21.1	30.3	15.0	5.6	46.7
Copperbelt	24.3	2.2	11.4	28.4	25.9	6.3	1.5	35.9
Eastern	19.7	4.7	11.5	23.3	27.3	11.0	2.5	39.5
Luapula	24.7	18.5	23.6	19.9	8.7	3.5	1.0	21.4
Lusaka	49.7	3.9	9.7	12.4	17.3	5.8	1.2	23.4
Muchinga	19.1	10.0	9.0	24.6	25.1	9.0	3.2	37.3
Northern	16.5	17.3	14.8	21.7	18.4	9.1	2.2	32.6
Northwestern	24.9	6.1	16.4	18.7	25.2	5.7	3.0	33.8
Southern	35.4	8.5	11.5	22.6	13.9	7.0	1.2	26.4
Western	62.0	12.9	9.1	11.1	3.4	1.4	.1	9.4

Source: RALS 2015

Figure 4. 2: Average household crop commercialization index
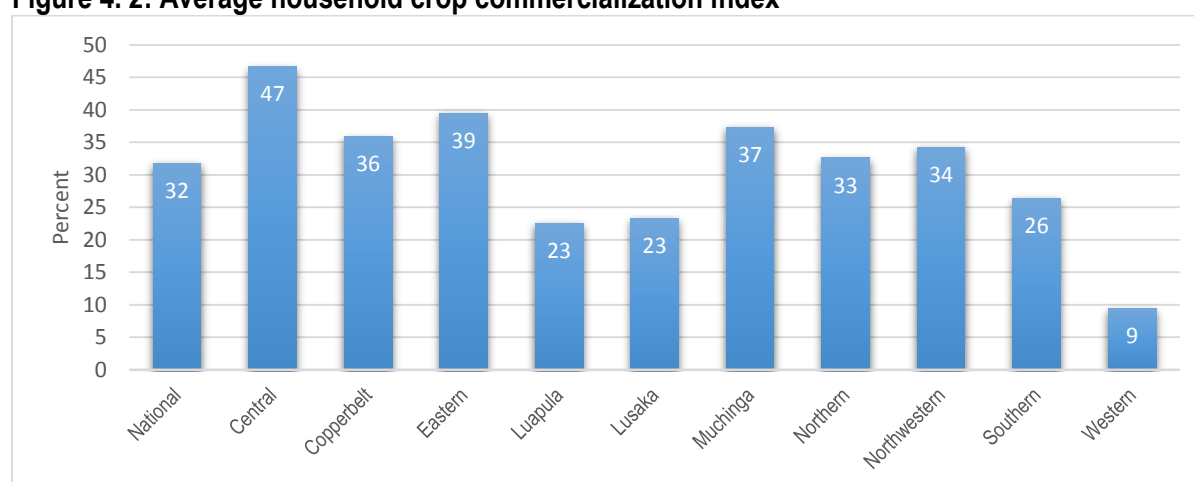
Source: RALS 2015

Figure 4. 3: Household crop commercialization index by gender and province

Source: RALS 2015

40
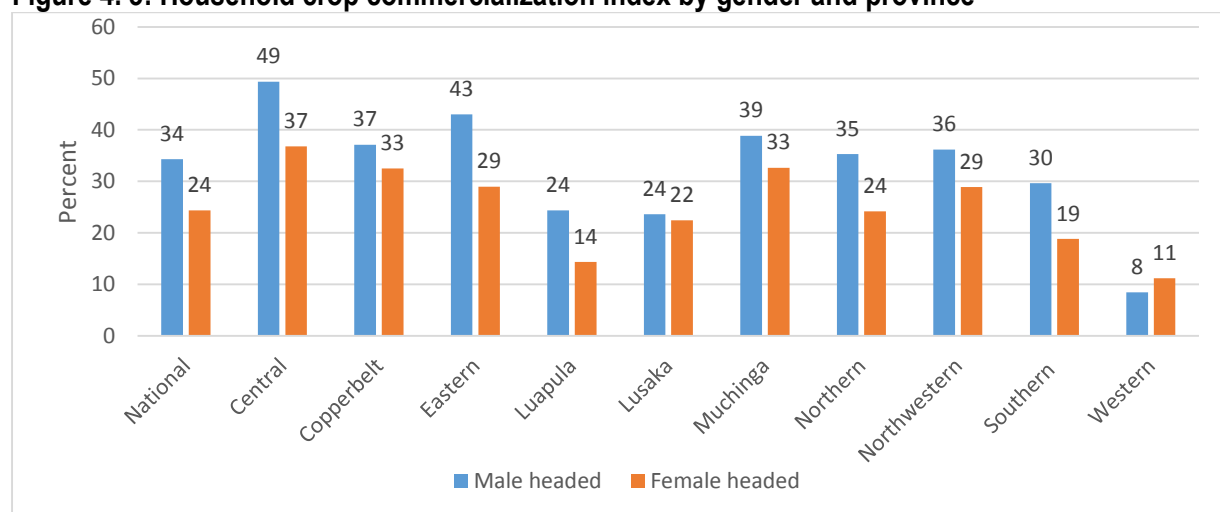
4.1.3   Household commercialization and landholding size

As expected, Table 4.4 shows that on average, households that cultivated larger areas have higher HCI because they are more likely to produce a surplus. However, households cultivating 5 hectares or more only constitutes about 5.5% of all the smallholder farmers. As indicated earlier, most of the farmers are land constrained, hence they are not able to produce enough surplus for sale. Even if they were able to produce something for sale, it would not be enough to propel them out of poverty given that they produce mostly low value food crops such as maize and their productivity is very low.

Surprisingly, Table 4.4 also shows that 12.5% of rural smallholder households cultivating greater than 10 hectares had an HCI of zero, meaning in 2013/14 agricultural season all their crop production was for subsistence purposes only. A closer examination of these households show that 95% are in Western province and the other 5% were in Southern province. It is beyond the scope of this survey report to do any additional analysis about these households. Detailed analysis is required to understand why these households were not in the market even when they reported cultivating more than 10 Ha.

Table 4. 4: Distribution of household commercialization index by landholding size

Land cultivated group	Number of households	Average HCI	Household Crop Commercialisation Index (%)						
			Subsistence	0-10	10-25	25-50	50-75	75-90	90-100
0-0.5 ha	279,305	11.07	65.7	7.7	7.6	11.5	5.9	.8	.7
0.5-1.0 ha	320,244	21.74	35.4	12.4	16.7	18.7	13.5	2.2	1.0
1.0-2.0 ha	459,244	32.98	19.3	10.1	14.6	25.2	23.2	7.0	.7
2.0 - 5.0 ha	375,023	44.57	11.1	7.5	10.8	25.2	28.6	13.6	3.3
5.0 - 10 ha	64,709	61.89	4.8	5.5	4.2	13.6	26.7	34.1	11.1
>10ha	13,853	65.28	12.5	3.1	5.1	7.3	13.0	23.8	35.2

Source: RALS 2015

4.2   Gender and decision to sell and use of income from sales

Commercialization of crops have been shown to disadvantage female members of the family as males have been found to take over crop production, management and income use decisions. In the RALS 2015 survey, respondents were asked about who made the decision to sell crops as well as income use. Table 4.5, shows proportions of females who made the decision to sell by crop and use income from the sales in male headed households. In general, the table shows that males still dominated the decision to sell their crops with three exceptions at provincial level, i.e. sweet potato-orange fleshed, cowpeas and groundnuts.

Nationally, the results show that only 34.8% of females who grow groundnuts in male headed households made the decision to sell them. The percentage is much higher in Southern province (73.9 %), and was above 40% in Central, Copperbelt and Lusaka provinces. We also find similar results for cowpeas and orange-fleshed sweet potatoes, crops that are considered as female's crops.

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Table 4. 5: Proportion of females who made the decision on how to use the income from the sales of crops in male headed households

Crops	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Maize	5.5	2.7	6.7	5.6	5.9	10.1	5.1	3.6	7.6	3.5	8.0
Sorghum	13.6	10.0	22.2	12.5	100.0	0.0	11.5	33.3	13.3	8.6	21.4
Rice	13.6	0.0	0.0	17.9	16.0	0.0	12.5	8.8	0.0	0.0	15.6
Millet	19.7	18.5	75.0	14.3	10.0	66.7	19.7	20.2	14.3	3.1	26.1
Groundnuts	34.8	47.8	49.7	22.3	23.1	43.0	23.0	34.9	21.8	73.9	32.1
Soya beans	10.1	3.5	23.1	11.7	8.0	10.0	12.1	5.4	27.8	27.3	0.0
Seed cotton	2.2	1.8	0.0	2.2	0.0	0.0	4.0	0.0	0.0	1.1	0.0
Mixed beans	22.5	25.0	43.4	27.0	17.4	37.9	20.3	14.8	29.3	37.5	20.0
Cowpeas	32.7	31.3	50.0	38.9	57.1	44.4	25.0	0.0	100.0	31.8	21.9
Sweet potato-white or yellow-fleshed	30.6	30.1	24.6	11.9	20.2	41.1	23.3	22.2	24.1	59.9	50.0
Cassava	21.3	16.7	19.0	11.8	15.4	15.0	18.7	25.5	37.1	0.0	16.8
Sweet potato-orange fleshed	37.5	66.7	0.0	33.3	40.0	0.0	50.0	50.0	0.0	42.9	100.0
Fruits and vegetables	43.4	47.0	43.2	49.4	22.9	45.9	34.9	48.1	39.7	47.0	49.3
Other crops	16.6	5.3	42.1	14.0	37.1	10.3	12.2	22.2	11.1	19.2	25.0

Source: RALS 2015

4.3   Maize sales

As mentioned earlier, maize is an important crop in Zambia both in terms of production and sales. Therefore, the survey collected detailed information about households' maize production and marketing conditions and income use decisions. This section highlights some of the key aspects of the smallholder maize sector in Zambia.

4.3.1   Maize sales

Table 4.6 shows that only 52.5% of the farmers who produced maize sold it. These results are similar to what is obtained in other surveys that large number of households are not able to produce a surplus to sell. Therefore policies that ignore this reality fail to target the poorest segment of the rural population.

Maize sales are lowest in the Western province, which is an area of low production due to weather and soil conditions. Luapula, Northern and Muchinga provinces have higher maize commercialization rates than other provinces. Essentially, there are areas were cassava is a staple, so maize is produced for the market.

A very small percentage of farmers accounted for 50% of maize sales, about 4.6% of the total smallholder rural farm population. These results are consistent with findings generated from the different national representative surveys in the country. In general, Table 4.6 shows that these households cultivate three (3) times more land, sell on average 345 bags of maize compared to 33 bags among the rest of maize sellers, thus they are far more commercialized than the rest of the maize sellers.

Table 4. 6: Maize sales

Percent of maize sales	Households		Land cultivated	Maize Sold
	Number	%	Ha	Number of 50 kg bags
Maize sellers	690,885	52.5	2.56	60
Top 50% of maize sales	59,961	4.6	6.87	345
Rest of all other maize sales	630.924	47.9	2.15	33
Non maize sellers	625,562	47.5	1.38	0

Source: RALS 2015

4.3.2   Market position

Figure 4.4 shows the percent of farmers that grew maize and participated in maize marketing and those that did not participate in maize marketing. Of all the smallholder farmers in Zambia that grew and sold maize, 56% were maize net sellers. This means that they sold more maize than they purchased. On the other hand, 39% of the farmers were net buyers. This means that the households purchased more maize and maize products than they sold. About 5 percent of farmers were autarkic, meaning they did not buy or sell any maize at all.

Figure 4.4 shows that there are some differences by provinces. Western, Luapula and Copperbelt provinces have the highest percentage of net maize buyers at 61%, 55%and 52% respectively. While, four provinces have above national average percent of net sellers, with the highest in Northwestern (69.8%), followed by Eastern (68.7%), then Central (66.7%) and in fourth Muchinga province.

The net buyers of maize, constituting approximately 38.7% nationally or higher in other provinces are disadvantaged by high FRA prices. In general, these households are poorer and have smaller farm sizes

and asset holdings than an average rural household. Hence, they are directly affected by higher grain prices.

Figure 4. 4: Maize market position for smallholder farmers in Zambia
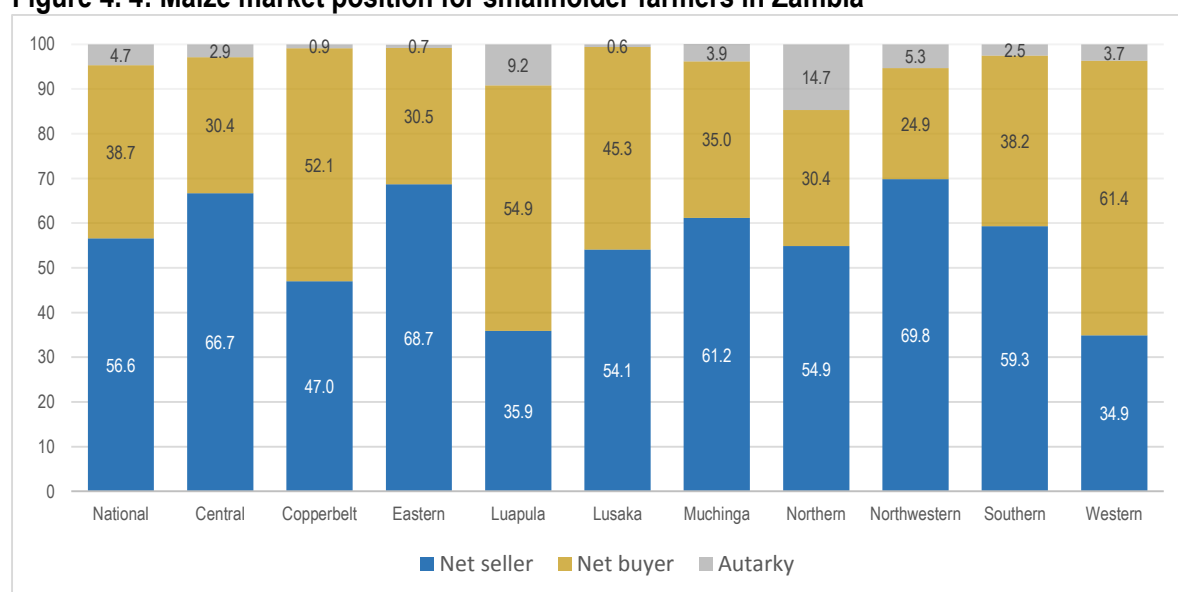
Source: RALS 2015

Notes: Net sellers sell more maize than they purchase; net buyers purchase more maize and maize products than they sell; and households that are neither buyers nor sellers do not participate in maize markets.

4.4 Maize marketing channels

Smallholder farmers have a variety of market channels for their maize. Figure 4.5 shows the percent of households that sold maize by buyer type in 2014/15 marketing season. The results show that the majority of households (40%) reported selling their maize to the Food Reserve Agency (FRA) with Muchinga having the largest percentage followed by Northern, Luapula and then fourth Northwestern provinces. It is important to note that the percentage of selling to FRA varies year to year depending on the amount of maize the government decides to buy using FRA.

Small-scale traders take up the second most common used market channel with 23% of the farmers using this channel. This marketing channel is mostly dominant in Central, Southern and Western provinces. Small-scale traders play an important role in providing a market for maize for households who may want immediate cash especially those with smaller surplus. The small-scale traders usually go into the market at the beginning of the marketing season before FRA entry into the market to offer an opportunity to farmers who would like to sell their maize early. They would camp in the villages in order to assemble maize from many households who mainly sell maize in smaller quantities for onward delivery to large-scale grain traders, millers and FRA.

The third largest market is sales to other households for home consumption. The retail market channel is the fourth mostly used channel with a national average of 5% of the households using this channel. However, Lusaka, Southern and Western Provinces have more than 30% of maize producers selling to other households for home consumption. The other channels including large-scale traders and millers are less commonly used, but still play a vital role in the livelihoods of farmers. The large-scale traders and millers buy maize close to the areas where they operate usually in areas closer to urban centers. Therefore, a higher percentage of households selling maize to large-scale traders and millers were found in Lusaka, Central, and Copperbelt provinces.

Figure 4. 5: Percent of households selling maize by buyer type
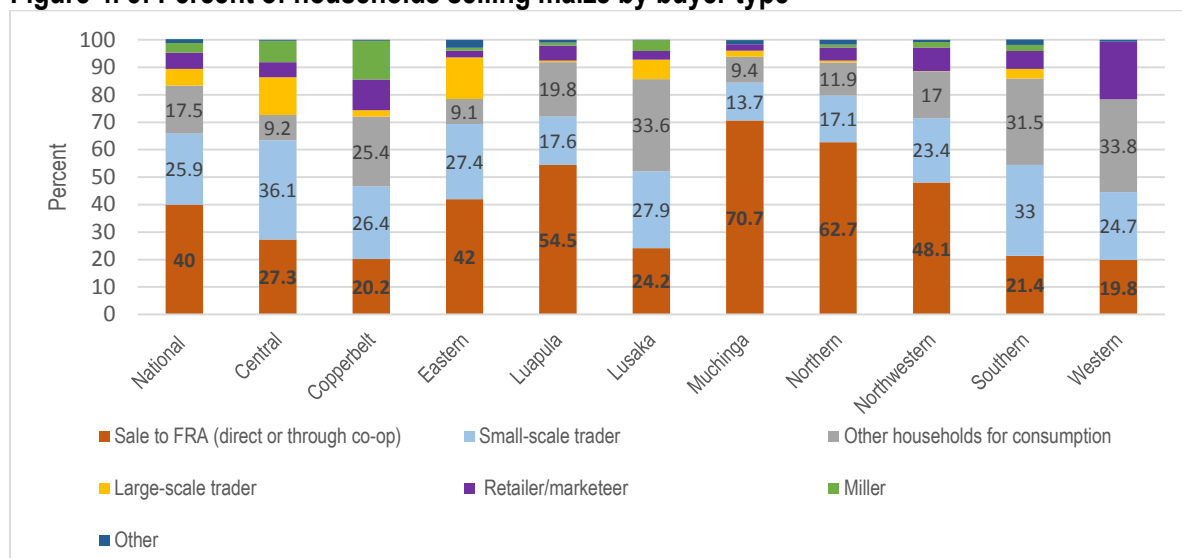
Source: RALS 2015

Figure 4.6 shows the percent of households selling maize by buyer type by gender of household head. The results follow a similar pattern as all households irrespective of gender. However, there are a few notable variations by gender of household head. For example, a higher proportion of more male headed households sold their maize to FRA than female headed household, 46% compared to 40%. Whilst, 23% of female headed households reported selling their maize to other households for home consumption compared to 14% among male headed households. Thus, a larger percent of female headed households sell their maize in smaller units to other households for consumption.

Figure 4. 6: Percent of households selling maize by buyer type by gender of household head
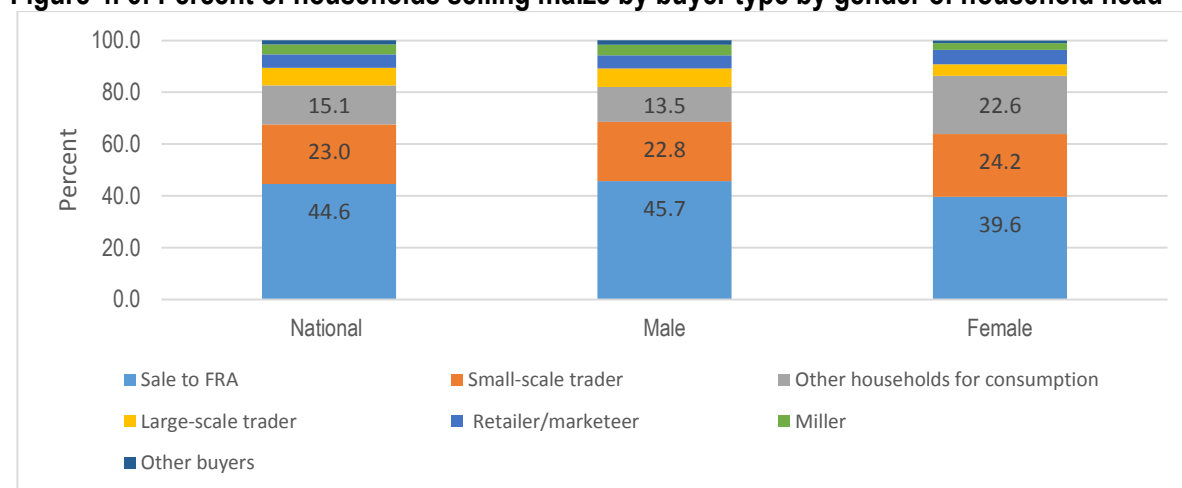
Source: RALS 2015

4.5 Market Access

One of the most widely held perceptions in Zambia's maize market is the concern of smallholder farmers' poor access to markets. Hence, the government's crop marketing policy through FRA has been conceived fundamentally as a response to this perceived market failure and weak access to markets.

Table 4.7 shows the distribution of distance to the location of the largest maize sale transaction by type of private buyer. Despite the poor condition of many feeder roads in Zambia, most smallholder farmers reported either sold their maize directly on their farms or travelled very short distances to sell their maize0 to private buyers. About 50% of households selling to small-scale traders, retailers/marketers and other households sold their maize right in their villages. Whilst 25% of households selling to large-scale traders reported selling within the village. Households, typically those with larger quantities of maize to sell, chose to travel long distances of 20km or more to sell their maize to larger buyers such as millers and brewers.

Table 4. 7: Distribution of distance to the location of the largest maize sale transaction by type of private buyer

Buyer type	Mean km	Percentile 10	Percentile 25	Percentile 50	Percentile 75	Percentile 90
Small-scale trader	5.4	0.0	0.0	0.0	1.0	12.8
Large-scale trader	15.8	0.0	1.0	7.8	20.0	30.0
Retailer/marketeer	17.6	0.0	0.0	0.0	5.0	40.0
Other households for consumption	0.5	0.0	0.0	0.0	0.0	0.0
Sale to FRA (direct or coop)	5.9	0.1	1.0	4.0	7.0	15.0
Miller	32.7	2.5	5.0	17.0	65.0	80.0
Other buyers	23.9	10.0	11.0	18.5	42.5	43.5

Source: RALS 2015

5. FERTILIZER AND SEED SOURCES AND ACQUISITION

This chapter presents key results from sections 4 and 5 of the questionnaire that deals with fertilizer and seed acquisition by source respectively. We report results on the sources of seed for five key crops (maize, groundnuts, soya bean, sunflower and sweet potatoes) and fertilizer. We examine whether the fertilizer was available on time, the reasons for not acquiring fertilizers from government programmes or commercial sources, the trend in the FISP since 2008/09 agricultural season and the fertilizer use per Ha. It is important to note that the total percentage for fertilizer acquisition by source adds up to more than 100 percent because households obtain fertilizers from more than one source.

5.1 Fertilizer acquisition by source

Table 5.1 shows the percentages of households acquiring fertilizer from various fertilizer channels. The results show that only two fertilizer channels are prominently used by smallholder farmers, that is, government and commercial traders/retailers.

From the government channels, majority of the households (about 58.4%) obtained their fertilizer from the FISP either directly from FISP or via farmer organizations while only 0.8% of the farmers nationwide acquired the government fertilizer through the food security pack. It should be noted that within the 10 provinces of Zambia, Northwestern province recorded the highest percentage of farmers acquiring fertilizer from FISP, 75.7% followed by Western province with 71.4% while Eastern province had the lowest percentage of farmers acquiring fertilizer through FISP with 48.2%.

Under commercial fertilizer purchases, two sources are mostly utilized by the smallholder farmers, which are cash purchases from private traders and loan purchases from out-grower schemes. Nationally, cash purchases from private traders/retailers accounted for 43.6% of the farmers and loan purchases from out-grower schemes accounted for 15.4% of the farmers. However, in Central and Copperbelt provinces, the percentage of households purchasing fertilizer from the private traders/retailers is almost 20% above the national average, 65.0% and 62.8% respectively. As expected. Northwestern and Western provinces have the lowest percentage of farmers acquiring fertilizer through cash purchases from private traders as most farmers reported acquiring their fertilizers from FISP.

At the national level, the second most commercial source was loan purchases from out-grower schemes and was more prominent in Eastern Province where 42.4% of the households acquired fertilizer through this channel. Central province ranks second from Eastern province in terms of the percentage of households acquiring fertilizer on loan from out-grower schemes with 21.6% of the households acquired fertilizer through this channel.

Table 5. 1: Percent of farmers acquiring fertilizer from each source

Fertiliser channel	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Government											
FISP/MAL (Direct from FISP or via a coop/farmer group)	58.4	51.7	55.7	48.2	67.1	61.2	59.6	68.8	75.7	58.7	71.4
Food Security Pack/Expanded Food Security Pack/Ministry of Community Development, Mother and Child Health	0.8	1.3	0.7	0.6	0.3	0.0	0.4	1.2	0.4	1.2	1.8
Commercial											
Cash purchase from private trader/retailer	43.6	65.0	62.9	40.4	24.6	46.7	38.1	35.7	13.4	51.4	22.5
Cash purchase from cooperative or farmer association excluding FISP/MAL	3.6	3.0	2.5	2.6	1.5	4.7	10.6	3.1	4.1	2.1	0.5
Cash purchase from another farmer or individual	7.9	4.8	4.6	6.5	18.0	7.0	10.1	11.3	8.8	4.9	12.5
Loan purchase from private trader/retailer	1.5	0.5	0.4	3.8	0.8	0.4	3.2	0.0	0.1	1.1	1.3
Loan purchase from out-grower scheme or others	15.4	21.6	0.1	42.4	1.3	2.7	10.5	0.0	0.6	8.2	3.4
Direct commercial exchange/barter	0.3	0.0	0.0	0.4	0.4	0.0	0.3	0.0	0.0	0.9	0.2
Other											
Other households, institutions or other sources	3.2	2.8	1.9	2.9	2.0	7.9	1.6	2.6	5.5	4.2	4.3

Source: RALS 2015

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5.1.1   Fertilizer acquisition source by gender

Table 5.2 disaggregates fertilizer acquired from various sources by gender of the household head. The results show that in general, the pattern of fertilizer acquisition by gender follows the general national pattern. However, a lower proportion of female headed households acquired fertilizer from each source compared to male headed households. The difference is greater for cash purchases from private trader/retailer, where 46.8% of the male headed households acquired through this channel compared to 37.3% among the female headed households. Loan fertilizer purchases from out-grower scheme was also higher in male headed households compared to the female headed households.

Table 5. 2: Percent of fertilizer acquired by source by gender of household head

Fertilizer channel	All households	Male	Female
Government			
FISP/MAL (Direct from FISP or via a coop/farmer group)	58.4	61.9	59.9
Food Security Pack/Expanded Food Security Pack/Ministry of Community Development, Mother and Child Health	0.8	0.9	1.2
Commercial			
Cash purchase from private trader/retailer	43.6	46.8	37.3
Cash purchase from cooperative or farmer association excluding FISP/MAL	3.6	3.8	3.6
Cash purchase from another farmer or individual	7.9	6.8	6.4
Loan purchase from private trader/retailer	1.5	2.0	0.7
Loan purchase from out-grower scheme or others	15.4	19.3	15.4
Direct commercial exchange/barter	0.3	0.3	0.2
Other			
Other households, institutions or other sources	3.2	2.8	5.4

Source: RALS 2015

5.2   Timing of fertilizer delivery

Table 5.3 shows the percentage of households that reported to have received basal and top-dressing fertilizer on time from the government channels (FISP and Food Security Pack) and commercial sources. Generally, a much higher percentage of households reported receiving commercial fertilizers on time compared to fertilizer from government programs.

Among the FISP recipients on average 64.7% and 66.8% reported to have received basal and top-dressing fertilizer on time respectively. In comparison to the other provinces, Eastern province recorded the highest percentage of households reporting to have received their basal and top-dressing fertilizer on time. Western province on the other hand, recorded the lowest percentage of households reporting to have received basal and top-dressing fertilizer on time. For households that obtained fertilizer from the Food Security Pack on average 67.3% and 70% of the recipient reported to have received basal and top-dressing fertilizer on time respectively. However as shown in Table 5.2, less than 1% of the household's national wide acquired fertilizer from the Food Security Pack**.**

Table 5. 3: Percent of household reporting having received basal and top dressing fertilizer on time

| | -----------Received Basal Dressing on Time--------- | | | ----------Received Top Dressing on Time----------- | | |
	FISP	Food Security Pack	Commercial sources	FISP	Food Security Pack	Commercial sources
National	64.7	67.3	90.1	66.8	70.0	92.1
Central	63.4	60.0	89.2	63.8	70.0	92.2
Copperbelt	70.4	50.0	95.4	67.1	50.0	94.9
Eastern	77.0	88.9	93.0	70.2	80.0	94.8
Luapula	58.5	100.0	78.5	63.6	50.0	80.0
Lusaka	59.7	0.0	94.4	69.8	100.0	97.5
Muchinga	53.6	33.3	85.7	64.6	66.7	87.8
Northern	66.7	66.7	84.1	71.0	100.0	85.6
Northwestern	56.0	100.0	83.9	63.6	100.0	83.8
Southern	61.5	75.0	91.0	69.7	75.0	94.7
Western	50.0	50.0	89.4	31.8	33.3	93.2

Source: RALS 2015

5.3 Reasons for not acquiring FISP fertilizer

Table 5.4 summarizes some of the reasons that farmers cited for not acquiring fertilizer from FISP and three main reasons emerged. First, about 31.4% of the households indicated that they could not afford the FISP down payment. Second, 21.8% reported that they could not access FISP because they were not registered farmers to any farmer organization/cooperative and third, 20.8% of the farm households reported that they could not afford the membership fee to the farmer organizations/cooperatives.

These three reasons were prominent across all the provinces, with Eastern province recording a highest percentage (44%) of households that the reported failure to pay FISP down payment as the main reason for not acquiring fertilizer from FISP followed by Northwestern and Southern provinces. The majority of the farmers in Copperbelt and Luapula provinces reported not being registered farmers as the main reason for not acquiring fertilizer from FISP. Furthermore, failure to pay membership fee to a farmer cooperative/organization was mostly reported by farmers in Eastern, Northern and Muchinga provinces.

5.4 Reasons for not acquiring fertilizers from commercial sources

Table 5.5 shows that on average 80% of the households interviewed cited lack of cash as the main reason for not acquiring commercial fertilizer. Lusaka province had the highest proportion of households citing lack of cash, 87.5% with Eastern province coming last with 66.2%. Approximately 7.3% indicated having not grown maize or any other crops as the reason for not acquiring commercial fertilizer with Luapula province recoding a higher percentage of such cases followed by Central and Northern provinces. Furthermore, about 4% of the households cited having enough fertilizer and/or good soils as the main reason for not acquiring commercial fertilizer. Of the households that reported that they did not need fertilizer due to fertile soils, majority of them where from Southern province while Copperbelt province recorded a highest percentage of farmers indicating they had enough fertilizer from other sources.

Table 5. 4: Reasons for not receiving FISP

Reason	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Not eligible because did not have enough land	2.6	0.4	0.5	2.1	3.5	2.8	7.0	3.5	5.4	1.5	1.6
Not eligible because cultivated too much land	0.5	0.4	0.3	0.6	1.1	0.0	1.5	0.9	0.0	0.0	0.0
Not eligible because Food Security Pack Programme beneficiary	0.6	1.0	0.0	0.8	0.6	0.5	1.5	0.3	0.4	0.8	0.0
Not eligible because defaulted on a government agricultural credit program	0.2	0.0	0.4	0.1	0.0	0.9	1.0	0.0	0.7	0.0	0.1
Not eligible for reasons other than those specified	8.6	4.3	5.0	4.3	11.2	7.6	13.1	13.5	7.9	5.8	13.4
Did not want to get FISP because of late delivery	4.8	12.2	2.8	6.8	1.9	3.7	6.0	0.7	3.4	5.8	2.9
Did not want to get FISP for other reasons	10.0	12.9	2.8	10.7	12.7	8.1	16.4	9.0	10.4	9.8	5.2
Do not grow maize	8.0	3.6	4.6	1.2	19.2	5.6	3.9	20.8	11.7	2.5	7.3
Soil is fertile (do not need fertilizer)	4.3	1.1	0.7	5.2	4.2	3.9	5.2	1.3	3.8	6.2	7.3
Could not afford FISP down payment	31.4	22.6	19.1	44.0	29.7	30.1	24.1	28.1	34.6	32.6	30.5
Could not afford cooperative/farmer group membership	20.8	21.8	16.4	28.6	19.5	2.8	22.3	25.1	21.4	16.3	15.3
No FISP fertiliser available in my area	10.0	4.0	5.2	2.9	3.5	7.3	12.5	10.8	9.4	6.7	33.0
Denied cooperative/farmer group membership for reasons other than cost of membership	5.3	3.6	2.4	3.5	7.9	5.8	7.2	7.7	4.1	7.9	2.6
FISP fertiliser allocated to my area was not enough for all eligible applicants	2.7	3.5	2.0	4.2	1.1	2.3	3.9	1.7	2.9	2.7	2.0
Eligible and applied but not selected to receive FISP for unknown reason	1.8	2.0	4.3	1.6	1.8	2.0	2.1	0.6	1.2	2.5	1.7

Table 5.4 continued

Reason	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
My cooperative/farmer group was not selected to participate in FISP	0.8	0.0	0.8	0.8	0.8	0.6	1.1	0.9	1.1	0.9	1.1
Not a registered farmer	21.8	21.9	37.3	15.2	35.3	12.0	23.3	26.7	17.2	14.5	19.7
Was not actively involved in farming in the camp coverage area	1.7	2.2	0.7	1.3	3.5	5.0	1.8	1.7	0.1	0.8	1.8
I submitted my application or down payment after the deadline	1.6	3.9	1.3	1.6	0.4	0.2	1.7	2.3	2.6	1.6	0.5
Did not want to be a member of a cooperative/farmer group	6.4	8.4	3.8	4.9	8.9	6.6	9.0	10.3	3.2	6.6	3.0
Does not know about FISP	0.3	0.0	0.0	0.4	0.1	3.0	0.0	0.0	0.0	0.1	1.0
Does not know the reason	3.6	2.3	1.0	1.0	6.5	7.0	6.6	4.3	1.3	2.5	6.1

Source: RALS 2015

Table 5. 5: Reasons for not receiving commercial fertilizer

Reason	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Did not have cash	80.0	75.6	71.0	87.5	73.6	66.2	84.9	79.0	70.8	85.5	86.2
It did not pay, it was not profitable, it was too costly	2.7	1.0	2.2	0.7	0.9	4.3	1.3	3.9	11.0	1.4	2.1
Transport costs too expensive	1.0	0.0	0.0	0.5	0.9	1.8	2.6	1.3	1.3	0.1	1.6
Not available in the stores	0.7	0.0	0.0	0.1	2.1	0.4	0.0	0.7	1.1	0.1	0.7
Soil is fertile (do not need fertilizer)	4.0	4.4	1.0	4.8	3.2	4.2	2.8	1.0	2.8	8.2	5.3
Did not grow crops and/or maize	7.3	12.8	6.9	3.5	13.4	11.4	4.3	12.2	6.3	2.4	3.6
Had enough fertiliser	4.1	5.9	18.8	2.9	5.9	10.7	3.7	1.9	6.2	1.9	0.2
Given by others	0.2	0.4	0.0	0.0	0.0	0.2	0.4	0.0	0.4	0.3	0.3
Used manure and other organic fertilizers	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
Lack information on fertilizers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: RALS 2015

5.4.1   Reasons for not acquiring fertilizers from commercial sources by gender of household head

Table 5.6 summarizes the reasons for not getting commercial fertilizer by gender of the household head. Similar to Table 5.5 the majority of the farmers cited lack of cash as the main reason for not acquiring commercial fertilizer. However when disaggregated by gender of the household head, 80.2% of the female headed households cited lack of cash compared to 75% among the male headed households. Furthermore, equal percentages of male and female-headed households indicated having not grown maize or any other crop as another reason for not getting commercial fertilizer. Also, Table 5.6 shows that a slightly higher percentage of male-headed households indicated having enough fertilizer compared to their female counterparts. Lastly, 6% and 5 % of the male and female-headed households respectively, indicated that they did not need fertilizer due to fertile soils as another reason for not acquiring commercial fertilizer.

Table 5. 6: Reasons for not receiving commercial fertilizer by gender

Reason	National	Male	Female
Did not have cash	76.3	75.0	80.2
It did not pay, it was not profitable, it was too costly	3.5	3.8	2.5
Transport costs too expensive	1.2	1.4	0.5
Not available in the stores	0.9	1.0	0.6
Soil is fertile (do not need fertilizer)	5.8	6.0	5.0
Did not grow crops and/or maize	6.4	6.4	6.5
Had enough fertiliser	5.7	6.2	4.2
Given by others	0.2	0.1	0.4
Used manure and other organic fertilizers	0.1	0.1	0.0
Lack information on fertilizers	0.0	0.0	0.1

Source: RALS 2015

5.5   Farmer Input Support Programme

Table 5.7 presents the percentage of households that have been receiving FISP fertilizer from 2008/9 to 2014/15 farming season. The results show an increasing trend in the percentage of households that have been receiving FISP fertilizer from 9.1% in 2008 to 33.5% in 2014. The increase in the percentage of households receiving fertilizer is observed in almost all the provinces except for Western province whose values have remained below 12% for the past 7years. Muchinga province on the other hand has recorded the highest increase in the percentage of the households receiving fertilizer followed by Northern and Central provinces.

Table 5. 7: Percent of households receiving FISP fertilizer by year

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
National	9.1	11.5	16.3	21.9	29.0	34.8	33.5
Central	13.0	15.1	21.6	29.4	37.2	43.7	40.2
Copperbelt	12.7	16.3	20.0	27.9	34.2	37.9	35.2
Eastern	9.1	11.5	16.5	22.6	29.2	33.7	34.6
Luapula	4.3	6.3	11.1	13.7	18.9	25.1	23.4
Lusaka	17.2	21.2	26.9	31.9	42.6	47.9	43.1
Muchinga	12.5	13.7	20.1	26.8	35.8	44.5	46.3
Northern	5.8	7.7	13.8	20.7	30.3	37.6	35.8
Northwestern	13.5	17.6	23.1	28.0	36.0	41.5	39.8
Southern	9.6	13.8	16.5	22.7	30.3	37.9	36.0
Western	2.7	2.9	5.0	6.2	9.2	10.1	8.9

Source: RALS 2015

Table 5.8 presents the percentage of households that received FISP fertilizer in the 2014/15 agriculture season by total area cultivated. The table shows that a much larger proportion of households who received FISP during this season were those who cultivated 5 or more Ha followed by households cultivating between 2 to 5 Ha compared to the percentage of households cultivating smaller land sizes. Only 12% of all the households cultivating less than 0.5 Ha received FISP fertilizer compared to 54% of the households cultivating 5 or more or 47% among households cultivating between 2 and 5 Ha. Thus, at national level, the percentage of households receiving FISP increases with farm size. The huge variation in the percentage of FISP recipient by area cultivated is seen across the provinces with exception of Northwestern province where the highest percentage of FISP recipients are households that cultivated between 2 to 5 Ha followed by those cultivating between 1 to 2 Ha.

Table 5.8: Percent of households receiving FISP fertilizer in 2014/15 by total cultivated area category

	Category of total cultivated area*				
	Less than 0.5 Ha	0.5 to 1 Ha	1 to 2 Ha	2 to 5 Ha	5 or more Ha
National	11.7	24	35.4	47	54
Central	18.1	31.8	41.4	48.6	50.8
Copperbelt	13.6	37.4	39.8	51.6	62.6
Eastern	15	16.9	30.2	47.8	58.8
Luapula	5.5	8.3	30.8	54.7	52.9
Lusaka	27.7	44	51.3	65.8	51.8
Muchinga	18.2	34.3	54.1	64.6	65.7
Northern	7.3	28.3	35	57.2	72.5
Northwestern	12.3	35.4	49.3	50.1	32.8
Southern	10.2	21	32	44.1	54.5
Western	5.7	6.4	12.4	9.3	20.2

Source: RALS 2015

*includes rented in/borrowed in land

5.6   Fertilizer use per hectare

Figure 5.1 shows the average kgs of basal dressing fertilizer applied per Ha. In all the Provinces, the average applications rates are lower than the blanket recommendation rate of 200 kg/Ha. The national average was 154.6 kg/Ha of basal fertilizer, while Northern province has the highest rate with 180kg/Ha followed by Luapula (177 kg/Ha) and Copperbelt province (174 kg/Ha). Southern province had the lowest rate of basal dressing fertilizer application with 113 kg/Ha.

Figure 5. 1: Average basal dressing fertilizer application per ha (Kg/Ha)
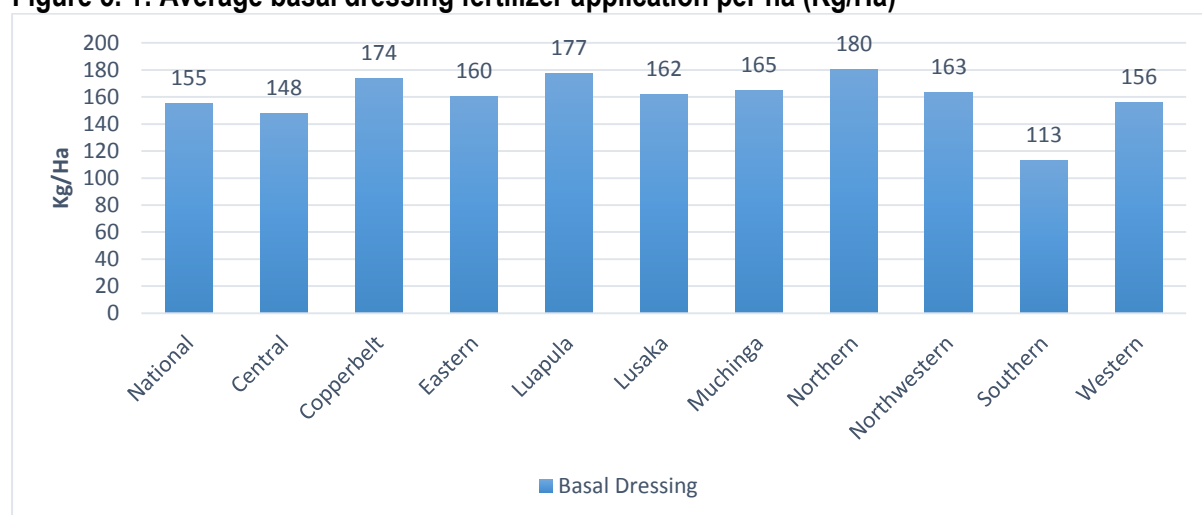
Source: RALS 2015

The average rates of top dressing fertilizer are shown in Figure 5.2. Nationally, households on average apply 153kg/Ha of top dressing fertilizer, which still falls short of the blanket recommendation rate of 200 kg/Ha. Similar to basal dressing application rates, Northern and Luapula provinces still have the highest application rates of top dressing fertilizer, while Southern province has the lowest application rates.

Figure 5. 2: Average top dressing fertilizer application per ha (Kg/Ha)
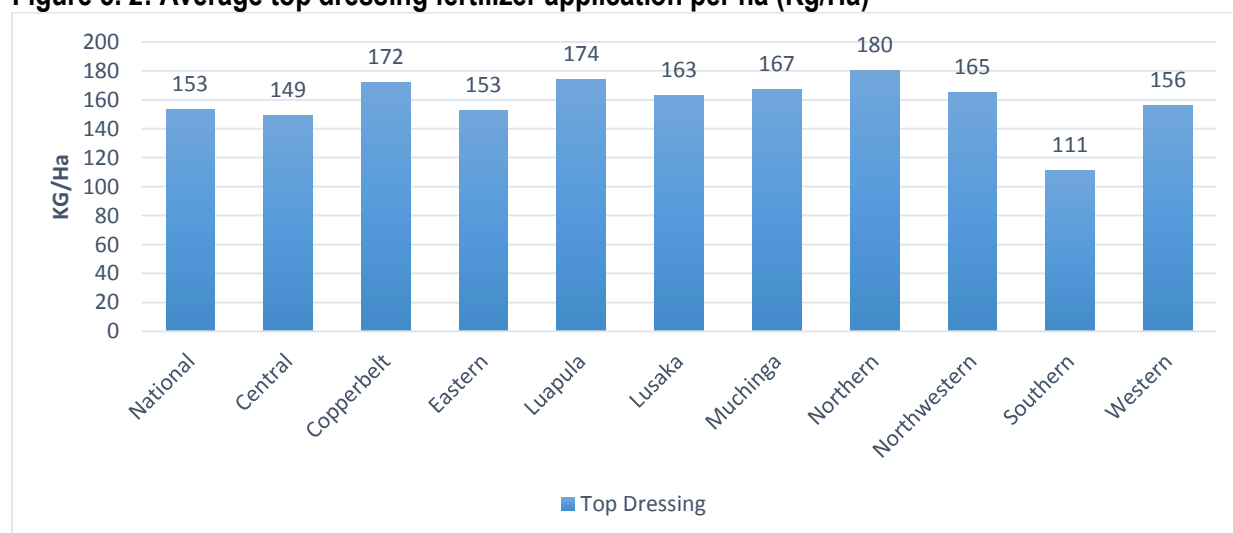
Source: RALS 2015

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5.7   Seed acquisition and sources

This section examines seed or planting material sources for five crops and the percentage of households that acquired seed from each of the seed source by province. Households that grew a particular crop were asked to identify the main source of the seed for the largest transaction by answering the question, "For the largest transaction used to acquire this seed, what was the source of seed/planting material?" Four categories of sources of seed were identified as follows: purchased seed from private traders, FISP, own harvest and other sources such as NGOs and other free seed from other households.

Maize: Figure 5.3 shows approximately 37% of the farm households reported purchasing their maize seed from an agro-dealer while 33.6% and 23.9% of the households acquired their seed from own harvest and FISP respectively. The three seed sources were the main sources of maize seed in various provinces. Central province had the highest percentage of households sourcing their seed from the market at 60.9% compared to 22.6% from Western province. Whilst, Northern province had the 42.3% of the households acquiring their primary maize seed from FISP compared to 34.7% who purchased it from the market. Western province has the highest percentage of farmers using maize seed from their own harvest followed by Eastern province, 59.9% and 53.3% respectively.

Figure 5. 3: Main source for maize seed
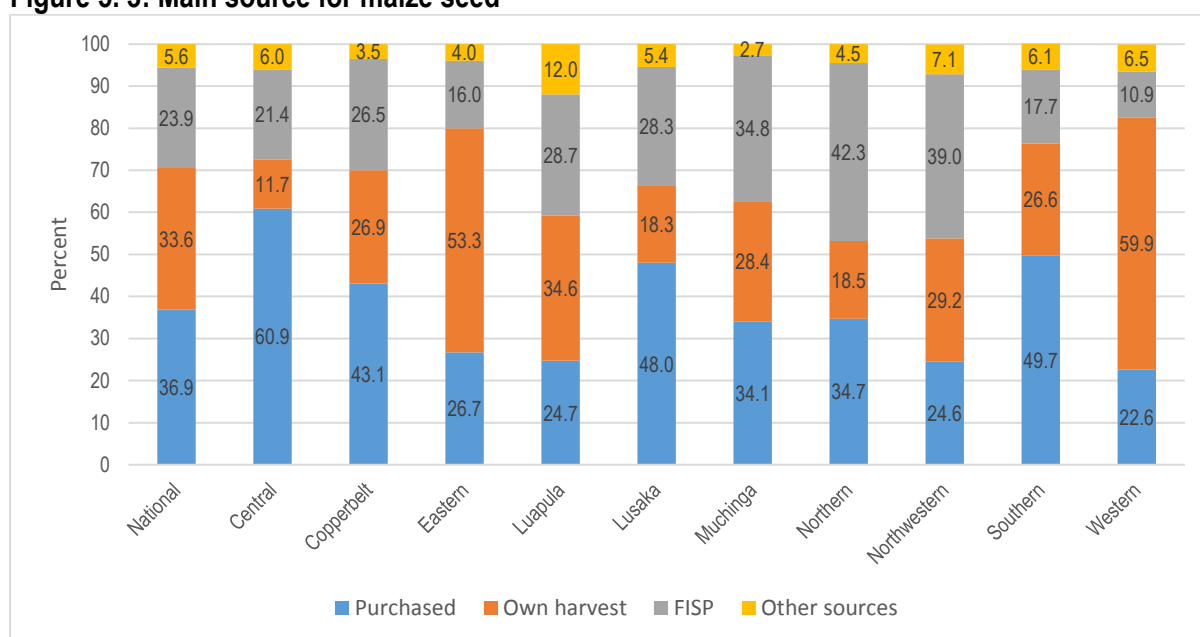
Source: RALS 2015

Groundnuts: Figure 5.4 shows that more than 65% of the households sourced their groundnuts seed from own harvest with the exception of households in Copperbelt, Lusaka and Northwestern provinces where a greater proportion of households used purchased seed. Muchinga province had the highest percentage of households (93%) reporting using seed from own harvest.

Figure 5. 4: Main source for groundnut seed
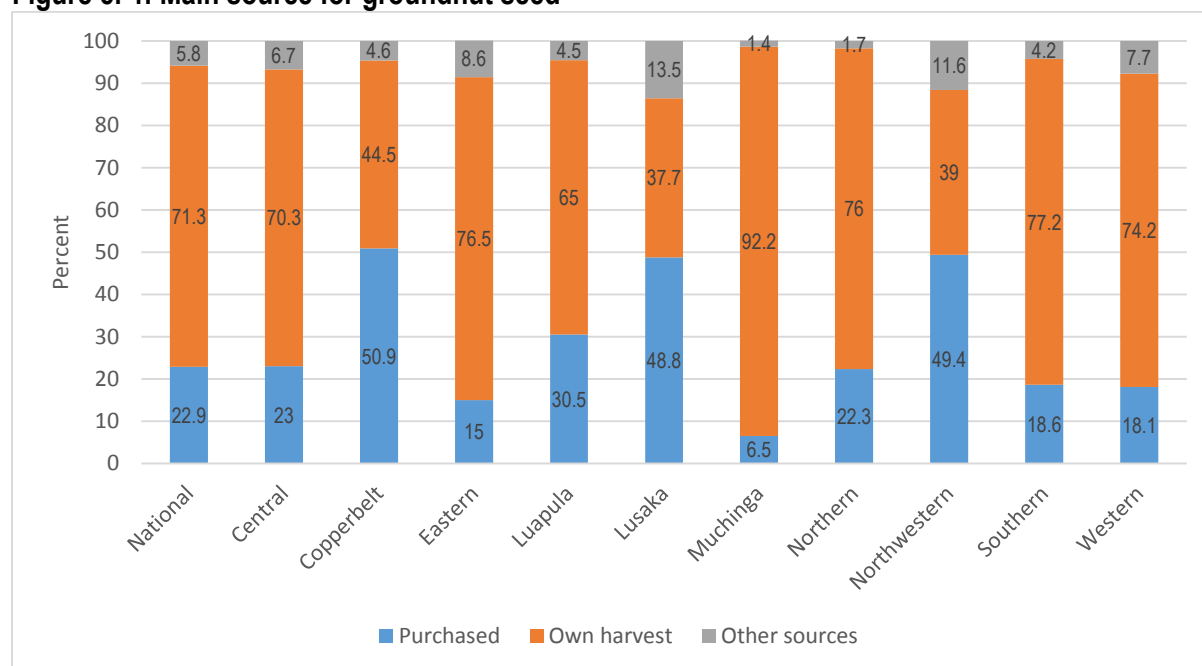
Source: RALS 2015

Soya beans: Figure 5.5 shows that more than most of the households growing soya bean in Southern and Lusaka provinces source their seed from private retailers with 88.3% and 84.1% using this source respectively. The other provinces where more than half of the households reported sourcing their soya bean seed from the market include Northwestern, Central and Copperbelt provinces. Households in the remaining provinces especially Western, Muchinga and Eastern provinces used mostly seed from own harvest.

Figure 5. 5: Main source for soya bean seed

Source: RALS 2015

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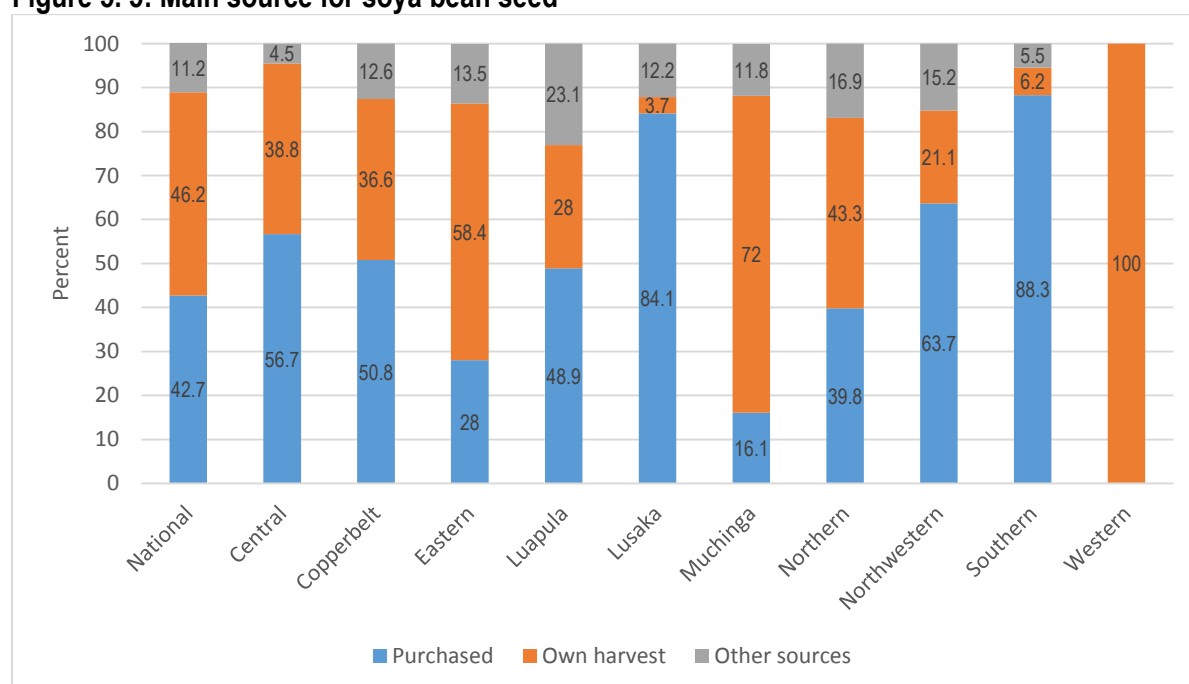
Sunflower: Table 5.9 shows that majority of the households growing sunflower used seeds from their own harvest. The trend is similar across the provinces with Muchinga recording a highest percentage of farmers using seed from own harvest for these three crops compared to other provinces. Lusaka province on the other hand, had the highest percentage of households that purchased sunflower seed from the private traders. None of the households interviewed grew sunflower in Copperbelt, Northwestern and Luapula province.

Sweet potatoes: Table 5.9 shows that the majority of smallholder households in Zambia use vines from own harvest both for white/yellow and orange fleshed sweet potatoes. An exception is Northwestern province for orange fleshed sweet potatoes which is mostly purchased.

Table 5. 9: Main source for sunflower and sweet potatoes seed or planting material (percent)

Crop Source	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Sunflower											
Purchased	22.6	52.2	-	17.8	-	87.0	18.4	16.0	-	34.8	0.0
Own harvest	64.2	47.8	-	69.7	-	2.8	70.0	71.9	-	46.1	0.0
Other	13.2	0.0	-	12.5	-	10.2	11.6	12.1	-	19.1	0.0
Sweet potato-white or yellow-fleshed											
Purchased	20.8	21.4	33.1	40.9	20.6	29.2	11.9	9.2	18.7	17.5	43.4
Own harvest	59.0	57.2	49.4	34.3	51.9	60.1	82.7	74.6	62.3	57.5	55.4
Other	20.3	21.4	17.4	24.9	27.5	10.7	5.4	16.2	19.0	25.0	1.2
Sweet potato-orange fleshed											
Purchased	22.1	39.5	8.6	0.0	2.7	0.0	0.0	47.9	87.4	0.0	0.0
Own harvest	52.8	32.1	91.4	87.6	68.4	65.6	100.0	52.1	0.0	26.2	100.0
Other	25.1	28.4	0.0	12.4	28.8	34.4	0.0	0.0	12.6	73.8	0.0

Source: RALS 2015

6. RURAL LOANS/CREDIT

This chapter presents results about households' access to loans and credit to support agricultural production. Table 6.1 shows the percentage of households acquiring loans for agricultural purposes by source. The results show that on average 15% of the households interviewed in 2015 reported having acquired an agricultural loan. The percentage is highest in Eastern province with 39% acquiring an agricultural loan followed by Central province with 23% and then Muchinga with 9%. Out of the 11 loan/credit sources, only two sources were more prominent, that is, out-grower schemes in Eastern, Central and Muchinga and informal money lenders across all provinces. Other loan/credit sources such as community lending groups, commercial banks and others, were used by less than 1 percent of the households. On average, the value of loans was K924.93, with Lusaka province having the highest loan value of K3141.80 and Muchinga province with the lowest loan vale of K587.97

6.1   Credit/Loan acquisition by gender of household head

When disaggregated by gender of the household head, we find a similar pattern in terms of loan sources with a higher proportion of male headed households acquiring loans than female headed households. Table 6.2 shows that 8.2% more male headed households acquired agricultural credit nationwide compared to female headed households, 17.8% and 9.6% respectively. By source, about 11% of the male headed households acquired loans via out-grower schemes compared to 6% among the female headed households. Similarly, a slightly higher percentage of male headed households acquired loans from the informal money lenders compared to their female counterparts. All other sources have a less than 1% of households using them.

6.2   Credit/Loan acquisition by landholding size

When disaggregated by land cultivated, we find a similar pattern in terms of loan sources were out-grower schemes are more among households with land size of 0.5-20 Ha. The households with less than 0.5 Ha of land tend to use the informal money lender more (2%) compared to other sources. Households owning 10-20 Ha acquire relatively more loans from the commercial banks as compared to other households with less land.   However, the results show that on average a greater proportion of households acquiring loans are those cultivating 5-10 Ha (27.3%).

Table 6.1: Households acquiring loans by source

Loan/credit source	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Number of farmers	1,512,378	173,812	77,988	281,672	156,634	48,508	125,151	184,101	106,563	206,397	151,553
% receiving loans	15.0	23.0	6.0	39.0	8.0	6.0	12.0	6.0	2.0	9.0	5.0
Government-run program	0.2	0.0	0.0	0.6	0.0	0.8	0.1	0.1	0.0	0.0	0.0
Commercial bank	0.3	1.3	0.2	0.2	0.0	0.8	0.5	0.3	0.1	0.1	0.0
ZNFU Lima Credit Scheme	0.3	0.6	0.1	0.5	0.0	0.7	0.8	0.2	0.0	0.1	0.1
Farmers' union or cooperative (excluding ZNFU Lima Credit Scheme)	0.5	0.8	0.7	0.6	0.5	0.4	0.4	0.2	0.4	0.5	0.3
Micro credit institution / community credit scheme	0.2	0.1	0.3	0.2	0.3	0.4	0.1	0.0	0.0	0.0	0.5
Out-grower scheme	9.7	17.3	0.3	35.1	0.0	2.1	6.9	0.1	0.0	3.7	0.2
Input credit from private company (excluding outgrower schemes)	0.6	0.9	0.0	1.5	0.0	0.0	0.4	0.2	0.1	0.5	0.3
NGO / faith-based organization / church	0.2	0.0	0.3	0.2	0.5	0.0	0.5	0.7	0.0	0.1	0.1
Friend/relative/informal money lender (e.g. kaloba)	3.3	2.9	3.0	2.7	6.7	0.4	2.5	3.2	1.2	4.9	3.1
Company leasing equipment to own (e.g. Rent to Own)	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Community-based savings group (e.g. SILC, VSLA, etc.)	0.4	0.1	0.9	0.3	0.0	0.5	0.2	1.2	0.0	0.2	0.5
Average value of loans (ZMW)	924.93	964.80	1465.05	817.07	1049.76	3141.80	587.97	1566.06	1601.76	847.66	794.71

Source: RALS 2015

Table 6.2: Households acquiring loans by source by gender of household head

Loan/credit source	National	Male headed	Female Headed
Number of households	1,512,378	1,124,485	387,893
% receiving loans	15.0	17.8	9.6
Government-run program	0.2	0.1	0.2
Commercial bank	0.3	0.4	0.0
ZNFU Lima Credit Scheme	0.3	0.4	0.0
Farmers' union or cooperative (excluding ZNFU Lima Credit Scheme)	0.5	0.5	0.3
Micro credit institution / community credit scheme	0.2	0.2	0.1
Out-grower scheme	9.7	11.0	5.9
Input credit from private company (excluding outgrower schemes)	0.6	0.6	0.3
NGO / faith-based organization / church	0.2	0.3	0.0
Friend/relative/informal moneylender (e.g. kaloba)	3.3	3.6	2.6
Company leasing equipment to own (e.g. Rent to Own)	0.0	0.0	0.0
Community-based savings group (e.g. SILC, VSLA, etc.)	0.4	0.4	0.2

Source: RALS 2015

Table 6. 3: Households acquiring loans by landholding size

Loan/credit source/	National	-------------Land holding size (Ha) -------------					
		>0.5Ha	0.5- 1Ha	>1-2Ha	>2-5Ha	>5-10Ha	>10.0Ha
Number of households	1,512,378	279,305	320,244	459,244	375,023	64,709	13,853
% receiving loans	15.0	3.3	6.5	14.8	22.9	27.3	26.9
Government-run program	0.2	0.0	0.3	0.1	0.2	0.0	0.0
Commercial bank	0.3	0.1	0.1	0.3	0.0	0.9	9.4
ZNFU Lima Credit Scheme	0.3	0.0	0.1	0.2	0.4	1.8	2.2
Farmers' union or cooperative (excluding ZNFU Lima Credit Scheme)	0.5	0.2	0.1	0.4	0.7	1.6	0.8
Micro credit institution / community credit scheme	0.2	0.0	0.4	0.1	0.1	0.5	0.2
Out-grower scheme	9.7	0.8	3.8	9.0	17.0	17.1	11.0
Input credit from private company (excluding outgrower schemes)	0.6	0.0	0.1	0.5	1.1	0.8	0.5
NGO / faith-based organization / church	0.2	0.0	0.1	0.3	0.4	0.3	0.0
Friend/relative/informal money lender (e.g. kaloba)	3.3	2.0	1.6	3.9	4.0	6.1	4.2
Company leasing equipment to own (e.g. Rent to Own)	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Community-based savings group (e.g. SILC, VSLA, etc.)	0.4	0.3	0.3	0.4	0.5	0.1	0.0

Source: RALS 2015

7. LIVESTOCK, POULTRY AND FISH FARMING

This chapter examines the households' production, marketing and diseases control of livestock, poultry and fish owned by the rural smallholder households in Zambia. The role of livestock in poverty alleviation and its potential for commercialization at household level is largely determined by ownership and the size of the herd.

7.1   Livestock Production

Table 7.1 shows livestock ownership and percent of production by province. Results show great variability in livestock ownership across provinces for all livestock types. The results shows that the most common type of livestock owned by the majority of households are chickens followed by goats and then cattle. On average, more than 80% of the households reported that they had at least one chicken, 35% owned goats, 31% cattle and only 16% reported owning pigs. Figure 7.1 shows the ownership patterns for cattle, goats and pigs whilst table 7.1 presents ownership patterns on other livestock type.

Figure 7. 1: Cattle, Goats and Pigs ownership among smallholder households by province.

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Nwestern	Southern	Western
Cattle	31.1	36.9	13.3	47.1	2	26.2	10.3	8	13.2	58.7	41.6
Goats	35.1	45	27.9	30.7	37.5	37.7	26.5	27.4	33.9	54.3	8.8
Pigs	16.3	7.4	11.4	40.3	8.2	7.1	16.1	12.4	4.3	13.7	6.9
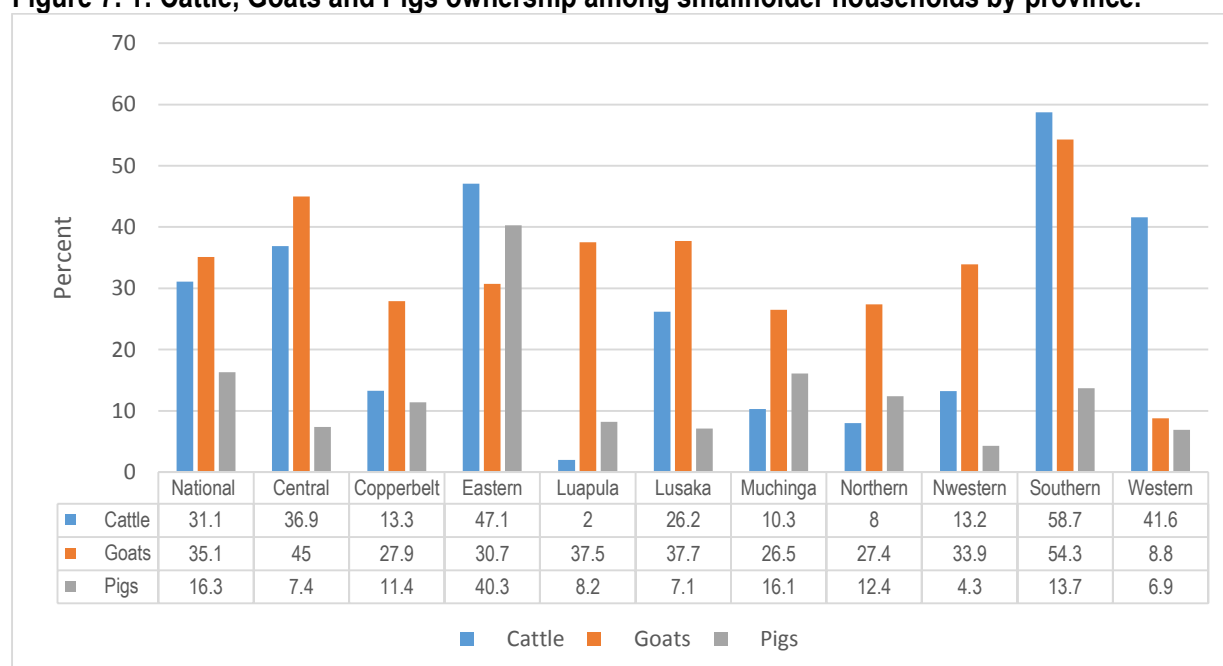
7.1.1   Cattle

As expected, the percentage of households raising cattle is highest in three provinces, Southern with 58% owning cattle, followed by Eastern with 47% and then Western with 42%. Luapula and Northern provinces have the least number of households raising cattle, with only 2% of the households raising cattle in Luapula and 8% in Northern (Figure 7.1). In terms of herd size, Table 7.2 shows that on average among cattle producers, smallholder farmers in Zambia own about 8 cattle.

7.1.2   Goats

Figure 7.1 shows that Southern province leads in terms of the percentage of households raising goats, 54.3%, closely followed by Central province with 45% and then Lusaka province with 37.7%. In general, goats are produced across all the provinces with Western province having the least percentage of

households raising goats.   In terms of herd size, Table 7.2 shows that on average among goat producers, smallholder farmers in Zambia own between 4-7 goats.

7.1.3   Pigs

Figure 7.1 shows that Eastern province leads in terms of the percentage of households raising pigs with about 40% raisings pigs compared to a national average of 16.3%. Most of the provinces have less than 10% of the households raising pigs. Among those raising pigs, the average number of pigs raised per household is 4, with the highest in Lusaka province where the average number owned per household raising pigs is 10. In Eastern province, the average is 5 pigs per household.

7.1.4   Village Chickens and egg production

Village chickens are widely produced across all the provinces with an average of 13 birds raised per household.   Central province has the highest percentage of households raising village chickens followed by Copperbelt, 94% and 89% respectively. More than 30% of the households raising chickens reported producing eggs (not for hatching) in all the provinces except Western, Muchinga and Northwestern. Western province has the lowest percentage of households producing eggs, 11.8% compared to the national average of 41.8%.

7.1.5   Milk production

The percentage of households reporting that they produced milk correlates well with cattle ownership. Southern province has the highest percentage of households producing milk with 42% of the households indicating milking their animals followed by Western and Central provinces with 29.8% and 26.9% respectively. Eastern is in close fourth with 16% of the households reporting producing milk.

7.1.6   Aquaculture

Table 7.1 shows that aquaculture (fish grown in ponds) in Zambia is generally very low with less than 1% of the households reporting that they had fish ponds. However, Lusaka province has the highest percent of households growing fish in ponds at 3.4%, whilst none of the households in our sample raised fish in ponds in Southern, Western, Central and Copperbelt provinces.

Table 7.1: Livestock production

Livestock type	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Value of livestock	3,194	4,493	2,952	2,427	563	5,804	1,413	910	1,972	5,402	3,708
Percent owning											
Cattle	31.1	36.9	13.3	47.1	2	26.2	10.3	8	13.2	58.7	41.6
Goats	35.1	45	27.9	30.7	37.5	37.7	26.5	27.4	33.9	54.3	8.8
Pigs	16.3	7.4	11.4	40.3	8.2	7.1	16.1	12.4	4.3	13.7	6.9
Sheep	1.2	0.5	2	1.3	0.7	1.2	0.6	0.4	0.8	3.2	0
Donkeys	0.1	0.2	0	0.1	0	0.6	0	0	0	0.4	0.1
Village Chickens	84.4	94	89.6	73.8	84.3	87	88.6	82.6	83.3	86.2	85.8
Guinea Fowls	6.2	12.1	2.7	3.6	0.1	7	2.1	1	1.5	18.7	0.5
Ducks & Geese	6.5	5.7	9	5.5	11	11	6.2	5	6.6	5.7	5
Rabbits	0.4	0.3	0.5	0.1	1.2	0.8	0.4	0.9	0	0.1	0
% producing milk	21.9	26.9	6.9	16.8	0	25.6	6.8	0.9	3.5	42.9	29.8
% producing eggs	41.8	60.8	36.1	34.7	45.6	47.5	21.8	27.6	44.9	65	11.8
% growing fish	0.9	0.2	1.4	0.6	0.1	6.5	3.4	0.4	1.2	0.4	0
% harvesting fish from ponds	0.3	0	0	0.1	0.6	0.6	0.1	1.4	1	0	0

Source: RALS 2015

Table 7.2: Average number of owned livestock as of April 2015

Livestock type	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Number of farmers	1,189,344	162,489	62,135	237,335	113,306	37,638	99,733	132,261	67,983	192,694	83,771
Cattle	8	8	7	6	4	11	7	4	8	10	9
Goats	7	9	6	5	4	10	5	4	6	10	4
Pigs	4	4	7	5	3	10	3	4	3	4	7
Sheep	6	6	5	6	7	15	5	3	6	7	.
Donkeys	3	3	.	4	.	1	.	.	.	4	2
Village Chickens	13	15	12	10	9	18	12	11	16	17	11
Guinea Fowls	7	6	6	7	12	7	6	5	6	8	5
Ducks & Geese	6	5	7	6	5	5	9	6	12	6	6
Rabbits	6	3	9	16	6	5	4	6	.	1	.

Source: RALS 2015

7.2   Livestock ownership by gender

Figure 7.2 shows the proportion of households owning livestock by gender. In general, we find that a higher proportion of male headed households own livestock compared to female headed households. In terms of the average number of livestock owned, Figure 7.3 shows that that male headed households on average own more of the different livestock type apart from sheep, ducks and geese. These results support findings from other studies showing male headed households fare much better in terms of resource ownership than female headed households.

Figure 7.2: Percent of households owning livestock by gender of household head

	Cattle	Goats	Pigs	Sheep	Village Chickens	Guinea Fowls	Ducks & Geese	Rabbits	Donkeys
National	31.0	35.2	16.3	1.2	84.5	6.2	6.5	.4	.1
Female	23.2	26.8	14.3	.8	81.9	3.5	4.7	.1	.1
Male	33.4	37.6	16.9	1.3	85.2	7.0	7.0	.5	.2
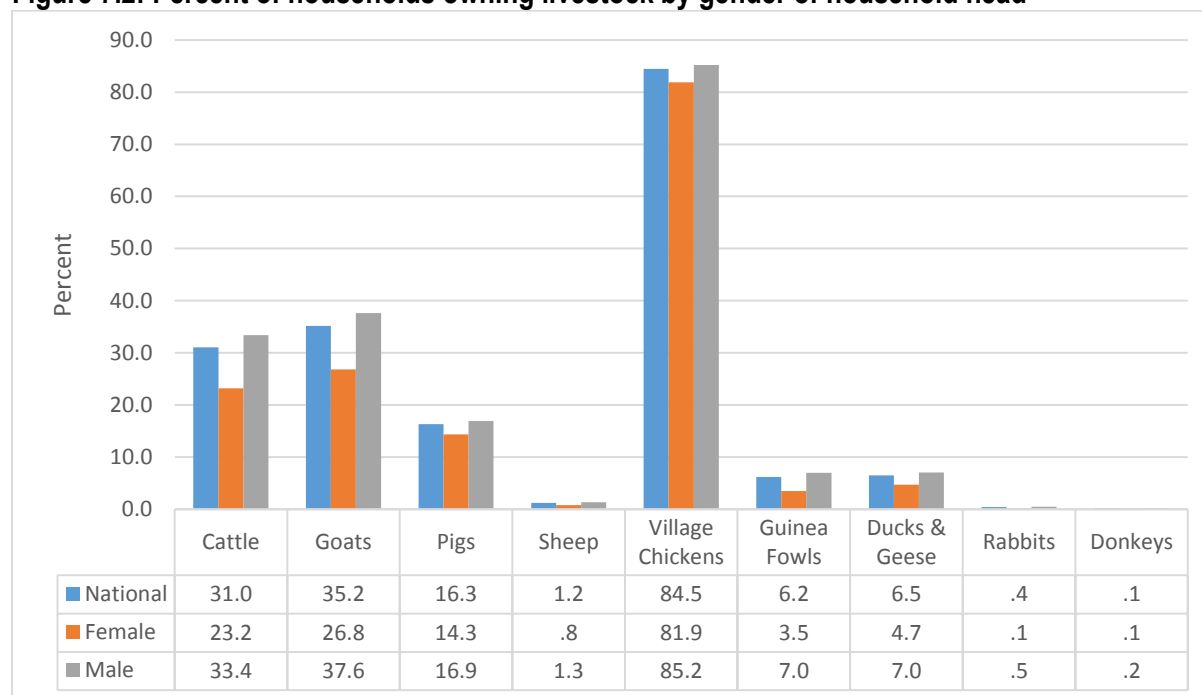
Source: RALS 2015

Figure 7.3: Average number of owned livestock by gender of household head

	Cattle	Goats	Pigs	Sheep	Donkeys	Village Chickens	Guinea Fowls	Ducks & Geese	Rabbits
■ Total	8	7	4	6	3	13	7	6	6
■ Male	8	7	5	6	3	14	7	6	7
■ Female	6	6	4	8	2	10	5	7	3
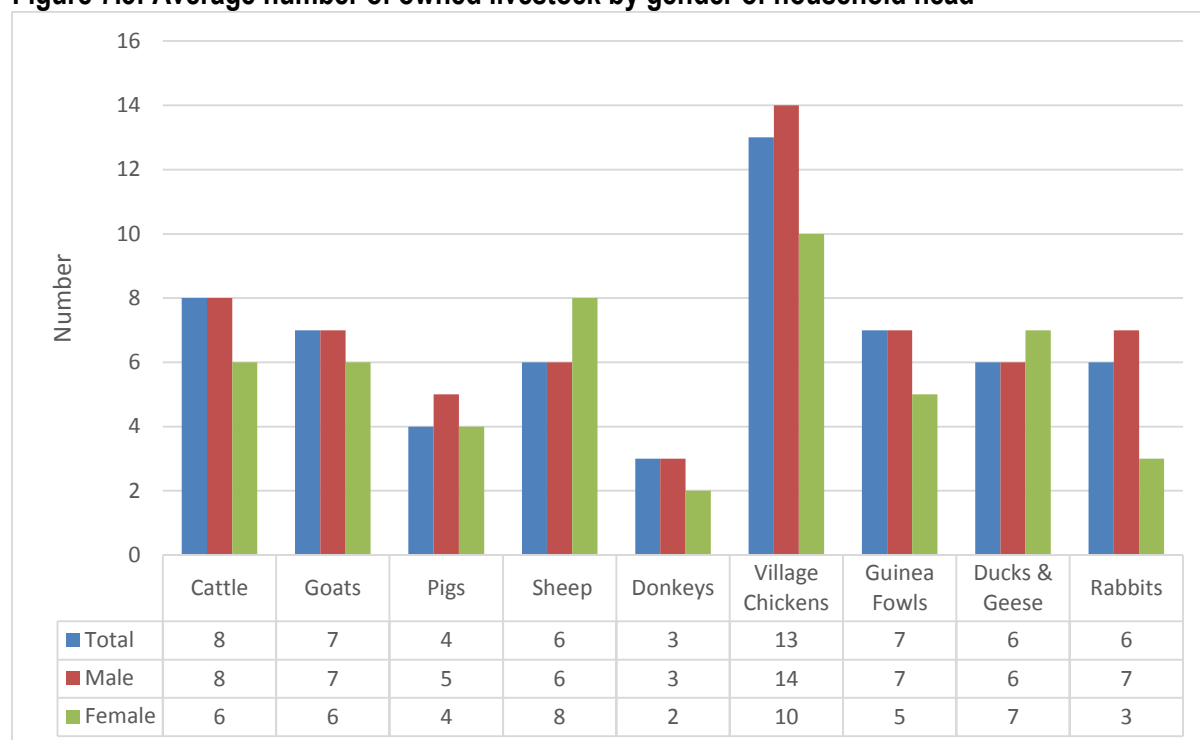
Source: RALS 2015

7.3   Livestock sales

For the survey year, results in Table 7.3 show that participation in livestock markets among smallholder farmers in Zambia was generally low in the survey year. Among those who raise livestock, sales of small livestock was more common, despite having only 3 in every ten households raising goats, pigs, chickens, and sheep participating in the market.

For cattle, only 16.9% of households raising cattle reported selling any of their animals. At provincial level, Northwestern province had the highest percent of households participating in the cattle market (33.7%) whilst Eastern province had the lowest percent of households selling cattle (11.7%). Despite having the largest proportion of households owning cattle, only 16.5% of the households in Southern province sold their livestock.

In terms of income generated from livestock, the national average per household was only about K738, with Southern province recording the highest income per household from livestock sales at K1227, followed by Lusaka province with K1209. Northern province had the lowest income generated from livestock sales with only K161. These results suggest that the country still has a lot to do in terms of promoting livestock marketing especially in provinces where a greater proportion of households have animals.

Table 7.3: Livestock sales

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Farmers selling (%) - among owners											
Cattle	16.9	15.5	24.1	11.7	17.9	24.7	16.2	22.3	33.7	16.5	27.7
Goats	33.6	46.2	48.2	20	37.7	49.5	21.1	22.5	33.2	35.7	25.3
Pigs	32.1	46.7	63.3	21.9	47	60	24.8	33.2	56.2	45.5	40.2
Sheep	35.5	9.4	7.4	20	67.1	81.3	12.7	27.2	79	44.2	0
Village Chickens	36.1	31.4	44.7	23	31.3	43.8	33.2	40	48.5	42.4	48.1
Livestock sales (ZMW)	738	874	538	573	279	1209	368	161	495	1227	746

Source: RALS 2015

Table 7. 4: Percent of women making decisions to sell livestock

Livestock type	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Cattle	17.8	16.1	22.3	16.4	17.8	12.4	7.4	14.4	20.4	20	21.7
Goats	24	28	27.6	24	17.3	27.9	10.7	18.1	23.8	28.7	19.9
Pigs	28.2	18.1	43.7	33.5	5.5	29.7	12.9	24.8	25.3	27.1	34.1
Sheep	22.9	0	28.8	35	6.7	46.2	41.3	0	11.1	20.3	0
Village Chickens	50.5	47.6	56.8	55	52.3	55.3	39	42.9	47.1	52.6	59

Source: RALS 2015

For decisions involving the selling of livestock, the results show that more women make decisions on the sale of chickens (50.5 %), compared to sales of cattle, sheep, goats, and pigs mainly done by men (Table 7.4). Some differences can be noted when the share of women making decisions to sell is disaggregated by province. Notably, there is a higher proportion of women making the decision to sell cattle in Southern (20%), Northwestern (20.4%), Copperbelt (22.3%), and Western province (21.7%) compared to the national average of 17%.

7.4   Livestock disease control

Table 7.5 shows the percentage of households that vaccinate and deworm their livestock. The results show vaccination and deworming is most commonly done for cattle compared to the other livestock types. For example, of all the households owning cattle, 76% vaccinated their animals, compared to less than 40% for all other livestock types. For cattle, Southern province had the highest proportion of households reporting that they vaccinated their cattle followed by Western province with 84.5% and Central with 78.1% of cattle owners having vaccinated their herds of cattle. Deworming is also mostly done on cattle compared to other livestock types. In general, the results show that village chickens receive the least attention given that the proportion of households vaccinating or deworming their chickens is lowest compared to the rest of the livestock.

7.5 Type and sources of drugs

Table 7.6 shows the type and source of drugs. The results show that majority of the smallholder households treat their animals using veterinary drugs. However, the use of traditional medicines to treat sick animals is above 50% in three provinces, Copperbelt with 60.5% of the households reporting using traditional drugs, 71% in Luapula and 58.3% in Northern province. Southern province has the highest percentage of households using veterinary drugs.

The results show that livestock farmers in Zambia acquire drugs from mainly two sources, the private sector and government veterinary department. Nationally, 49.2% of the households reported sourcing their drugs from private sources, 44.5% sourced their drugs from the government and the remainder from other sources. A higher percentage of households in Central, Lusaka and Southern provinces source their veterinary drugs from private sources compared to the other provinces that mostly rely on government as a major source of the drugs.

7.6 Tick/flea control

The majority of livestock producing households indicated that they did not do anything to control for ticks or fleas (Table 7.6). The remaining 25% used a variety of methods to control for the bugs with spraying being the most common method used. Only 4.2% of the livestock owners reported dipping as their main method for tick/flea control. Southern province has the highest proportion of households practicing tick/flea control. By province, spraying is mostly practiced in Lusaka province and dipping is mostly practiced in Southern province.

Table 7.5: Percentage of households that vaccinate livestock

Livestock type	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Percent of households that vaccinate livestock											
Cattle	76	78.1	75.6	69.9	57.3	77.5	46.8	29.8	48	87.3	84.5
Goats	19.2	23.1	11.3	3.7	3	32.4	8.3	0.2	5.7	45.6	15.5
Pigs	15.3	17.6	33.8	6.3	5.5	17.2	20.7	2.5	11.6	48.6	16.3
Sheep	37.1	59.8	37.3	3.6	0	54.4	10.7	0	0	63.5	0
Village Chickens	13.8	19.5	7.2	8.8	2.2	21.8	7.4	7.1	6.8	29.1	17.9
Percent of households that deworm livestock											
Cattle	52.9	67.5	68.8	40.8	40.1	52.7	51.2	31.4	55.4	63.4	36.1
Goats	10.8	16.3	14.7	3.2	0.7	25.5	4.6	0.7	2.2	20.9	13.2
Pigs	12.5	17.4	56.9	3.3	1.8	24.4	18.7	2.8	5.4	35	17.8
Sheep	30.2	29.5	31.3	10.8	13.6	51.7	10.7	0	11.1	46.6	0
Village Chickens	4.3	4.7	4.7	2.9	1.7	6.6	3.4	0.7	1.8	8.9	6.4

Source: RALS 2015

Table 7.6: Type and source of drugs and tick/flea control

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Type of drug											
Veterinary drugs	70.5	69.9	39.5	81	22.9	72.2	68	41.7	55.9	84	50.7
Traditional medicines	29.5	30.1	60.5	19	77.1	27.8	32	58.3	44.1	16	49.3
Source of drug											
Government	44.5	30.4	54.7	56.5	62.4	35	52.6	39.4	61.7	39.5	71.3
Private	49.2	60.7	36.3	39.3	23.7	56.3	40	49.8	29.6	55.2	22.9
Other	6.3	8.9	9.1	4.2	13.9	8.6	7.4	10.8	8.7	5.2	5.9
Tick/flea control											
Dipping	4.2	3	2	3	0.6	2.5	1.8	0.3	1.3	12.7	0.1
Spraying	16.1	31.4	14.8	13.6	1.9	30.8	2.6	1.7	1.5	28.3	5.8
Pour on	1.2	1	3.1	1.2	0.5	1.2	3.3	0.3	0.1	1.1	0.1
Hand dressing	2	0.3	0.4	0.5	1.6	0	0.6	0.5	3.6	3.6	11.1
Injectable	1.7	0.5	0.8	1.7	0.3	0.1	2.7	0.4	4.4	1.9	6.3
None	74.7	63.8	78.8	79.9	95	65.4	89	96.8	89.1	52.3	76.5

Source: RALS 2015

7.7   Animal grazing

Table 7.7 shows the main grazing areas for livestock by different season. Of the households that owned large ruminants, 87% graze their animals in communal pastures, this number reduces to 68%, and 54.7% in the hot and cold season respectively. With own pasture, crop fields, becoming more important areas for animal grazing during the hot and cold seasons Unfenced own or neighbors crop field is the second most common grazing area reported by the farmers during the hot and cold dry seasons compared to the rainy season. This is because crop-residues are a major source of feed for ruminants in the dry season.

Table 7.7: Small and Large Ruminants Grazing Area by Season

Season	Large ruminants (Cattle)	Small ruminants (Goats and sheep)
Rainy season		
Communal pastures	87.1	59.4
Own pasture	8.4	16.1
Pegged/corralled at homestead	1.9	18.6
State land (e.g. parks)	0.2	0.2
Own and neighbors crop fields (no fencing, restrictions)	0.9	3.2
Own crop fields only	1.3	2.1
Other (specify)	0	0
Did not own at this time	0	0.1
Kept elsewhere not specified	0.2	0.2
Near a river/stream	0	0
Pasture at another farm	0	0
Cold dry season		
Communal pastures	54.7	53
Own pasture	9	13.5
Pegged/corralled at homestead	0.5	4.5
State land (e.g. parks)	0	0
Own and neighbors crop fields (no fencing, restrictions)	28.2	22.4
Own crop fields only	7.2	6.1
Other (specify)	0	0
Did not own at this time	0	0.2
Kept elsewhere not specified	0.2	0.2
Near a river/stream	0.2	0
Pasture at another farm	0	0
Hot dry season		
Communal pastures	68.3	62.2
Own pasture	5.5	10
Pegged/corralled at homestead	0.8	3.3
State land (e.g. parks)	0	0
Own and neighbors crop fields (no fencing, restrictions)	21.6	19.9
Own crop fields only	3.4	4.1
Other (specify)	0	0
Did not own at this time	0.1	0.2
Kept elsewhere not specified	0.2	0.2
Near a river/stream	0.1	0
Pasture at another farm	0	0

Source: RALS 2015

8. HOUSEHOLD ASSETS/IMPLEMENTS

This section examines the ownership of assets and farm implements owned by the households. Table 8.1 shows household ownership of farm assets, while Table 8.2 shows household ownership of non-farm assets.

8.1   Ownership of farm assets

Results show that the most commonly owned assets among smallholders are ox-drawn ploughs (21%), trained oxen (19%), and knapsack sprayers (16%). Other farm assets owned by households are scotch carts (8%) and wheel barrows (7%), while the rest of the farm assets are owned by less than 5% of the households.

The observed farm assets ownership pattern shows that rural households mainly own those assets that are used for land preparation purposes, crop protection and to a lesser extent, transportation of produce. When disaggregated at provincial level, the data shows that ox-drawn ploughs ownership is highest in Southern province (58%) followed by Central (36%), Eastern (27%), Western (20%) and Lusaka provinces (18%). The ownership of ox-drawn ploughs corresponds well to the ownership of trained oxen/cows.

Ownership of other land preparation assets such as harrows, cultivators, rippers, ridgers, weeders is very low among smallholder households with slightly higher ownership in Southern and Central provinces compared to the other provinces. Notably, very few smallholder farmers own conservation farming equipment such as rippers.

Tractor ownership is only 0.2% across all the provinces. Similarly, ownership of irrigation equipment is very low, implying heavy reliance on rain fed agriculture. However, ownership of knapsack sprayers is appreciably higher than other assets, especially in Central, Lusaka, Southern, Eastern and Copperbelt. Scotch cart ownership is low across all provinces but is relatively higher in areas where cattle ownership is more prevalent in Southern, Central and Eastern provinces. Ownership of wheel burrows is relatively higher in Lusaka, Copperbelt and Central compared to all the other provinces.

Table 8 1: Percent of household ownership of farm assets

Asset	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Trained Oxen/Cows	19	31.2	6.3	31.9	0	15.7	0.3	2.8	1.1	47.1	17.8
Ox-drawn plough	20.7	36	9.7	26.5	0.1	17.5	0.6	3.4	2.4	57.5	20.4
Disc plough	0.4	1	0.8	0.5	0	1.9	0	0	0	0.2	0.3
Harrows	4.4	13.8	2.6	0.1	0	6.2	0.1	0.1	0	17.1	0.8
Cultivators	3	9.2	0.5	0.1	0	0.8	0	0	0.3	13.4	0.1
Rippers	1.9	4.7	0.9	2.7	0	2.2	0	0.2	0	4.9	0.3
Ridger / weeder	2.3	3.5	0.9	9	0	0.3	0	0	0.2	1.1	0.1
Planter	0.2	0.5	0.2	0	0	0.1	0	0	0	0.9	0
Fitarelli	0	0.1	0	0	0	0	0	0	0	0.1	0
Tractor	0.2	0.6	0.5	0.3	0	0.8	0	0	0	0.3	0
Hand driven tractor	0	0	0.1	0	0	0	0	0	0	0	0
Scotch carts	8.4	16.1	3.6	14	0	6.4	1	0.2	2	18.4	8
Wheel barrow	7.1	10.8	16.5	3.4	8.3	30.9	5.1	3.9	6.7	6.7	2.1
Water pump / treadle	1.7	5.6	2.5	0.6	0.4	10.2	0.1	0	0.6	2.4	0.9
Other irrigation equipment (e.g. irrigation pipes)	2.1	5.8	1.4	3	0.2	9.9	0	0	2.7	1.9	0.6
Knapsack sprayer	16.3	39	20.7	25.9	2.7	28.5	1.8	2.4	3.4	27.6	2.6
Boom sprayer	0.5	0.2	0.1	0.8	0	0.9	0.3	0.1	1.2	1.2	0

Source: RALS 2015

8.2   Ownership of non-farm assets

Table 8.2 shows household ownership of assets. Overall, the main types of assets owned by households apart from their houses[2] include bicycles (61%), radios (55%) and cellphone (54%). Between 20-30% of the households owned solar panel equipment, car batteries and televisions. Household ownership of these asset types reflect the importance of shelter, transportation, information/entertainment, communication and energy. It is also interesting to note that more than 50% of households own either radios or cellphones, which are important channels for targeting rural households with extension messages on commodity marketing and input prices among others.

At provincial level, Lusaka had the least proportion of house ownership (83.4%), reflecting a higher number of households with rented or borrowed shelter. Central province had the highest number of households owning bicycles (78%) while Western province had the least (30%). For some assets such as radios, cellphones, car batteries and televisions, household ownership varies across provinces with provinces on the line of rail having higher ownership percentages. Copperbelt province had the highest proportion of households owning solar panel equipment compared to all the other provinces. Ownership of car batteries somewhat corresponds to ownership of solar panels and Televisions. Fishing nets and boats/canoes are important assets in Luapula, Northern and Western provinces. This is not surprising given that these provinces have fishing as one of the prominent activities.

Figure 8. 1: Average value of assets per household with and without housing

Source: RALS 2015
Note: Figure is based on numbers presented in Table A8.1 in the appendix.

Figure 8.1 shows the average value of assets owned by households at national and provincial level with and without housing. On average, the value of productive assets nationally is K15, 846. This reduces to K10, 046 when housing is excluded. At provincial level, the value of productive assets is highest in Lusaka at K 96,739, followed by Northwestern and Copperbelt provinces at K23, 584 and K20, 003, respectively. Western province had the least average value of productive assets at K5, 558. When households are excluded, Lusaka still had the highest average value of productive assets at K 49, 317, followed by

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[2] Note that some households interviewed resided in rented households, and as such, did not own any households.

Southern and Central provinces at K15, 351 and K15, 099 respectively. The lowest values are observed in Muchinga, and Northern Provinces at K3, 824 and K3, 644 respectively.

A further disaggregation of asset value into farm and non-farm, (Figure 8.2) shows that on average, household's assets value is higher for non-farm assets compared to farm assets. This is the case even at provincial level. Lusaka province on the other hand seems to be an outlier, with the value of non-farm assets (K 8,277) being about 3 times higher than the national average (K2, 588).

Figure 8.2: Average value of farm and non-farm assets
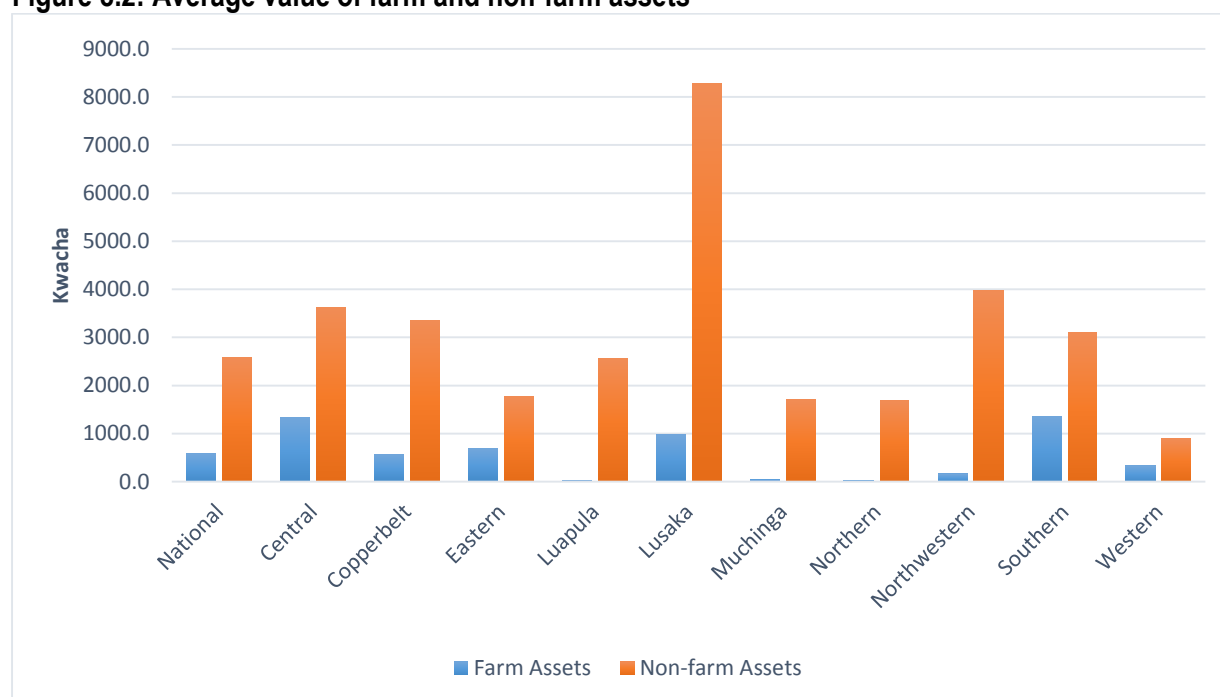
Source: RALS 2015
Note: Figure is based on numbers presented in Table A8.2 in the appendix.

Table 8.2: Household ownership of other assets

Asset	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Trucks / lorries	0.7	1.4	0.9	0.2	0.6	4.0	0.6	0.2	0.3	1.0	0.0
Pickups / vans / cars	2.9	5.1	3.0	2.1	2.2	7.9	1.4	1.9	4.4	3.9	0.7
Trailer	0.1	0.4	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.0
Motorcycle	2.6	1.9	0.2	2.9	1.7	2.3	2.8	1.5	8.2	4.3	0.2
Bicycles	61.3	77.7	72.2	64.0	67.0	56.1	63.5	63.3	66.4	53.0	30.9
Boats / canoes	4.6	0.1	1.6	0.0	15.3	0.7	1.5	8.5	3.0	1.4	13.2
Fishing net	6.0	1.1	1.9	1.2	16.9	1.7	3.1	11.4	5.4	2.5	13.2
Cattle dip / crush pen	0.6	0.4	1.0	0.1	0.1	0.5	0.6	0.0	0.0	2.8	0.0
Hand mills	1.1	0.2	0.1	0.2	0.0	0.7	0.0	0.0	0.9	6.9	0.0
Hammermills	1.5	2.6	1.8	0.7	0.3	1.6	1.6	1.7	2.7	2.2	0.2
Rump presses / oil expellers	0.1	0.0	0.2	0.1	0.0	2.5	0.0	0.0	0.0	0.1	0.0
Hand operated maize sheller	0.0	0.1	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Motorized maize sheller	0.1	0.1	0.5	0.1	0.0	0.9	0.0	0.0	0.0	0.2	0.0
Hand operated groundnut sheller	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Motorized groundnut sheller	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solar panel and equipment	30.0	50.2	23.0	28.5	24.9	41.1	23.0	23.4	29.8	30.0	28.9
Generator	3.2	7.6	5.8	2.2	2.5	7.8	2.0	1.2	4.5	2.2	1.6
Cell phone	53.6	68.7	72.2	50.6	49.1	85.9	42.4	42.0	54.3	62.2	37.7
Radio	54.5	63.4	68.9	55.6	54.3	77.8	56.0	51.4	56.0	50.8	33.8
TV	19.6	30.5	31.0	15.7	17.0	55.7	17.1	17.9	19.5	14.7	10.4
Car battery	21.2	32.6	29.6	15.2	18.6	36.7	21.5	21.2	18.0	19.7	16.7
Sewing machine	2.7	3.0	3.2	2.1	2.0	6.5	2.0	3.7	3.5	2.6	1.5
Houses excluding fields	94.7	95.9	96.0	97.3	90.2	83.4	90.8	95.5	96.1	94.3	97.4
Water tank	0.6	0.2	0.9	0.1	0.0	8.4	0.4	0.0	1.3	0.5	0.0
Standard well (protected)	3.0	8.5	20.2	1.1	0.8	6.4	1.5	0.6	0.4	2.3	0.1
Borehole	0.8	0.7	1.4	0.1	0.7	8.5	0.9	0.6	0.2	0.9	0.1
Improved Brazier (Mbaula)	3.7	0.3	0.3	5.1	0.0	1.1	16.8	1.0	1.4	2.9	7.0

Source: RALS 2015

8.3 Farm assets ownership by gender

Disaggregating household farm assets by gender of the household head, Table 8.3 shows that on average a higher proportion of female headed households reported owning ox-drawn ploughs scotch carts compared to male headed households.

Table 8. 3: Percent of Households owning farm assets by gender

Asset	Male	Female
Trained Oxen/Cows	43.2	41.2
Ox-drawn plough	45.0	59.2
Disc plough	0.8	0.0
Harrows	25.2	13.1
Cultivators	16.7	11.5
Rippers	4.2	4.9
Ridger / weeder	7.2	6.1
Planter	0.4	0.0
Tractor	0.9	0.0
Scotch carts	21.5	30.4
Wheel barrow	12.6	1.9
Water pump / treadle	8.2	2.6
Other irrigation equipment (e.g. irrigation pipes)	7.9	1.5
Knapsack sprayer	45.7	38.0

Source: RALS 2015

9. OFF-FARM INCOME ACTIVITIES, AND REMITTANCES

This section examines the household's off-farm income and remittances received by the household. Apart from farming, smallholder households also engage in other activities to generate income.

9.1 Off-farm income activities

Off-farm income activities discussed in this section include employment and business activities. Selling one's own agricultural produce was not considered an off-farm income earning activity. Figure 9.1 shows the percentage of households with at least one member earning income from employment and business activities. Overall, about 49% of smallholder households have at least one member who receives income from a business activity and 29% have at least a member receiving income from employment activities. Luapula leads in terms of the proportion of households with at least one member with a business activity with 67% compared to the national average of about 48%. On the other hand, Lusaka province has the largest proportion of households with at least one member that earns income from employment activities.

Figure 9. 1: Percentage of households with at least one member engaged in business and employment income activities.

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Business income	48.7	56.0	54.1	38.5	67.0	59.0	34.7	47.1	52.7	43.7	51.8
Employment income	29.4	21.0	35.5	36.8	35.1	49.0	28.3	22.6	34.2	24.2	22.7

■ Business income   ■ Employment income
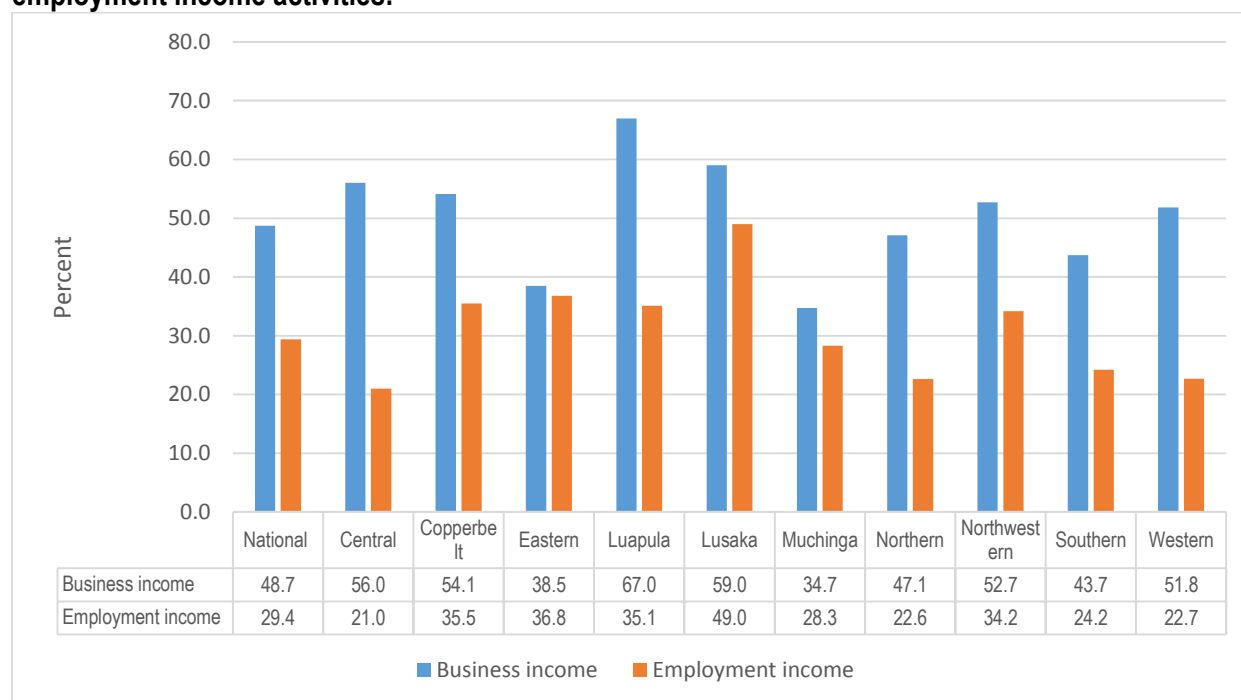
Source: RALS 2015

9.1.1   Business activities

Table 9.2 shows the percentage of households participating in various business activities. Overall, the survey results indicate that retailing/vending is the most important business activity with about 22% of households engaged in the activity. About the same proportion of households (13%) are engaged in charcoal production and selling, and local beer brewing and selling. Only about 10% of the households were involved in fishing and selling, while about 8% engaged in crop input/output trading. For the remaining business activities, participation was low, with less than 5% of the households engaging in each of the activities.

Retailing/vending is most prominent among households in Central and Northwestern provinces and least among households in Western province. Local beer brewing and selling was largely prominent in Muchinga province with over 30% of households engaged in the activity. Whilst Southern province had the least proportion of households engaged in local beer brewing business, with only about 3% participating in the activity. The percent of households involved in charcoal production was highest in Copperbelt province (29.7%) and lowest in Eastern province (5.9%). Fishing and selling of fish remains an important business activity among households in Luapula, Northern and Western provinces. The proportion of households involved in crop inputs and output trading is low across all the provinces but is comparatively higher in Northern province and lowest in Western province. Figure 9.2 shows the relative important of the top three (3) business activities in Zambia.

Figure 9. 2: Relative importance of three most important business activities in Zambia by province
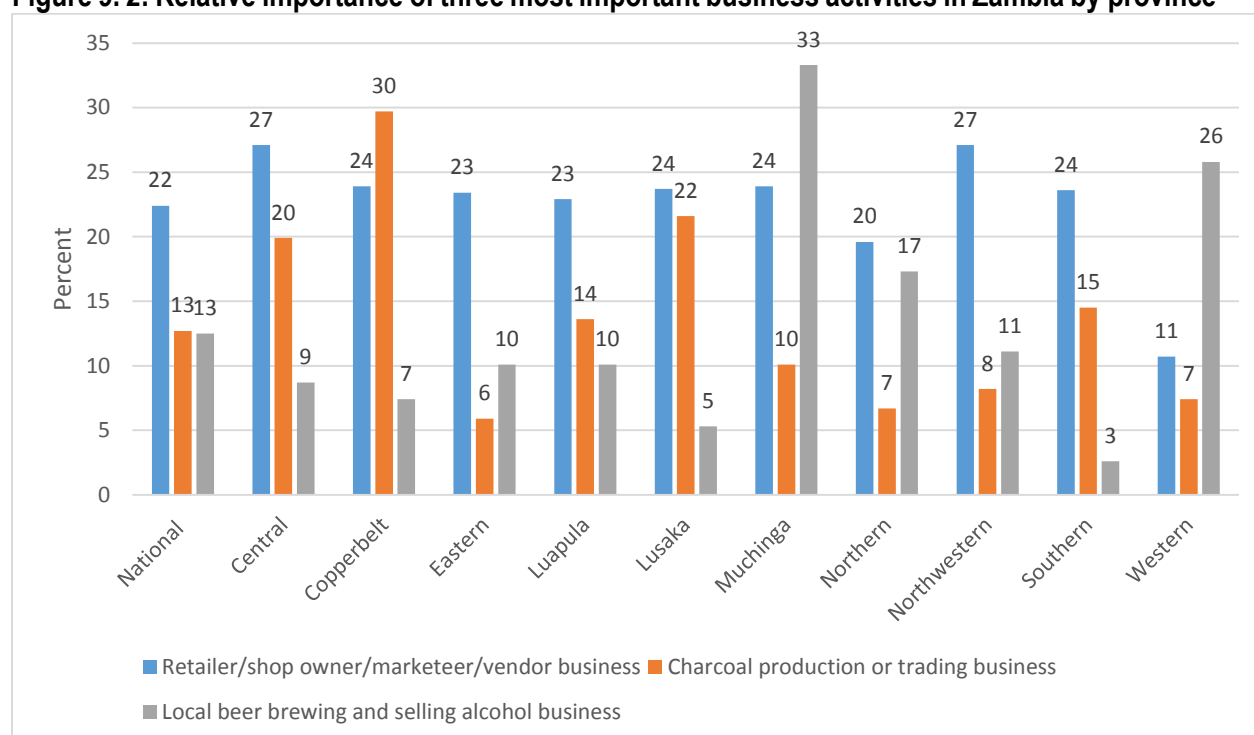
Source: RALS 2015

9.1.2   Employment activities

Table 9.1 shows the number of households participating in various employment activities other than their own farming activities. At national level, the most popular employment activity was working on a smallholder farm, with about 40% of the households having at least one person working on another smallholder farm. An additional 7% of the households had members who worked on large commercial farms. The second most important type of employment was casual/non-agricultural piece works whilst employment by private companies or individuals and working as civil servants were the third and fourth most popular employment activities respectively.

By province, working on other peoples' smallholder farms was more prominent in Eastern province with more than 60% of the households reporting having at least one household member participating in such activity. This activity was least popular in Central province. Copperbelt province had the largest proportion of households with members working on a large farm. This is because Copperbelt has large commercial farms compared to other provinces. Figure 9.3 shows the participation distribution for 6 main aggregated employment groups unlike what is shown in Table 9.2.

Figure 9. 3: Relative importance of different employment activities
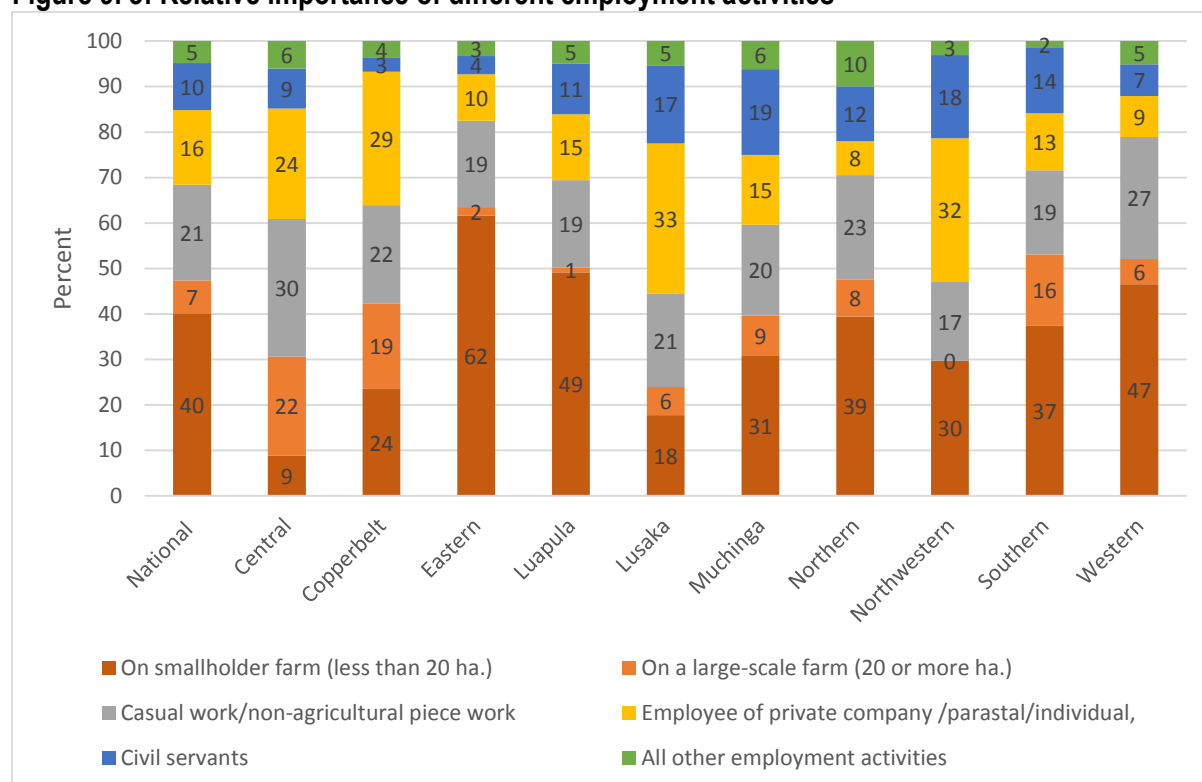
Source: RALS 2015

Table 9.1: Percent of households participating in various business activities

Business activity	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Retailer/shop owner/marketeer/vendor business	22.4	27.1	23.9	23.4	22.9	23.7	23.9	19.6	27.1	23.6	10.7
Charcoal production or trading business	12.7	19.9	29.7	5.9	13.6	21.6	10.1	6.7	8.2	14.5	7.4
Local beer brewing and selling business, selling other alcohol	12.5	8.7	7.4	10.1	10.1	5.3	33.3	17.3	11.1	2.6	25.8
Fishing and selling (from lakes /rivers/streams) business	9.6	2.6	4.3	1.5	17.2	2	3.4	18.8	8	8	19.7
Crop input or output/crop trading business	8.2	7.7	5.6	10.6	8.5	7	5.8	14.4	6.4	9.1	1.6
Carpentry or construction business (includes brick making, quarrying)	4.9	5.5	5.9	6.5	2.1	7.1	2.5	5.2	4.4	7	4.1
Baker business	4.6	3.8	2.5	10.5	2.3	3.1	4.9	2.7	4.8	5	4.5
Landlord	3.6	3.8	5.5	4	5.2	12.7	4.1	2.4	2.5	0.9	0.3
Collection and selling of other forest products (e.g. poles/timber, grass, mushroom, caterpillar, wild fruit)	3.1	1.4	1.5	2.4	2.4	1.7	0.7	2	2.7	4.4	10.2
Tailoring and weaving business	2.1	1.9	0.4	3.2	1.9	0.9	0.9	2.4	3.3	2	2
Transporter business	2.0	1.9	1.5	3.7	2	1.4	0.4	0.3	4.2	2.5	0.8
Livestock input or output trading business (including dairy)	1.9	2.4	1.1	2.4	0.7	2.6	0.3	0.5	1.5	5.1	2.2
Firewood collection or trading business	1.6	0.8	1.6	1.7	3.3	0	1.2	2.2	1	1.5	1.2
Milling or oil extraction business (e.g. hammer mill)	1.6	3	1.4	2.2	0.8	1.5	3.1	0.8	2.5	1.7	0.1
Repairing items business (e.g. bicycles, radios, solar, etc.)	1.6	1.3	1.5	2.3	2.1	0.8	1.7	1.5	2.2	1.3	0.9
Blacksmithing business	1.3	1.5	0.4	2.9	0.9	0.9	0	1	1.2	2.3	0.3
Crop services business (e.g. ploughing or spraying business)	1.2	1.2	0.2	0.9	0	3.4	0.5	0.1	0.4	3.6	2.2
Wild honey collecting and selling business	1.1	0.8	1.2	0.9	0.6	1	0	0.8	5.8	0.8	0.4
Hair saloon / barbershop business	1.0	1.9	1.3	1.2	1.2	1.9	0	0.2	0.3	0.7	0.6
Curio/carving business	0.9	0.1	1	1.5	0.3	0.2	0.2	0	1.6	1.3	2.8
Healing (traditional) business	0.7	1	0	0.5	1.1	0	0.1	0	0.1	1.1	1.9
Butchery or abattoir business	0.5	0.6	0	0.9	0.2	0	1.3	0.8	0.4	0.1	0.1
Beekeeping and honey selling business	0.5	0.9	1.5	0.8	0	0.3	1.2	0.4	0.1	0.3	0
Fish, buying and selling	0.2	0	0.2	0	0.7	0	0	0	0	0.3	0.1
Livestock service business (e.g. veterinary, vaccination)	0.1	0.3	0.3	0	0	0.1	0.5	0	0.3	0.1	0
Professional services	0.0	0	0	0	0	0.9	0	0	0	0	0

Source: RALS 2015

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Table 9 2: Percent of households participating in various employment activities

Employment activity	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
On small holder farm (less than 20 ha.)	40	8.9	23.5	61.6	49.1	17.7	30.9	39.4	29.7	37.4	46.5
On a large-scale farm (20 or more ha.)	7.4	21.7	18.8	1.9	1.1	6.2	8.7	8.2	0	15.7	5.6
Civil servant excluding ZAWA (eg. Teacher, extension officer, nurse, police, etc.)	9.8	8.8	3	3.8	11.2	17.1	12.8	12	18.3	13.6	7
Parastatal employee (NCZ, FRA, ZESCO)	1.1	1.9	1.1	0.9	0.9	3.7	0.3	0.7	0.1	2.7	0
Private agricultural/crop firm (eg grain processing, crop input or output handling and sales, crop service firm, etc.)	2.2	2	0.4	2.1	1.5	2.4	3.2	6	0.8	0.8	3.2
Private livestock services and processing (eg. Abattoirs, livestock and livestock medicine sales)	0.4	1	0.5	0	0	1.2	0	0	0.3	2	0.1
Employee of private company /individual, (exclude agriculture and tourism) (mine, bank, house help, mechanic, security guard etc)	13.1	19.4	22.7	6.8	13.5	27.3	13.4	6.2	29.6	7.6	4.9
As a worker in lodges or safari industry (excluding hunting)	1.1	0.9	1.5	1.6	0	0.8	1.1	0.6	0.8	0.2	4
As a worker in a hunting safari	0.1	0	0	0.1	0	0	0.6	0	0	0	0
Forest services	0.6	1.1	3.6	0.8	0.1	0.1	0	0	0.8	0	0
ZAWA/Village scouts	0.6	0	0	0.2	0	0.1	6	0	0	0.8	0
Casual FRA worker	2.7	2.5	1.5	4.4	0.9	0	5.6	3.4	1.9	3.2	0.1
Other casual work/non-agricultural piecework	18.3	27.8	20.1	14.6	18.3	20.5	14.4	19.5	15.4	15.3	26.7
Receive pension	2.5	3.9	3.4	1.5	3.4	3.1	2.9	3.9	2.3	0.8	2

Source: RALS 2015

9.2   Remittances and social cash transfers

9.2.1 Remittances

Household income from other sources play an important role in rural households' livelihoods by supplementing the income they earn from the farm and off-farm activities. Table 9.3 shows other sources of cash or commodities the households received, including social cash transfers. The results show that none of the households reported receiving food aid. Remittances (cash or commodities from non-household members) tops the list in terms of the proportion of households reporting receiving cash or goods from non-household members, followed by marriage dowry and lobola payments.

Nationally, 21.3% of the households reported that they received remittances from non-household members. Households in Luapula province rank first in terms of remittances from cash or commodities with more than 32% of the households receiving remittances followed by Copperbelt and Western provinces with 29.7% and 28.6% respectively. However, the results show that remittances are not popular in Muchinga where only 12.4% of the farmers received remittances.

By gender, we find that a higher proportion of households headed by females reported receiving higher remittances compared to male headed households (Figure 9.4). On the other hand, when stratified by land cultivated, the results show a declining trend in the proportion of the households receiving remittances. Thus, the percentage of households receiving remittances was higher in households with smaller landholdings compared to those with higher landholdings. For example, as shown in Figure 9.5, 28.1% of households cultivating less than 0.5 Ha received higher remittances compared to those cultivating 5 to 10 Ha (13.5%).

Figure 9. 4: Percentage of households receiving remittances by gender
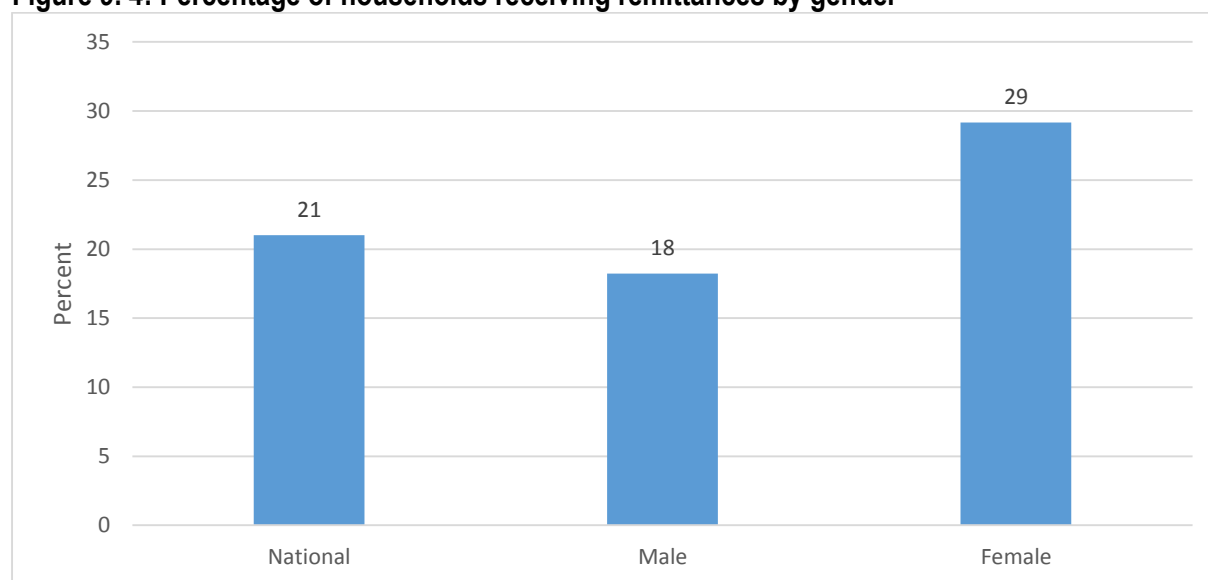
Source: RALS 2015

Table 9. 3: Percent of households receiving income from other sources

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Marriage dowry/lobola payment	5.2	5.7	5.4	2.6	7.9	4.1	3.1	5.7	4.1	6.5	7.2
Damage payments and elopement fees	1.8	1.9	0.4	1.5	1.7	3.7	0.2	0.5	2.8	1.5	4.8
Cash or commodities from non-household members	21.3	24.9	29.7	18.8	32.1	22.7	12.4	13.6	18.5	18.3	28.6
Church/local community organization/NGO	1.6	1.5	3	1.5	2	2.4	1.2	1.4	1.8	1	1.4
Social Cash Transfer Program (Ministry of Community Development	2	1.7	0.3	3	3.1	0.7	1.9	2.6	1.6	0.8	1.9
Food aid	0	0	0	0	0	0	0	0	0	0	0
Other	0.2	0	0	0.2	0.7	0.6	0	0.2	0.4	0.1	0

Source: RALS 2015

Figure 9. 5: Percentage of households receiving remittances by landholding size
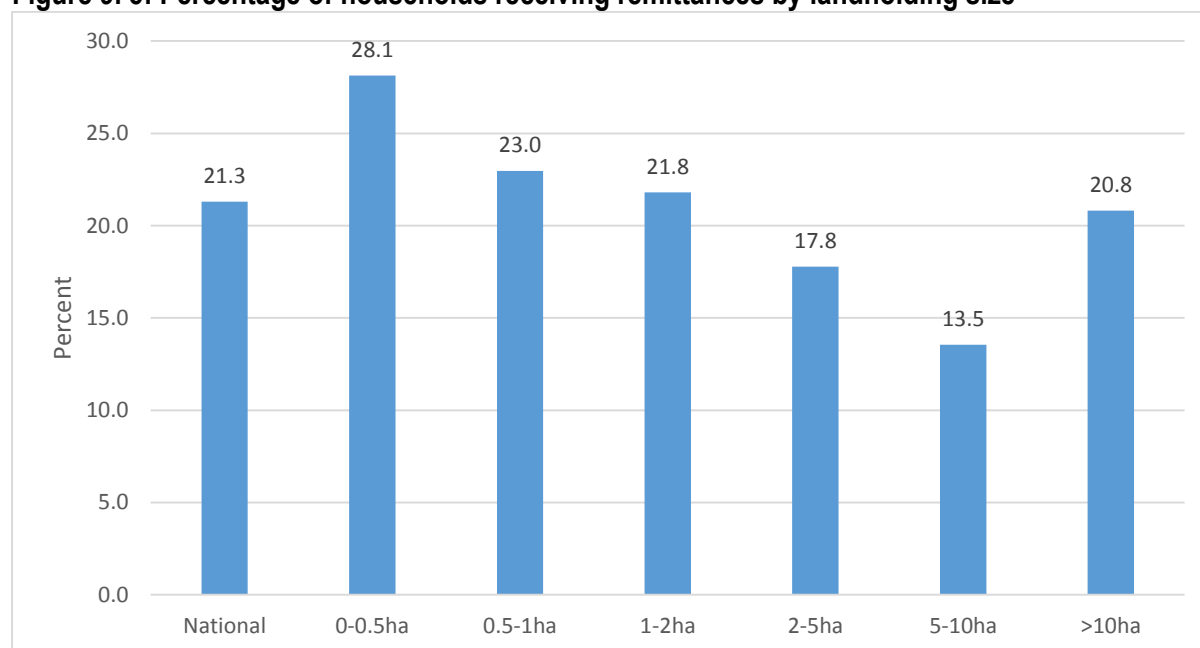
Source: RALS 2015

9.2.2 Social cash transfers

The percent of household receiving social cash transfers is minimal, only 2% of the households reported to have at least one member receiving social cash transfers from the Ministry of Community Development, Mother and Child Welfare. By province, Luapula province tops the list with slightly above one percentage point above the national average of households receiving social cash transfers (Table 9.3). By gender of household head, the results show that 4% of female headed households received social cash transfers compared to 1.3% among male headed households (Figure 9.6)

Figure 9. 6: Percentage of households receiving social cash transfers by gender
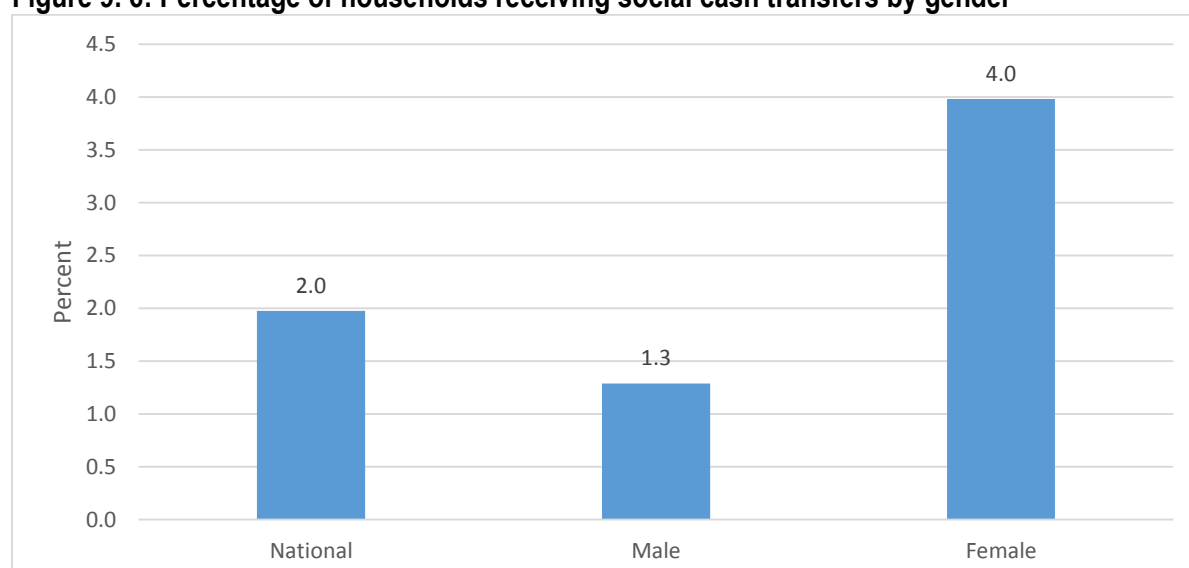
Source: RALS 2015

In terms of targeting by land holding size, the results in Figure 9.7 show that on average the Ministry of Community Development, Mother and Child Welfare reached more than 2% of the households cultivating

less than 2 Ha than those cultivating 2-5 Ha and even less among households cultivating more than 5 Ha. This suggests that the targeting is somewhat precise.

Figure 9.7: Percentage of households receiving social cash transfers by landholding size
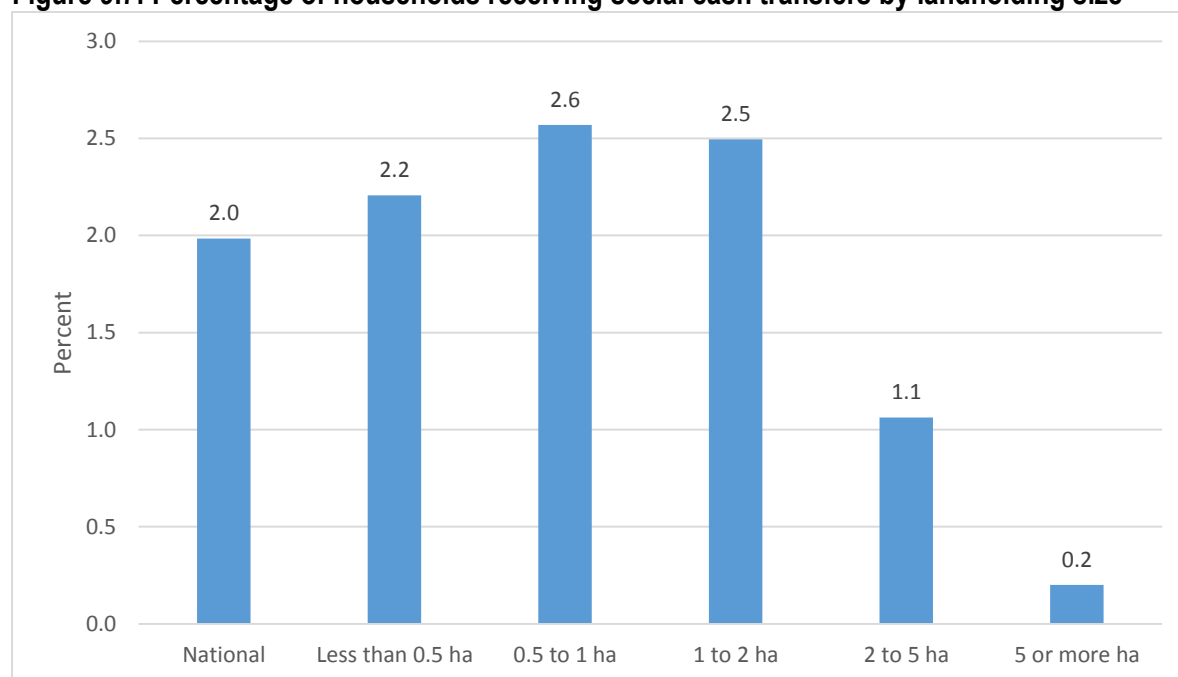
Source: RALS 2015

10. AGRICULTURAL INFORMATION, DISTANCES TO AGRICULTURAL SERVICES

This chapter examines the households' access to agricultural advice/information, the soil and land management practices used by the households, cell phone usage, and distances to key agricultural services.

10.1   Advice on agricultural practices

Figure 10.1 summarises the percent of farmers receiving advice on agricultural practices from organisations, private agents or other individual farmers. On average, more than 50% of the farmers received advice on leaving crop residue in the field and crop rotation. Whilst, very few households reported receiving information regarding the problems associated with aflatoxin in maize and/or groundnuts.   These results are consistent across the provinces as shown in Table 10.1.

In terms of minimum tillage methods, about 37% reported to have received information on planting basins/pot-holing, 31% on zero tillage and about 28% on ripping. By Province, the results in Table 10.1 show that Central, Eastern and Lusaka are particularly important when it comes to information received on conservation practices, namely; minimum tillage (planting basin, zero tillage and ripping), residue retention and crop rotation with legumes. This is not a coincidence because these are the provinces where the conservation farming is being promoted by the Conservation Farming Unit (CFU) and Conservation Agriculture Scaling Up (CASU).

Figure 10. 1: Percentage of farmers receiving advice on agriculture practices
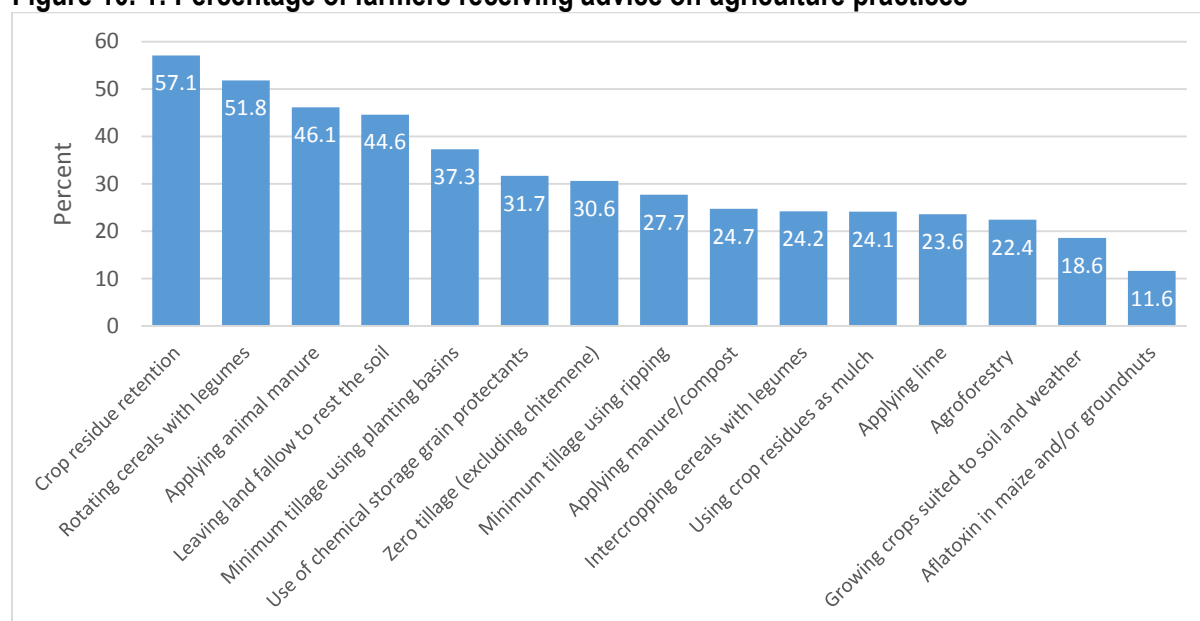
Source: RALS 2015

Table 10.1: Percentage of farmers receiving advice on agriculture practices

Advice	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Leaving crop residues in the field and incorporating it into the soil	57.1	64.5	72.3	63.3	54.6	79.0	45.5	48.6	63.8	52.9	46.0
Rotating cereals with legumes/nitrogen-fixing crops	51.8	71.4	65.5	62.9	42.1	66.0	39.3	37.7	52.0	64.5	17.3
Applying animal manure	46.1	49.9	56.2	57.3	40.7	65.2	24.4	34.4	32.9	66.0	29.2
Leaving land fallow to rest the soil	44.6	58.5	71.7	44.2	50.0	61.4	25.1	38.5	44.1	47.6	24.4
Minimum tillage using planting basins (potholes)	37.3	59.7	36.3	57.3	17.1	70.0	25.2	10.7	20.8	51.7	19.4
Use of chemical grain protectants (e.g., Actellic chirinda matura dust) to protect maize in storage from weevils?	31.7	41.4	55.0	38.9	25	49.6	11.7	25.7	26.6	43.5	7.2
Zero tillage (excluding chitemene)	30.6	36.0	40.1	56.7	14.5	33.5	32.5	18.0	20.7	23.6	17.5
Minimum tillage using ripping	27.7	50.3	38.5	40.0	8.1	47.6	10.0	7.8	14.2	43.8	13.7
Applying plant manure/green manure or compost	24.7	24.3	41.9	37.8	19.3	41.7	13.8	17.3	17.7	23.7	16.7
Intercropping cereals with legumes/nitrogen-fixing crops	24.2	25.6	42.2	24.6	15.5	36.2	22.9	18.0	30.5	27.0	18.5
Using crop residues as mulch (cut and spread on field)	24.1	25.4	34.6	32.1	14.9	36.5	23.0	17.1	23.1	24.6	17.4
Applying lime	23.6	46.7	29.4	18.2	19.8	51.1	11.7	21.1	19.7	31.5	3.9
Agroforestry (Use of trees to protect/improve your crop or crop yields)	22.4	34.9	14.2	42.4	9.5	57.7	7.3	4.6	12.1	32.6	5.0
Growing crops that are well suited to soil and weather conditions in your area	18.6	17.1	23	24.3	20.8	24	17.1	8.4	14.8	23.3	13.8
Information about the problems associated with aflatoxin in maize and/or groundnuts?	11.6	6.7	28	18.3	11.2	18.7	8.3	2.3	18.9	11.2	3.7

Source: RALS 2015

10.2   Soil and land management practices

Figure 10.2 summarises results from questions regarding the soil and land management practices implemented by the households in 2013/14 agricultural season. The results correspond very well with the information that the households reported to have received. For example, crop rotation of cereals with legumes/nitrogen-fixing crops and leaving crop residues in the field and incorporating into the soil were found to have been the most implemented practices during this period. Agricultural practices such as ripping with mechanical power, grass barriers, terraces and agroforestry were only practiced by few farmers.

The detailed results by province are presented in Table 10.2.The results show that agro-forestry practices are more common in Lusaka and Southern provinces where more than 12% of the households reported practicing the activity in the 2013/14 agricultural season. Copperbelt province has the highest proportion of households using grass barriers to control soil erosion.

Figure 10. 2: Soil and land management practices
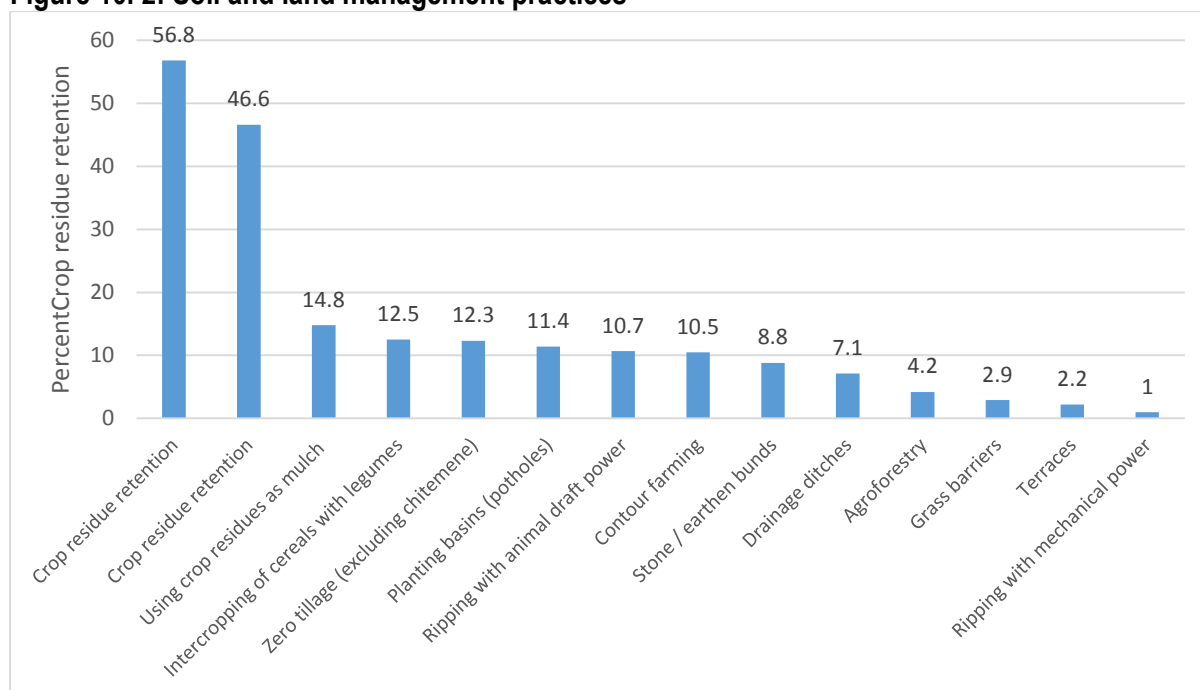
Source: RALS 2015

Table 10.2: Soil and Land Management Practices Implemented in 2013/14 agricultural season

Practice	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Crop residue retention	56.8	58.7	44.7	58.6	52.3	71.3	43.6	61.4	62.8	57.0	58.3
Rotation of cereals with legumes	46.6	69.2	41.9	62.5	33.6	34.6	37.8	50.2	43.0	52.4	8.6
Using crop residues as mulch (cut and spread on field)	14.8	18.9	10.1	15.5	9.0	12.8	14.5	22.9	8.2	11.7	17.3
Intercropping of cereals with legumes/nitrogen-fixing crops	12.5	10.5	10.8	6.1	9.7	5.7	16.6	22.4	11.4	16.0	12.8
Zero tillage (excluding chitemene)	12.3	7.2	6.3	26.0	3.4	13.3	21.3	14.7	2.4	5.2	10.7
Minimum tillage using planting basins (potholes)	11.4	19.0	7.0	13.8	4.6	21.4	13.9	9.1	0.6	14.8	8.4
Ripping with animal draft power	10.7	19.6	9.4	13.7	0.0	12.1	2.9	3.0	0.8	21.3	14.4
Contour farming	10.5	8.2	6.1	24.0	4.9	1.7	3.7	13.3	2.6	15.0	0.4
Stone / earthen bunds	8.8	8.1	3.8	9.9	6.6	8.5	6.8	16.7	2.1	15.0	0.3
Drainage ditches	7.1	5.7	10.3	4.8	3.6	7.5	10.3	8.6	7.2	12.4	3.4
Agroforestry (use of t+A14:A26rees to protect/improve your crop or crop yields)	4.2	2.4	0.7	6.3	1.2	12.8	3.3	2.2	0.0	12.3	0.0
Grass barriers	2.9	1.9	10.1	5.0	0.6	2.3	3.3	0.6	0.2	5.1	0.4
Terraces	2.2	0.7	2.4	2.6	0.5	2.1	2.7	3.9	3.7	2.9	0.0
Ripping with mechanical power	1.0	1.0	1.3	0.8	0.1	4.3	4.0	0.3	0.1	1.0	0.4

Source: RALS 2015

10.3 Membership into farmer organizations

Smallholder farmers' access to markets and agricultural support services has been a major concern of Zambian policy makers (Chapoto and Jayne 2009). This section presents some key facts about market access and agricultural services as reported by farmers during the RALS 2015 survey.

10.3.1   Membership into farmer organizations

Figure 10.3 shows that on average, 43.6% of households belong to a farmer association/cooperative. The percentage of households belonging to an association/cooperative is above average in all the provinces except in Luapula and Western. The high membership is not surprising because in Zambia, a household has to belong to a cooperative to be able to participate in the government's FISP. In terms of membership into a women's group, the results show that about 19% of households have at least one member belonging to a group. However, participation in women's groups is below the national average in Western (lowest), Northwestern, Lusaka and Luapula provinces.

Households were also asked about whether they belonged to any local savings and loan society and the results in Figure 10.3 shows that less than 5% of the households reported belonging to such a group. The proportion is highest in Northern province, with 12% of the households having at least one member of their household belonging to a local savings and loan society.

Figure 10. 3: Membership in farmer associations and local savings and loan society

Source: RALS 2015

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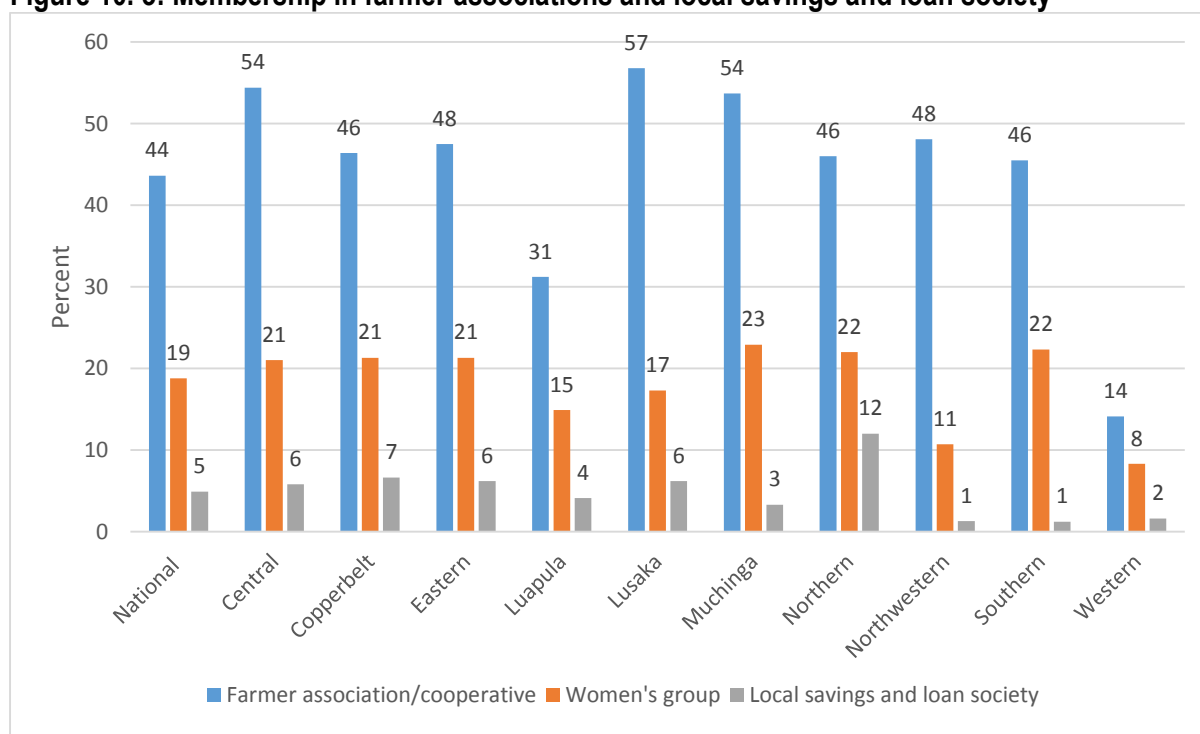
10.4   Ownership of a bank account and mobile phone

Figures 10.4 and 10.5 presents the percentage of households having a bank account and mobile phone respectively. The percentage of households possessing a bank account was about 10% nationally. However, Lusaka province led in terms of the proportion of households with a bank account, with 31.3% reporting to have an account. This percentage was most driven by farm households in Chongwe, Lusaka West and Kafue. Western province had the least percentage of households with bank accounts.

Figure 10.4: Percent of households with a bank account
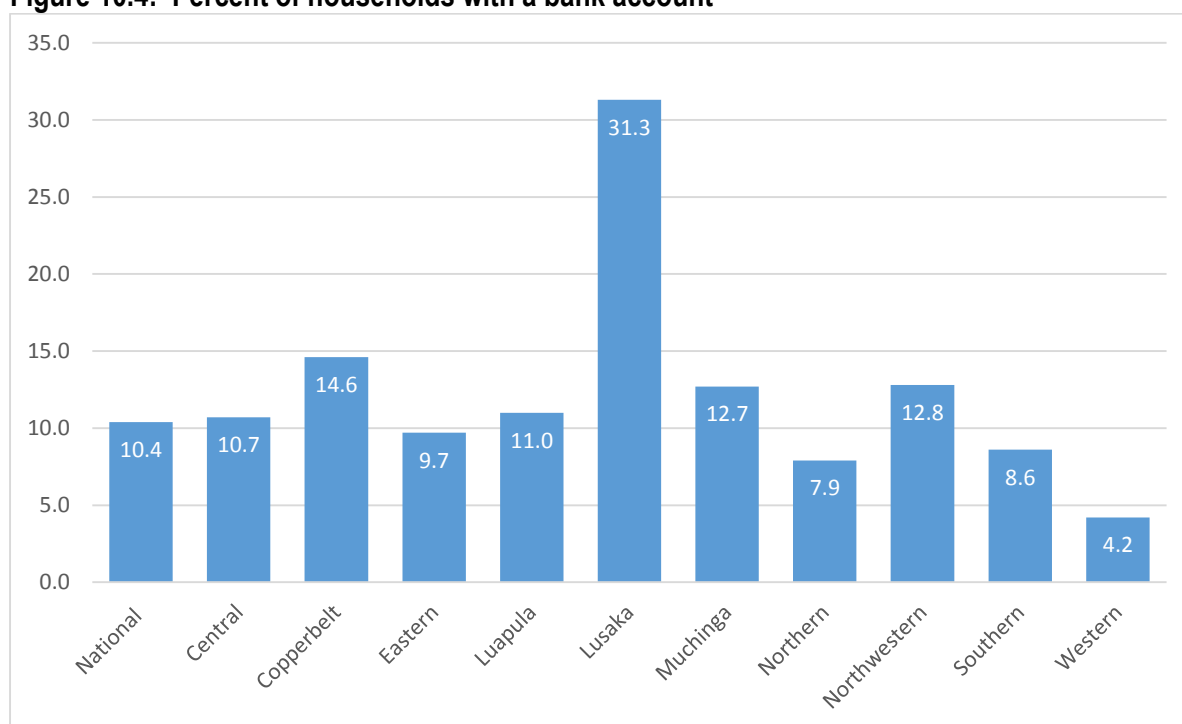
Source: RALS 2015

Figure 10.5 shows that access to mobile phones among the rural households in Zambia is fairly good, with approximately 54% of the households having at least one person in the household having a mobile phone. Lusaka province had the highest proportion of households owning a mobile phone (85.9%) followed by Copperbelt with 72%. In general, the percentage of households owning cellphones was above the national average in Lusaka, Copperbelt, Central, Northwestern and Southern provinces. Western province ranked lowest with about 38% of the households having a mobile phone.

Figure 10.5: Percent of households with a mobile phone
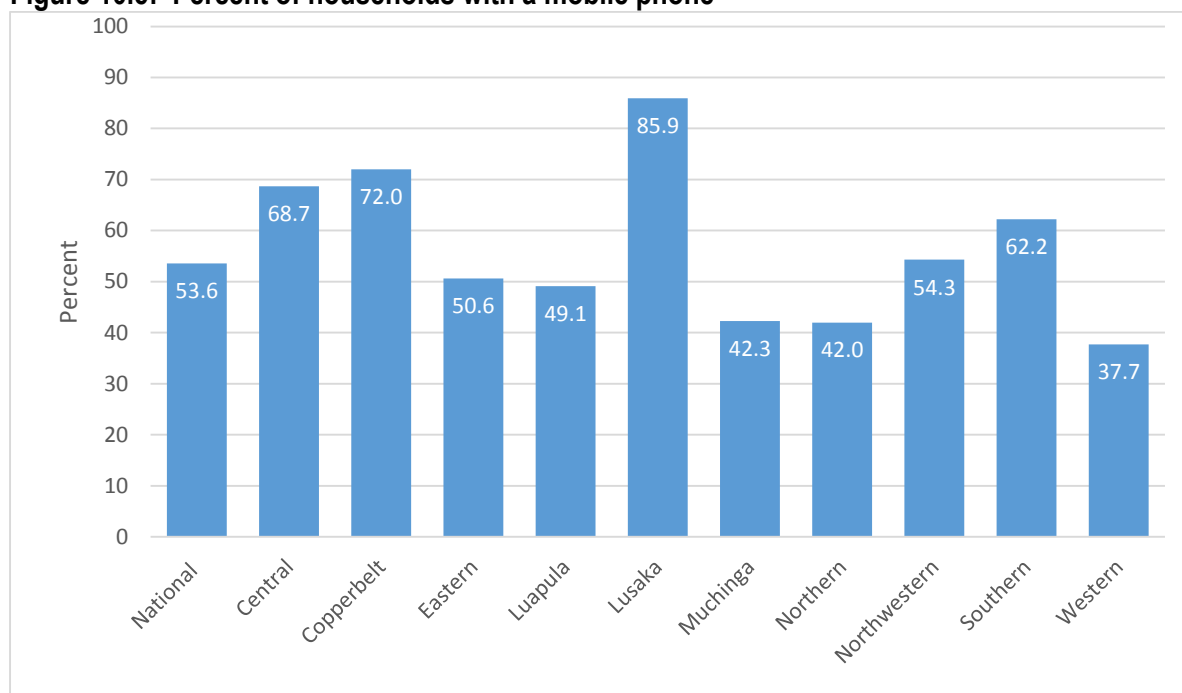
Source: RALS 2015

10.5 Distance to key agricultural services

This section examines the market access conditions of smallholder households according to the RALS 2015 survey. Table 10.3 presents the kilometer distances from the farm to various indicators of market access for households at different percentiles of the distribution. Table 10.4 presents the average distances to these services by provinces.

In order to help the reader interpret table 10.3 beyond the reported mean we explain why we present different percentiles through a few examples. For example, the first row of Table 10.3 shows that the mean distance travelled from the farm to the nearest district town was 42km. However, this distance was 26 km less for 25% of the population, 35km at the 50th percentile (median), and 88km at the 90th percentile, meaning that 10% of the rural farm population faced distances to the nearest district town that were even greater than this. Essentially, at least half of the smallholder farm households in Zambia were at least 35 km from a district town, and 25% of the households were at least 16 km away. This example shows that the mean/average distances vary considerably from the median suggesting that fewer large distances reported by some households located in remote areas pulls the mean up. Therefore, using the mean alone to conclude about market access may be misleading.

Table 10. 3: Distance to the nearest services

	Distance to the nearest agricultural service (km)				
	Mean	Percentile 25	Percentile 50	Percentile 75	Percentile 90
District Town/Boma	41.6	16.0	35.0	58.0	88.0
Tarmac/tarred road	29.6	4.0	15.0	44.0	75.0
Private fertiliser retailer (in October/November during the fertiliser selling season)	35.2	10.0	25.0	50.0	80.0
Established market place with many buyers & sellers of locally-produced agricultural products	25.5	5.0	15.0	35.0	67.0
Hammer mill	2.8	0.0	1.0	3.0	7.0
Feeder road	2.4	0.0	0.0	2.0	5.0
Point where you can receive mobile cell phone network services	2.4	0.0	0.0	0.0	2.0
Agro-dealer	32.5	8.0	20.0	45.0	78.0
Agricultural camp/block office	18.4	4.0	9.0	20.0	50.0
Point where you can sell livestock/livestock products to private buyers	27.3	4.0	15.0	40.0	71.0
Livestock service center	31.7	7.0	20.0	45.0	77.0
Para-vet	30.0	7.0	18.0	41.0	74.0
Seller of veterinary products	32.9	9.0	20.0	45.0	78.0
Dip tank	24.0	3.0	8.0	30.0	70.0
Basic school	3.7	1.0	3.0	5.0	8.0
Clinic / health centre	7.2	2.0	5.0	10.0	15.0
Borehole / piped water source	2.0	0.0	0.5	2.0	5.0
Electricity supply	22.3	2.0	9.0	30.0	65.6
FISP collection point	7.7	1.0	3.0	7.0	20.0

Source: RALS 2015

Distance to nearest tarred road and feeder road. Road infrastructure is vital for improving the agricultural sector by helping improve households' access to inputs and markets. The average distance to a tarred road is 30km and to a feeder road is 2km. However, in some provinces the distances are longer, for instance in Western and Northern provinces where the average distance to a tarmac/tarred road is 45 and 41 km respectively Nevertheless, looking at the distribution of households by distance to nearest tarred road and feeder road, the results show that the distance was 4km or less for 25% of the population, 15km at the 50th percentile (median), and 75km at the 90th percentile, meaning that 10% of the households had to travel longer distances to the nearest tarmac. In terms of feeder roads, the situation was better because three quarters of the households reported that their nearest feeder road was about 2km. However, we were not able to collect any information about the quality of these feeder roads.

Private fertiliser retailer during the agricultural season: The average distance to the nearest private fertilizer retailer is about 35 km. It is lowest in Copperbelt at about 16km and highest in Northwestern (45km) followed by Western Province with 42km. In terms of the household distribution by distance travelled, Table 10.3 shows that 25% of the households travelled about 20km less than the average. The top 10% of the households travelled at least 80km to a private fertilizer retailer. Earlier studies indicated that the distance to private fertilizer retailers was correlated with what happens under FISP. Agro-dealers were reluctant to tie their capital in a product that they might not be able to sell hence fertilizer stockists tend to be situated in the Boma. This situation is likely to be addressed if FISP inputs are distributed through the e-voucher because all fertilizer suppliers would participate.

FISP collection point: The average distance to the nearest FISP collection point was about 8km. It was highest in Western Province at about 16km. However, at least half of the households indicated that the nearest FISP collection point was about 3km from their farm.

Extension services: The average distance travelled to an agricultural extension worker and livestock service center is 17km and 29km respectively. Northwestern province has the highest distance to the nearest agriculture camp/block officer and livestock service centers, 40 and 50km respectively, while farmers in Luapula travel the least distance (11.6km) to an agriculture camp/block officer. The distance to the nearest livestock service centers is least in Lusaka province, averaging about 18km. These results suggest that investing more in extension services to reduce the distances travelled by farmers for such services will help grow Zambia's smallholder agricultural sector.

Distance to a health center: Nationally, households on average travel about 7km to reach a health center. Only a quarter of the households travel 2km or less whilst the other 25% travel more than 10km to the nearest heath center. By province, households in Luapula travel the least distance to a health center (3.8km) whilst the average distance in Central is the highest at 9.2km.

Distance to hammer mill. The average distance to a hammer mill nationally is about 2.5km. In some provinces the distances are longer. For example, in the Eastern and Western provinces, the average distance to a hammer mill is 4.6 and 4 km respectively. However, at least 50% of all the rural households travel 1km or less to the nearest hammer mill.

Distance to the nearest basic school: It was reported in the demographic section that nationally, about 64 percent of children aged 6 to 12 years living in smallholder farm households were reported to be attending school. On average, these children travel about 3.4km to and from school. However, it is important to note that 25% of the households reported to be within 1km of the school whilst 10% of the households lived 8km or more from a basic school. By province, Table 10.4 shows that households in Northern province reported having the largest distance to the nearest school (5.3km) from their homestead. The distance was least in Luapula, where there average distance was about 1.5 km

Borehole / piped water source: The average distance that the household has to travel to get to the nearest borehole is about 2 km. However, it is important to note that Table 10.4 shows that at least half of the households reported having a borehole within their village. About 10% of the households reported travelling more than 5km.

Table 10. 4: Distance to the nearest services

Key agricultural services	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Boma	41.6	40.6	29.4	36.3	36.3	24.2	46.4	51.1	52.0	47.8	40.6
Tarmac/tarred road	29.6	22.8	14.4	23.9	28.6	6.1	40.7	40.3	32.5	29.1	45.1
Private fertiliser retailer (in October/November during the fertiliser selling season)	35.2	28.3	16.4	32.1	26.3	20.7	40.7	47.7	45.8	39.0	42.8
Established market place with many buyers & sellers of locally-produced agricultural products	25.5	21.2	11.3	19.7	17.1	15.1	34.8	28.1	35.4	31.7	35.5
Hammer mill	2.8	2.1	2.4	4.6	1.9	1.7	2.3	2.6	1.0	2.1	4.0
Feeder road	2.4	1.4	1.4	3.3	0.4	0.4	6.1	3.6	0.8	2.6	1.4
Point where you can receive mobile cell phone network services	2.4	0.2	0.3	1.3	0.4	0.8	4.6	2.7	6.7	3.6	4.5
Agro-dealer	32.5	24.4	16.1	29.3	26.2	20.3	37.9	48.3	47.1	34.2	34.9
Agricultural camp/block office	18.4	24.0	15.2	12.0	11.6	12.2	26.7	22.2	25.5	17.3	20.4
Point where you can sell livestock/livestock products to private buyers	27.3	20.3	16.0	20.4	15.6	14.2	34.4	34.4	35.6	35.7	37.0
Livestock service center	31.7	25.0	23.7	26.0	24.7	18.2	40.2	42.5	48.9	33.8	31.1
Para-vet	30.0	21.9	24.2	24.1	23.3	18.3	38.4	44.1	52.1	30.2	29.6
Seller of veterinary products	32.9	24.5	22.2	26.8	27.9	19.6	41.4	51.1	48.3	34.1	33.8
Dip tank	24.0	17.7	16.0	18.1	25.2	12.2	34.6	42.3	57.0	9.0	32.5
Basic school	3.7	4.2	3.8	4.2	1.5	3.8	3.3	5.3	2.3	3.7	4.3
Clinic / health centre	7.2	9.3	5.5	6.7	3.8	4.4	10.3	8.7	5.8	7.4	7.5
Borehole / piped water source	2.0	3.2	2.5	1.2	0.8	1.1	4.2	2.8	0.6	1.6	2.7
Electricity supply	22.3	15.0	6.2	19.8	11.5	13.4	35.2	33.5	34.2	18.9	32.6
FISP collection point	7.7	7.1	4.3	4.1	4.5	3.6	13.9	7.5	6.6	9.0	16.5

Source: RALS 2015

11. FOOD PURCHASES AND PROCESSING

This chapter presents some key results from section 11 of the questionnaire that deals with the food purchases and processing of the households interviewed. The first part of the section looks at the maize grain and maize meal purchases by the household and the second section looks at households participating in wild product collection for home consumption.

11.1 Maize grain and maize meal purchases

Table 11.1 shows the percent of households purchasing maize for consumption. On average, about 9% of households purchased maize grain for home consumption, while about 6% purchased maize as mealie meal from commercial sources, and less than 1% purchase maize meal from the grinding meal. Essentially, these results indicate that most households relied mostly on own production. At provincial level, a slightly higher proportion of households purchased maize grain in Luapula (12.4%) and Western (11.8%) provinces. Slightly, more than 10% of the households purchased maize meal from commercial sources in Copperbelt, Western and Lusaka provinces.

Table 11 1: Percent of households purchasing maize

Province	Maize grain	Commercial maize meal (mealie meal)	Maize meal from grinding meal
National	8.98	5.50	0.92
Central	7.37	3.97	0.35
Copperbelt	7.94	12.53	0.45
Eastern	8.78	2.49	0.26
Luapula	12.37	7.69	4.11
Lusaka	8.08	10.37	0.27
Muchinga	9.23	3.51	0.84
Northern	7.23	3.26	1.16
Northwestern	5.04	3.52	0.26
Southern	10.04	4.66	0.46
Western	11.77	12.24	0.79

Source: RALS 2015

11.2   Maize grain and maize meal purchases by gender

Disaggregating the maize purchases by gender (Figure 11.1), shows that slightly more female headed households purchased maize grain and maize meal from the grinding meal than male headed households. On the other hand, male headed households purchased slightly more commercially packaged maize meal compared to female headed households.

Figure 11 1: Percent of households purchasing maize by gender
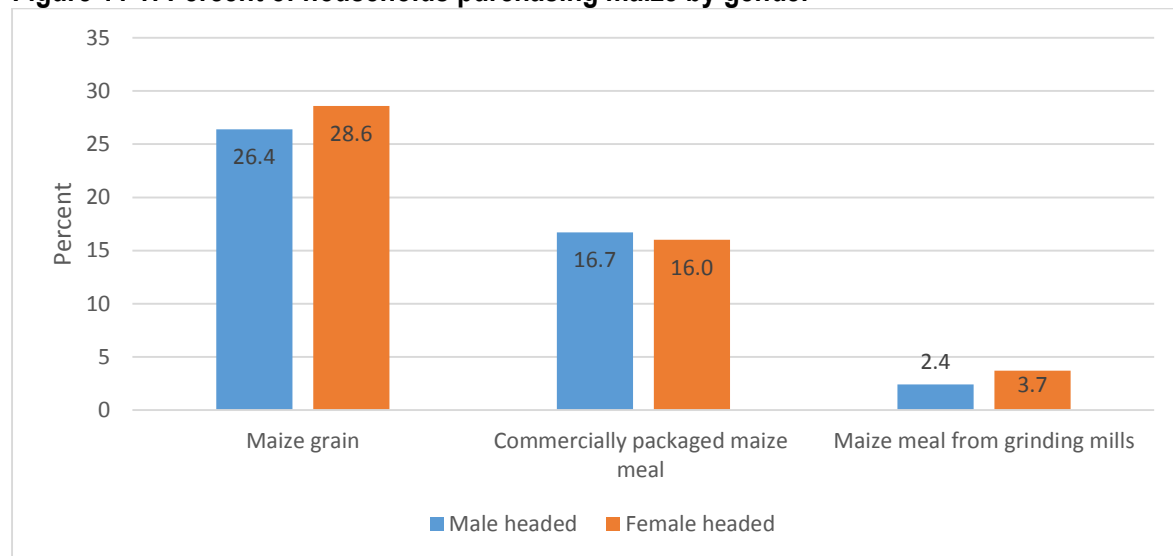
Source: RALS 2015

11.3   Maize grain and maize meal purchases by landholding size

Figure 11.2 shows the percent of households that purchased maize by landholding size. On average, households owning less than 0.5 Ha purchased more of all the maize products. The results show a decline in maize grain and maize meal purchases as landholding size increases. This suggests that households with more land are able to produce relatively adequate food for own consumption compared to the land constrained households. However, the percentage of households purchasing maize grain and commercial maize meal begins to increase for households cultivating more than 10 Ha.

Figure 11 2: Percent of households purchasing maize grain and maize meal by landholding size
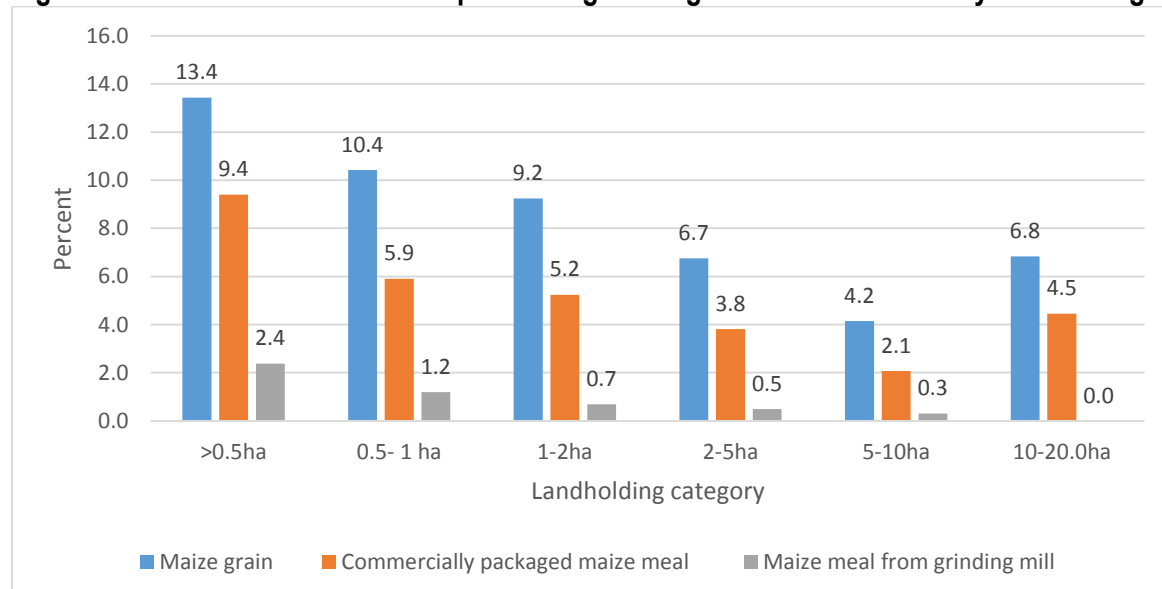
Source: RALS 2015

11.4 Wild products and charcoal production

Table 11.2 shows the percent of households participating in the collection of wild product and charcoal production for home consumption. Firewood was the most common product that households collect from the forest followed by wild mushrooms, wild fruits and thatching grass. At provincial level, the results show that wild fruits and mushrooms were the two most prominent wild food products in all the provinces apart from Eastern province which had a relatively larger proportion of households that reported hunting and consuming wild animals and birds compared to other wild food products.

Fish from rivers/lakes and streams were more important in Northern, Northwestern and Western provinces with more than 20% of the households reporting that they participated in fishing. Another important wild product was edible ants and caterpillars, especially in Northern, Muchinga and Northwestern provinces.

On average, 14.2% of the smallholder households reported producing charcoal for home consumption. However, the prevalence is about 40% in Luapula and Copperbelt while Eastern and Western provinces have the least percentage of households (2.4 and 2.6% respectively) participating in this activity.

11.5 Wild products and charcoal production by gender

Table 11.3 shows a similar participation pattern with the collection of firewood as one of the most common activities in both male and female headed households. This was followed by collection of wild mushrooms, wild fruits and thatching grass in that order. However, the results show that by gender, a higher proportion of male headed households participated in the different activities than female headed households with two exceptions, firewood and wild fruits collection. The difference for wild fruits was marginally higher among female headed households than male headed households.

Table 11 2: Percent of households participating in wild product collection for home consumption

Wild products	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Fish from rivers/lakes/streams (excluding fish ponds)	16.7	9.2	9.2	5.4	34	3.3	11	21.6	24.2	17.1	29.6
Edible ants and caterpillars	22.3	17.1	16.9	23.2	21.7	12.5	30.3	34.2	29.9	17.5	12.9
Wild fruits	48.5	54.9	36.9	34.2	51.5	23.7	45.2	42.4	32.7	82.8	53.1
Wild honey	12.1	24.4	15.8	11.6	4.3	5	4.2	3	9.6	29.9	2.7
Wild mushrooms	55.6	67.5	50.8	41.9	59.3	37.7	54.2	63.8	59	58.4	56.5
Wild animals and birds (e.g. rodents, small game, other)	17.7	17.9	11.9	44.1	14.7	25.8	17.4	5.6	7.6	10.7	3.1
Poles and timber	15.5	20.2	13.8	12.1	25.1	21.2	13	3.1	9.9	22.4	17.3
Firewood (excluding charcoal)	93.2	95.8	87.7	96.9	84.7	77.4	89.9	94.4	86.9	98.7	98.4
Charcoal (produced for home use)	14.2	15.9	39.2	2.4	40.9	13.8	11.7	19.7	10.1	6.5	2.6
Thatching grass	45.1	56.3	43.2	53.6	54.1	34	56.2	40	14	51.4	22.1
Fencing grass	10.5	16.1	13.1	4.4	24.2	9	11.7	8.8	2.4	4.5	15.4

Source: RALS 2015

Table 11 3: Percent of households participating in wild product collection for home consumption by gender

Wild products	Male	Female
Fish from rivers/lakes/streams (excluding fish ponds)	18.0	13.0
Edible ants and caterpillars	22.8	20.7
Wild fruits	48.4	48.8
Wild honey	13.9	6.9
Wild mushrooms	55.8	54.8
Wild animals and birds (e.g. rodents, small game, other)	18.9	14.1
Poles and timber	17.9	8.7
Firewood (excluding charcoal)	92.4	95.4
Charcoal (produced for home use)	16.1	8.7
Thatching grass	45.7	43.2
Fencing grass	11.2	8.5

Source: RALS 2015

12. MONTHS OF ADEQUATE HOUSEHOLD FOOD PROVISIONS

This chapter examines the household's food provisions during the year. Figure 12.1 shows the percent of household that responded "No" to the question "Between May 2014 and April 2015 were there months in which the household did not have enough food to meet its family's needs?" On average, 54% of households reported to have had adequate food provisions. Northwestern province had the highest percent of households reporting to have had adequate food provisions (71.1%) followed by Lusaka with 70.6% and then Central with 67.2%. Western and Muchinga provinces had the highest number of households with no adequate food provisions, with 41.7% and 43.6% respectively reporting that they had adequate food provision throughout the year.

Figure 12 1: Percent of Households with adequate food provisions
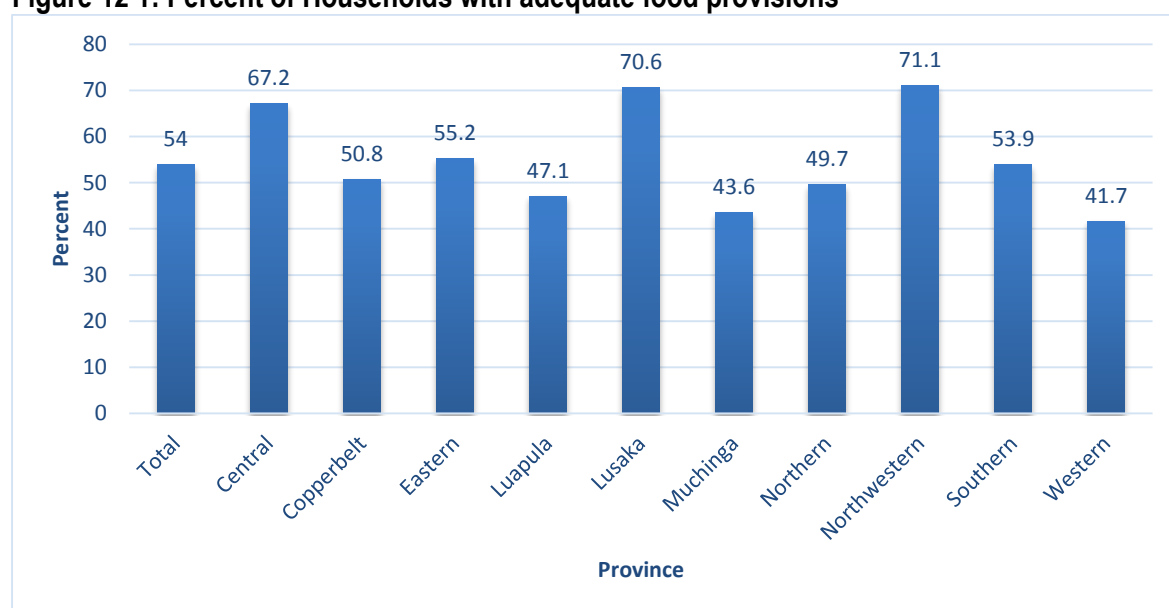
Source: RALS 2015

In terms of food provisions by month, Table 12.1 shows that less than 10% of households reported having adequate food provisions during the months of January and February. The results are consistent across all the provinces. None of the households in Muchinga, Copperbelt and Central Provinces reported that they were food secure in the month of January 2015 and the same results obtained in Muchinga Province in February 2015.

Table 12. 1: Percent of Households with adequate food provisions by month

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
May 2014	98.6	98.7	100.0	99.9	98.7	97.0	100.0	96.8	99.0	97.4	98.2
June 2014	98.2	98.7	100.0	99.9	96.8	97.8	100.0	96.3	99.0	97.4	97.1
July 2014	92.0	97.3	96.1	97.5	85.1	97.8	91.5	89.3	94.2	92.0	86.7
August 2014	88.9	95.9	96.8	94.9	86.9	96.4	91.2	88.3	91.3	88.2	71.6
September 2014	86.5	94.5	98.1	93.1	82.5	95.4	91.2	88.3	87.8	85.9	64.1
October 2014	79.9	92.7	94.6	89.4	75.5	83.0	83.9	83.2	85.3	76.1	51.2
November 2014	71.4	88.1	83.9	86.9	62.1	72.8	77.7	70.7	74.0	66.5	41.8
December 2014	52.7	69.8	57.4	73.9	41.6	46.0	60.3	48.9	53.5	44.8	26.6
January 2015	3.0	0.0	0.0	2.9	5.8	8.8	0.0	3.9	2.1	1.4	6.6
February 2015	2.9	0.2	0.4	0.4	6.3	1.4	0.0	3.7	2.1	1.4	9.6
March 2015	58.2	50.7	53.5	48.1	72.8	77.1	35.8	58.7	65.7	65.4	69.9
April 2015	87.0	91.2	92.9	89.3	88.9	92.5	80.2	84.0	87.0	85.5	85.8

Source: RALS 2015

12.1 Months of adequate household food provisions by gender

Table 12.2 shows the percent of household with adequate food provisions by gender of the households head. On average, there were no differences in food provisions by gender of household head. In Eastern, Luapula, Lusaka, Northwestern and Southern provinces, a slightly higher percentage of female headed households reported having adequate food provisions than male headed households.

Table 12. 2: Percent of Households with adequate food provisions by gender

	Male	Female
National	62.2	62.2
Central	62.9	61.3
Copperbelt	67.0	67.0
Eastern	65.8	67.1
Luapula	61.9	63.4
Lusaka	59.0	64.4
Muchinga	65.0	59.2
Northern	62.7	62.2
Northwestern	57.6	59.8
Southern	59.1	63.9
Western	56.6	54.4

Source: RALS 2015

12.2   Household dietary diversity

Household food access is defined as the ability to acquire a sufficient quality and quantity of food to meet all household members' nutritional requirements for productive lives (Fanta 2006). Based on Fanta (2006) recommended approach, we computed a household dietary diversity score (HDDS) which relates to nutrient adequacy (coverage of basic needs in terms of macro and micro nutrients) and to diet variety/balance, which are two of the main components of diet quality. In general, the household dietary diversity score reflects a snapshot of the economic ability of a household to access a variety of foods. The score is calculated by summing the number of food groups consumed in the household or by the individual respondent over the 24-hour recall period. Table 12.3 shows the twelve food groups that are used to compute the score[3]. Based on this set of food groups, the HDDS ranged from 0 to 12 with lower values being no food diversity and 12 being very diversified. In this report, we group the HDDS into three groups as follows:

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[3] This set of food groups is derived from the U.N. Food and Agriculture Organization (Food and Agricultural Organization. Food Composition Table for Africa. Rome, Italy, 1970. As viewed at www.fao.org/docrep/003/X6877E/X6877E00.htm.

Table 12. 3: Table of food groups used to compute the household dietary diversity score

A. Cereals	E. Meat, poultry, offal	I. Milk and milk products
B. Root and tubers	F. Eggs	J. Oil/fats
C. Vegetables	G. Fish and seafood	K. Sugar/honey
D. Fruits	H. Pulses/legumes/nuts	L. Miscellaneous

HDDS = A+B+C+D+E+F+G+H+I+K+J+K+L (ranges between 0 and 12)

HDDS Classification: 1) Low - HDDS= 0-4;   2) Medium - HDDS= 5-8   3) High - HDDS= 9-12

From the 24 hours food recall data, Table 12.4, shows that the majority of the households reported to have had cereals (97.5%), vegetables (dark green leafy vegetables and other vegetable) (72.8%), and vegetables (tomatoes, onions) (71.4%), a pattern that was common across provinces. These results are not surprising because the mostly consumed cereal is maize and is consumed with either vegetables cooked with tomatoes and onions. Consumption of other food groups are patchy suggesting nutritional imbalance in food intake within the households in Zambia. To gain a better understanding of the dietary diversity, we now turn to the results from the HDDS categorization.

Figure 12.2 shows the dietary diversity of the rural smallholder households. On average, 32.5% of the households are in the low dietary diversity group. These households had food from 4 or less food groups. Most of the households fall under the medium dietary diversity group (58.1%). These households consumed food from 5-8 food groups, showing a wider range of food diversity. Only 9.4% of the households are classified as having high household dietary food diversity. These results suggest that most households are not consuming a well-diversified diet.

Table 12.4: Percent of Households consumption of selected products in the last 24 hours

Food group	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
CEREALS - Any nshima, porridge, bread, etc. or any foods made from maize, rice, wheat, millet, sorghum or other grains?	97.5	99.3	99.0	98.7	97.5	98.4	92.9	96.3	99.3	96.7	97.8
ROOTS and TUBERS - Any white or yellow sweet potatoes, Irish potatoes, yam, white cassava, or other foods from roots?	55.0	55.0	60.1	42.3	70.7	40.2	65.7	66.0	63.1	46.2	48.1
MILK AND MILK PRODUCTS - Any milk, cheese, yoghurt, sour milk, or other milk products?	16.9	20.0	17.6	14.5	8.8	26	13.6	4.7	11.0	36.6	17.3
VITAMIN A RICH VEGETABLES AND TUBERS - Any pumpkins, carrots, squash, sweet potatoes -orange inside, vit. A rich?	32.1	23.7	42.6	42.4	25.9	34.4	48.6	31.5	29.7	31.5	12.4
DARK GREEN LEAFY VEGETABLES - Any dark green leafy vegetables including wild forms with vitamin A rich leaves?	72.8	77.5	83.7	79.0	71.3	85.8	73.5	55.9	83.9	73.6	58.7
VEGETABLES - Any tomatoes, onions?	71.4	83.1	94.8	86.1	68.4	95.8	48.2	67.5	71.1	65.4	45.8
VITAMIN A RICH FRUITS - Any ripe mango, ripe pawpaw?	3.8	2.9	5.9	3.0	12.2	3.8	3.0	3.4	1.3	2.1	1.4
OTHER FRUITS - Any guavas, oranges, avocado, including any wild fruits?	20.5	18.2	17.5	20.7	32.1	31.8	19.1	15.2	22.5	25.6	7.9
OFFALS - Any liver, kidney, heart, or other organ meats or blood-based foods?	4.8	6.2	5.6	6.0	3.2	9.1	4.8	4.0	4.5	5.3	1.8
FLESH MEAT - Any beef, pork, lamb, goat, game meat, crocodile, chicken, duck, other birds, and insects?	18.7	22.0	26.7	30.1	9.2	33.8	14.4	9.4	23.1	18.1	7.1
EGGS - Any eggs from chicken, duck, guinea fowl, and crocodile?	16.1	26.7	26.0	13.7	13.9	29.1	13.5	10.5	23.1	17.1	3.8
FISH - fresh or dried fish (e.g. kapenta, bream, chisense etc.)?	40.0	45.6	48.6	19.5	66.5	36.2	45.6	44.1	45.7	25.4	47.4
LEGUMES, NUTS and SEEDS - Any dried beans, groundnuts, or other foods made from these (e.g. peanut butter)?	52	56.5	53.9	68.3	45.8	42.6	58.5	52.2	52.2	49.5	22.8
OILS AND FATS - Any oils, fats or butter added to food or made for cooking?	66.5	71.7	84.8	74.0	66.8	87.5	61.1	48.1	64.5	68.4	56.1
SWEETS - sugar, honey?	40.6	53.7	59.8	44.6	26.3	69.3	34.5	26.5	36.1	49.1	27.9
SPICES, CONDIMENTS, BEVERAGES - Any spices, coffee, tea, alcoholic beverages?	37.1	41.0	56.5	76.5	16.7	51.2	22.9	13.6	23.1	39.0	13.2

Source: RALS 2015

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Figure 12.2: Household dietary diversity
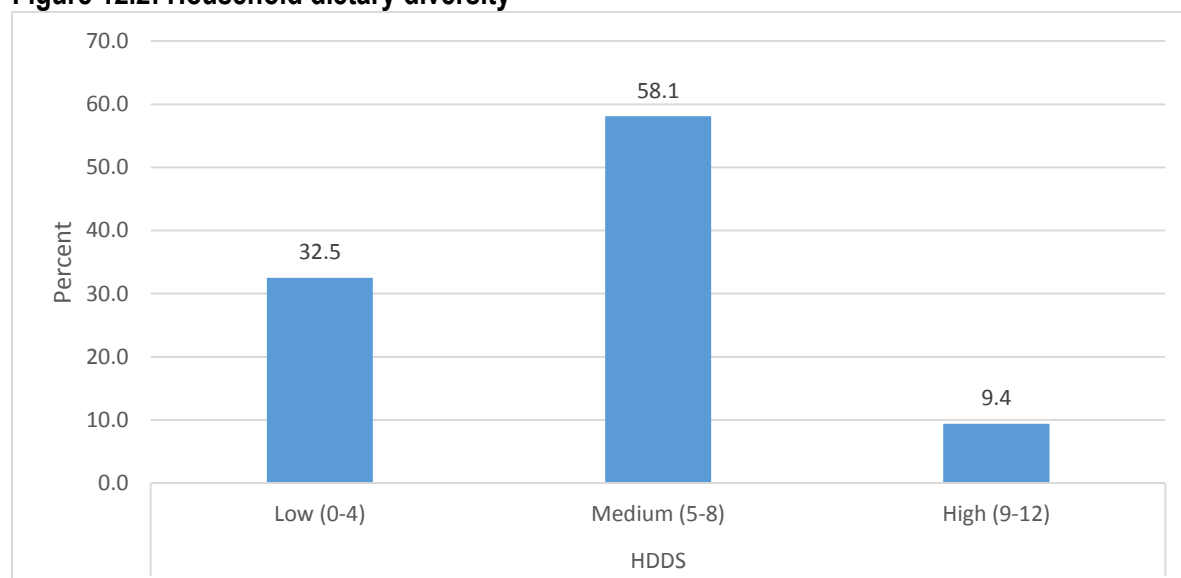
Source: RALS 2015

12.3.1 Household dietary diversity disaggregated by gender

When disaggregated by gender of household head, the results in Figure 12.3 shows, that there is a higher proportion of male headed households in the medium and high dietary diversity categories compared to female headed households. However, in the low dietary diversity category, we found about 12% more female headed households than male headed household. The results suggest that more female headed households fare worse than male headed households in terms of nutritional intake. These results are also consistent at provincial level (Table 12.5).

Figure 12. 3: Household dietary diversity by gender
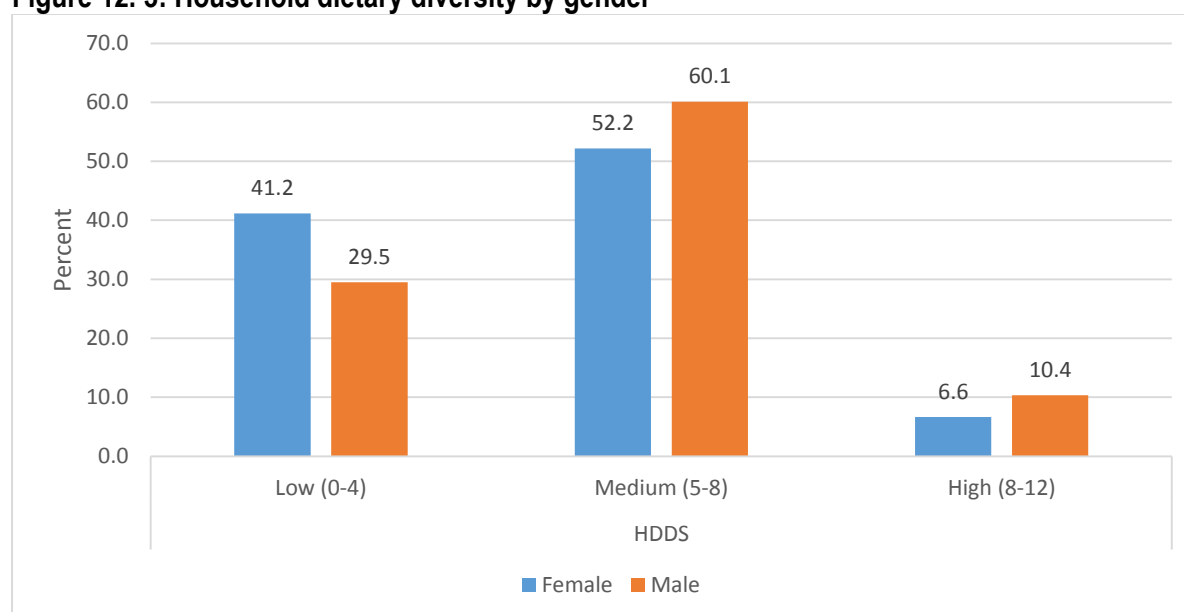
Source: RALS 2015

12.3.2 Household dietary diversity disaggregated by income and landholding size

Several studies have suggested that there is a positive correlation between income and dietary diversity. Thus, higher incomes are associated with the household's ability to afford a diverse basket of food products. Figure 12.5 seems to support this assertion. By income quintiles, we found that the proportion of households with low HDDS declines from as high as 51.6% in the first quintile to 12.5% in the highest quintile. On the other hand, the proportion of households with medium and high HDDS increases with income. We get the same trend when we compare HDDS by land holding size (Fig 12.5).These results suggest a high correlation between income and landholding size.

Figure 12.4: Household dietary diversity by income quintiles
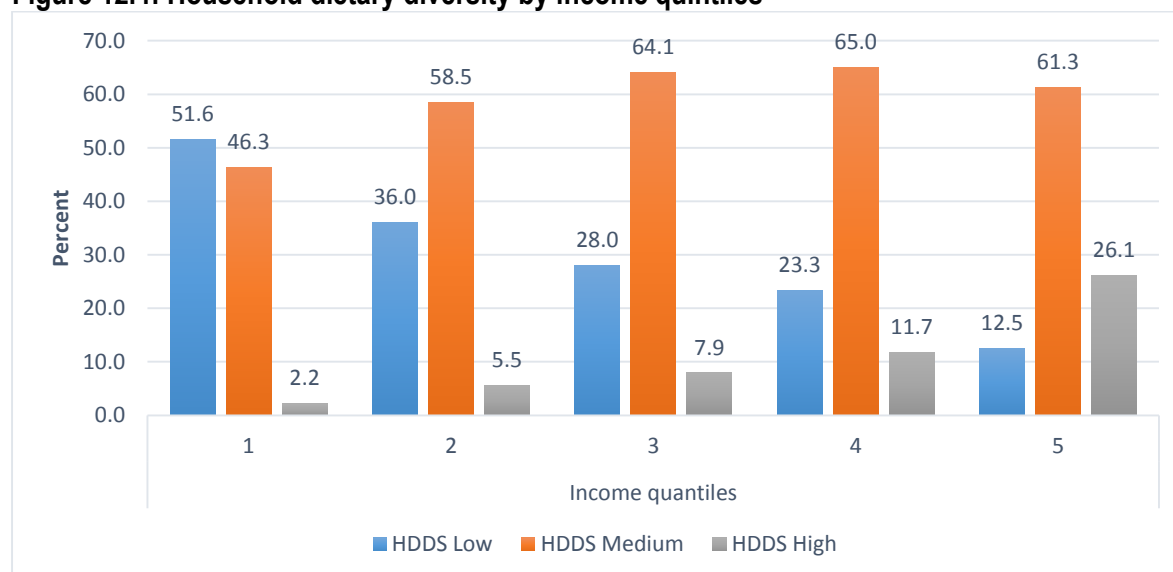
Source: RALS 2015

Figure 12. 5: Household dietary diversity by landholdings size categories
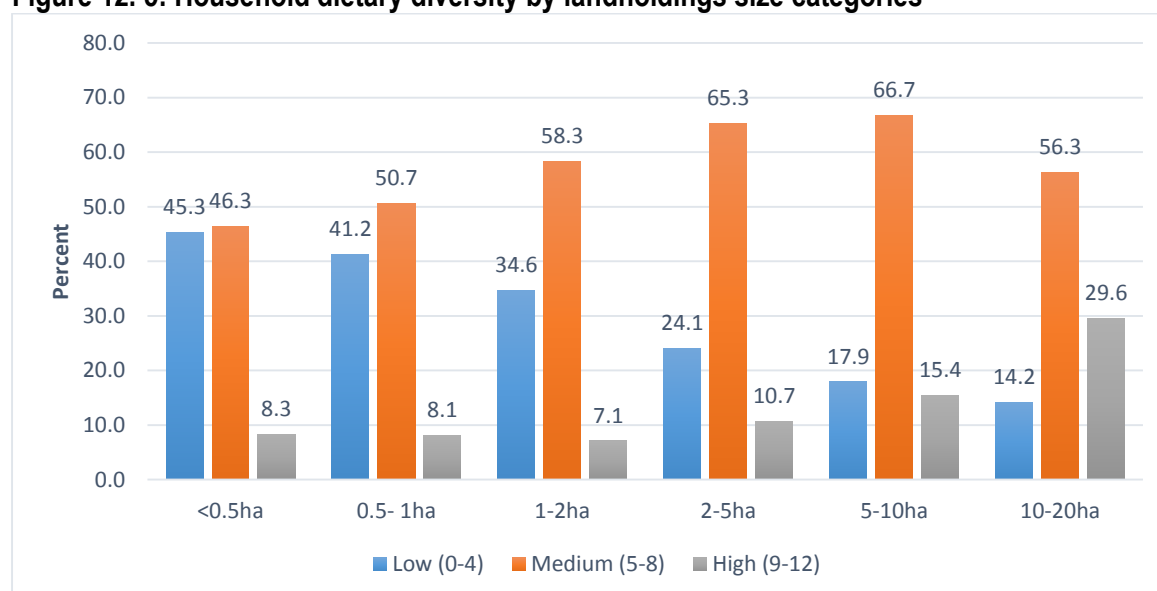
Source: RALS 2015

Table 12.5: National and Provincial HDDS by gender and landholding size

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
	6	6	7	6	6	7	5	5	6	6	4
Gender											
Female	5	6	6	6	5	6	5	4	5	6	4
Male	6	6	7	6	6	7	5	5	6	6	4
Landholding Size (Ha)											
<0.5 Ha	5	6	7	6	5	6	5	4	5	5	4
0.5- 1 Ha	5	6	7	6	5	7	5	4	5	5	4
1-2 Ha	5	6	6	6	6	6	5	5	6	6	4
2-5 Ha	6	6	7	6	6	7	6	5	6	6	5
5-10 Ha	6	7	8	7	6	8	7	6	5	6	5
10-20 Ha	7	8	9	7	9	8	5	6		7	6

Source: RALS 2015

# 13. HOUSEHOLD INCOME, INCOME SOURCES AND POVERTY

13.1   Household income sources

Household income is defined as the sum of farm and off-farm income. Farm income is given by the gross value of crop production, fruits and vegetables and livestock income from sales of animals and products. On the other hand, off-farm income includes all cash or goods earned from working outside one's own farm, i.e., another farm or non-farm business. This is a broad category that includes wage labor, casual labor, formal employment and pension; off-farm business activities; and remittances. Selling one's own agricultural produce was not considered an off-farm income earning activity.

Overall, the average household income among smallholder farmers in Zambia is K16, 937 of which 64% is earned from farm activities and the remainder is earned from off-farm activities. The income source composition is similar across all the provinces except in Lusaka and Copperbelt Provinces where the proportion of off-farm income is higher than from farm income.

Figures 13.1 and 13.2 summarises the breakdown of farm and off-farm income. In general, most of the farm income is derived from crops income followed by income from fruits and vegetables and lastly from livestock (Figure 13.1). The results are consistent across all the provinces (Table 13.1). On the other hand, the bulk of off-farm income is derived from business income with the exception for households in Eastern, Lusaka and Muchinga Provinces where the proportion of business income is greater than wage income.

Figure 13. 1: Crop income shares	Figure 13. 2: Off-farm income shares
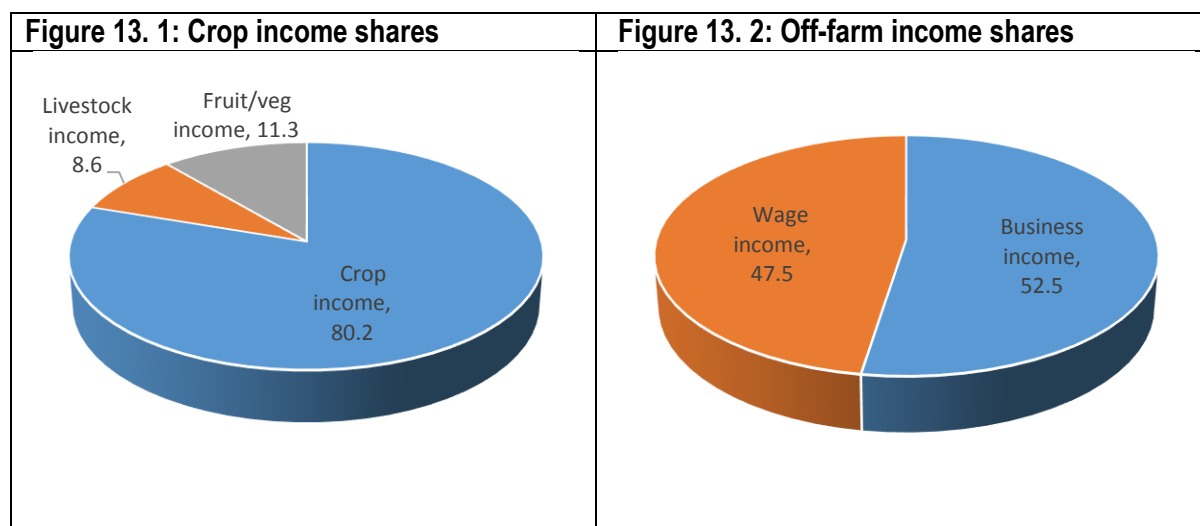
Source: RALS 2015

Table 13. 1: Household income sources by Province

	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Gross income (ZMW)	16,937	21,548	18,026	11,233	20,306	40,068	13,035	15,589	18,807	16,927	14,359
Farm income (%)	63.6	61.6	46.6	74.0	59.1	38.2	71.5	67.3	54.6	65.4	61.0
Crop income	80.2	77.5	74.5	84.1	78.0	64.4	90.2	88.8	82.1	68.1	82.6
Livestock income	8.6	11.1	10.7	5.6	2.6	16.1	5.7	4.4	7.9	19.1	7.3
Fruit/veg income	11.3	11.4	14.8	10.3	19.4	19.5	4.1	6.8	10.0	12.8	10.1
Off-farm income (%)	36.4	38.4	53.4	26.1	41.0	61.8	28.5	32.7	45.4	34.6	39.0
Business income	52.5	62.4	52.2	42.7	59.2	46.9	47.1	58.6	52.0	51.4	52.0
Wage income	47.5	37.6	47.8	57.3	40.8	53.1	52.9	41.4	48.0	48.7	48.0

Source: RALS 2015

13.2   Does household income differ by gender

Figure 13.3 shows household income disaggregated by gender. The results show that male headed households have more than double the gross income than that of female headed households. In terms of income composition, the results show that female headed households derive a slightly higher percentage of their income from their own farm activities than off-farm sources compared to male headed households. The difference is mainly from the value of fruits and vegetables, which is higher among female headed households than male headed households (Figure 13.4). In terms of off-farm income, the percentage share is higher for male headed households compared to female headed households. Further breakdown of off-farm income reveals that male headed households have a higher percentage share of business income but a lower percentage share of wage income compared to the female headed households (Figure 13.5).

Figure 13. 3: Household income sources by gender of household head
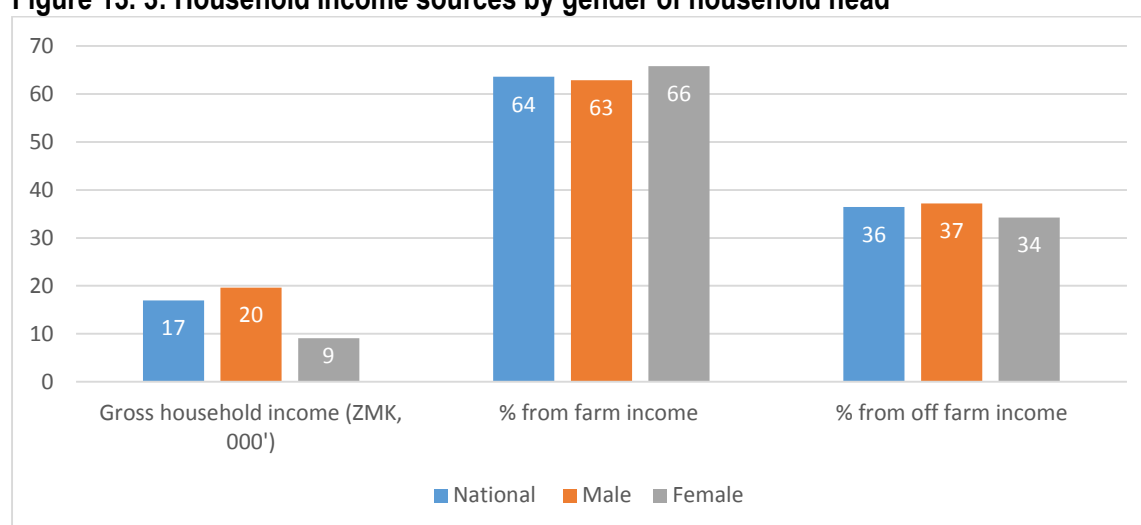
Source: RALS 2015

Figure 13. 4: Household farm income composition by gender of household head

Source: RALS 2015

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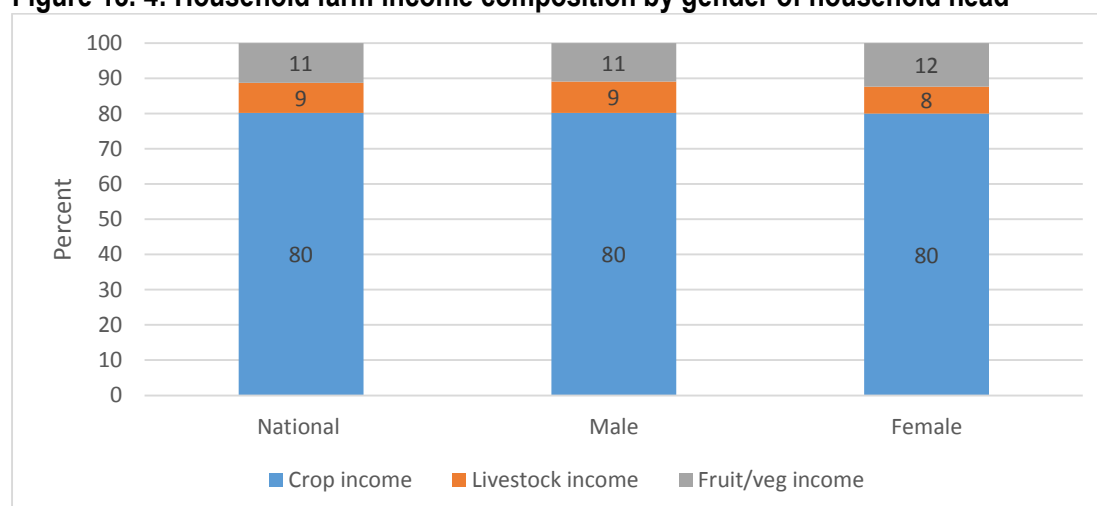
Figure 13. 5: Household off-farm income composition by gender of household head

13.3 Income Poverty Levels in Zambia

Zambia has made little progress in reducing poverty, particularly in rural areas despite the increasing economic growth that the country has experienced in the past decade. In the absence of updated official poverty figures, IAPRI has been calculating indicative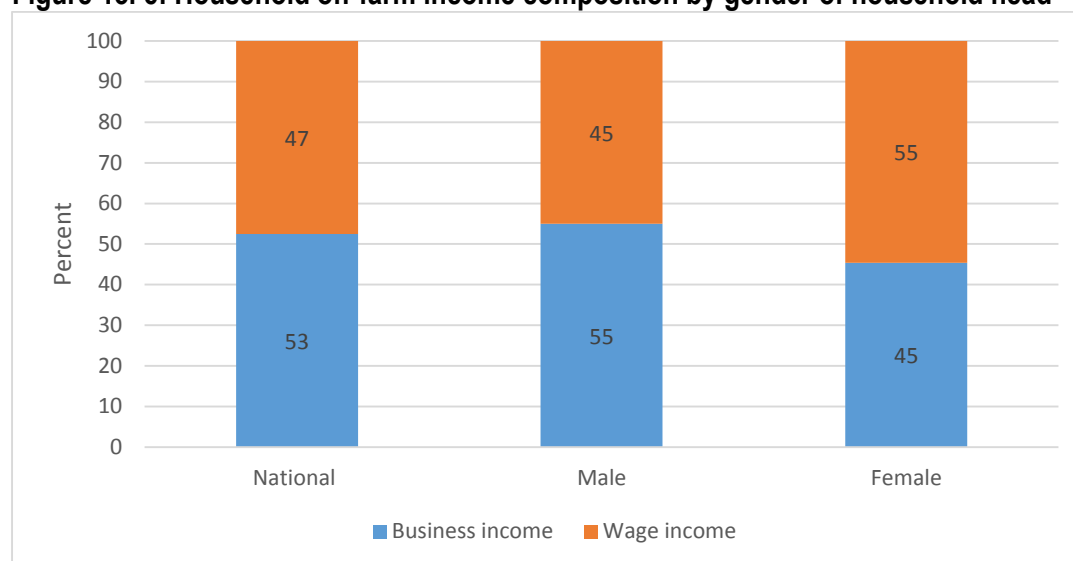 income based poverty rates from the nationally representative Rural Agricultural Livelihood Surveys (RALS), collected in collaboration with Central Statistical Office (CSO) and the Ministry of Agriculture. Although, the officially reported poverty levels are based on consumption expenditure, the income based estimates generated from RALS have been very comparable. Using the RALS 2015 survey data, we report rural poverty level based on the international poverty line of per capita US$1.25/day measured at 2005 PPP used by the World Bank. These figures can be compared to the official estimates that will be published in the CSO's 2015 Living Conditions Monitoring Survey.

13.3.1 Distribution of per capita income

Table 13.2 presents the average per capita income, in US$, among smallholder farming households. Incomes are generally low. Lusaka Province has the highest average per capita gross income of US$1,324.10 and Eastern Province has lowest with an average of US$302.21 followed by Muchinga with an average of US$310.74 per capita. However, Table 13.2 also shows that in all cases the average income is far larger than the median income, suggesting a skewed distribution of incomes, with a small group of relatively high earners pulling the mean income up. This is consistent with a highly differentiated smallholder sector.

Table 13. 2: Household off-farm income composition by province

	Gross household income per household member (US$ at official exchange rate)			
	Mean	Percentile 25	Median	Percentile 75
Central	509.07	114.02	227.05	520.48
Copperbelt	484.15	112.96	243.17	478.30
Eastern	302.21	85.64	160.72	296.07
Luapula	437.44	87.27	179.62	364.60
Lusaka	950.68	169.77	338.51	871.55
Muchinga	310.74	56.79	119.12	268.73
Northern	388.60	86.13	165.65	337.13
NorthWestern	448.47	95.50	199.07	431.23
Southern	408.90	98.96	199.80	418.11
Western	281.96	64.95	137.01	269.75
National	408.08	87.42	179.90	375.87

Source: 2012 CSO/MAL/IAPRI Rural Agricultural Livelihoods Survey

13.3.2 Head Count Poverty using 1.25$/day

This section compares income based poverty rates between RALS 2012 and 2015. In order to ensure that the estimates are not influenced by price changes between the survey periods, we estimated household crop income using 2012, 2005 PPP adjusted prices. The headcount ratio and other indices are based on weighted estimates from the 2012 and 2015 household surveys.

Figure 13.6 shows that the 2015 national poverty rates based on RALS 2015 have marginally increased by only 2% compared to 2012 poverty rates. However, the estimated poverty rates are shown to have declined by 1% to 7% in some provinces. For example, in Copperbelt (-7.7%), Central (-6.5%), Lusaka (-1.7%), Northwestern (-2.1%), while marginally declining in Southern province. In the remaining provinces, poverty rates have gone up, with the Northern Province recording the highest increase of 13.0% followed by Muchinga, Luapula and Eastern provinces with +8.3%, +7.2% and +3.7% respectively. In both survey years, poverty rates in Eastern Province have remained above 80% overtaking Western Province which had the highest poverty incidence in 2012. These findings will require additional analysis to further understand the underlying causes behind the changes in poverty rates by province.

Figure 13. 6: Prevalence of poverty: percent of smallholder households living on per capita income of less than $1.25/day (2005 ppp exchange rate) by province, 2012 and 2015

	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	NorthWestern	Southern	Western	Rural Zambia
2012	76.0	75.7	80.6	71.3	60.1	74.8	68.8	76.8	76.6	85.1	76.0
2015	69.5	68.0	84.3	78.5	58.4	83.1	81.8	74.7	75.8	83.3	78.0
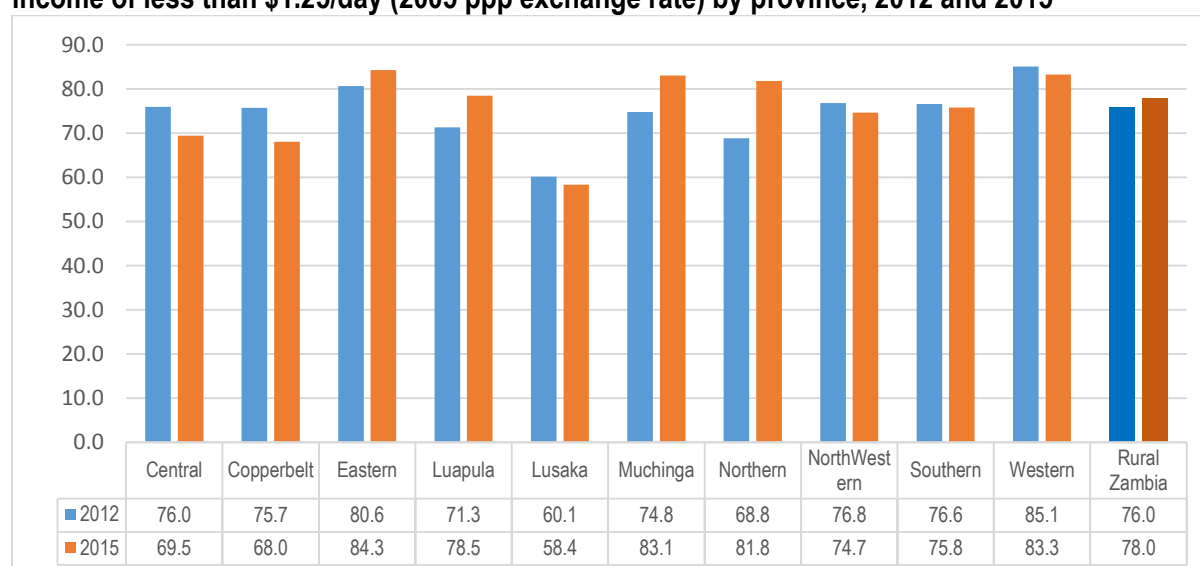
Source: 2012 and 2015 CSO/MAL/IAPRI Rural Agricultural Livelihoods Survey

13.3.3 Poverty Gap and Poverty Severity

In order to check the robustness of headcount percent reported in Figure 13.6, we computed two other poverty indices from RALS 2015, the poverty gap index and poverty severity index. The poverty gap measures both the depth of poverty as well as the incidence of poverty captured in Figure 13.6. The Poverty gap measures how far off households are from the poverty line. Thus, it measures the mean aggregate income or consumption shortfall relative to the poverty line across the whole population. The gap is measured by summing up all the shortfalls of the poor (counting the non-poor as having zero shortfall) and dividing the total by the population. In other words, the poverty gap measures the per capita amount of resources needed to eliminate poverty or reduce poor's shortfall from the poverty line to zero through perfectly targeted cash transfers (Poverty manual, Word Bank 2015). For example, the country needs more resources per capita to eliminate poverty in Muchinga and Western than any other province because they have the highest poverty gaps of 58.0% and 56.8% respectively. Thus, individual daily income has to go up by $0.69 (58.0%*US$1.25) in Muchinga to eliminate poverty compared to US$0.39 in Lusaka. It is important to note that although Eastern province has a higher head count index, the severity of poverty is higher in Muchinga as shown in Table 13.3.

On the other hand, poverty severity which is obtained by squaring the poverty gap takes into account both the distance separating the poor from the poverty line (the poverty gap), as well as the inequality among the poor. That is, a higher weight is placed on those households who are further away from the poverty line. The result shows that Muchinga has the highest poverty severity of 44.8% followed Western with 43.8% and Eastern province with 37.9%. Provinces on the line of rail; Lusaka, Central and Copperbelt provinces have poverty severity index well below the national index.

Table 13. 3: Poverty indices by province, Rural Zambia, 2015

Province	Headcount Index (%)	Poverty gap index (%)	Poverty severity index (%)
	(A)	(B)	(C)
Central	69.5	41.4	28.9
Copperbelt	68.0	38.9	26.8
Eastern	84.3	52.9	37.9
Luapula	78.5	49.8	35.8
Lusaka	58.4	30.9	20.5
Muchinga	83.1	58.0	44.8
Northern	81.8	52.4	38.4
Northwestern	74.7	47.2	34.2
Southern	75.8	47.3	33.9
Western	83.3	56.8	43.8
National	78.0	49.4	35.9

Source: RALS 2015

13.3.4 Poverty differences by gender of household head

Table 13.4 shows that the incidence of poverty, depth and severity is higher among female headed households compared to male headed households. These results reinforce other findings that a higher proportion of female headed households are poorer than households headed by males. In addition, 10% more resources are required to eliminate poverty among female headed households than male headed households because the level of poverty is more severe among female headed households.

Table 13. 4: Poverty indices by province, Rural Zambia, 2015

Province	Headcount Index (%)	Poverty gap index (%)	Poverty severity index (%)
	(A)	(B)	(C)
Male	75.5	46.6	33.3
Female	84.7	57.0	43.0
National	78.0	49.4	35.9

Source: RALS 2015

13.3.5 Poverty differences by land holding size

As indicated in the land ownership and use section, more than 60% of Zambian farmers cultivated less than 2 Ha with 39.7% of the farmers cultivating less than 1 Ha. Table 13.5 columns show that there is a higher proportion of households who are poor among households cultivating less than 2 Ha compared to those cultivating greater than 2 Ha. In addition, it is very clear from the Table (columns C and D) that the depth and severity of the poverty is highest among households with smaller landholdings. These results suggest that there is a correlation between landholding and poverty levels and poverty depth and severity. Therefore, efforts to deal with high poverty rates in the country should not ignore the fact that most rural farmers in Zambia are land constrained.

Table 13. 5: Poverty indices by province, Rural Zambia, 2015

Land cultivated group	Number and %		Headcount Index (%)	Poverty gap index (%)	Poverty severity index (%)
	(A)		(B)	(C)	(D)
0-0.5 Ha	279,305	18.5	81.2	59.0	47.0
0.5-1.0 Ha	320,244	21.2	86.1	59.5	45.7
1.0-2.0 Ha	459,244	30.4	83.1	52.1	36.9
2.0 - 5.0 Ha	375,023	24.8	70.9	37.8	24.1
5.0 - 10 Ha	64,709	4.3	39.3	14.9	7.8
>10 Ha	13,853	0.9	27.3	11.0	6.3
National	1,512,378	100	75.3	46.1	32.9

Source: RALS 2015

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APPENDIX

Table A3.1: Adoption of improved technology by gender

Province	Gender	Herbicide use	Fertilizer use	Hybrid seed use	Tractor ploughing	Animal Draft Power
Central	Male	18.8	36.1	62.1	2.6	68.8
	Female	16.2	29.1	49.3	0.1	63.2
Copperbelt	Male	27.6	32.6	59.5	1.7	17.9
	Female	21.7	30.9	56.2	1.1	15.6
Eastern	Male	5.3	25.8	42.5	0.6	60.6
	Female	2.4	21.2	34.3	0.1	44.8
Luapula	Male	7.1	13.0	22.4	0.0	0.1
	Female	6.5	8.7	14.3	1.7	1.0
Lusaka	Male	14.4	41.9	71.2	10.7	38.0
	Female	16.8	51.6	76.2	9.4	45.1
Muchinga	Male	19.3	28.2	50.1	0.9	1.1
	Female	11.6	30.3	53.9	0.0	0.2
Northern	Male	26.2	19.4	33.1	0.0	7.9
	Female	21.5	15.1	24.3	0.0	6.6
Northwestern	Male	16.1	20.6	35.7	0.2	3.9
	Female	14.7	22.4	41.3	0.0	2.8
Southern	Male	4.7	32.2	53.0	0.9	94.5
	Female	2.1	25.5	35.4	1.6	92.3
Western	Male	6.5	5.6	8.8	1.7	62.2
	Female	4.2	6.1	5.4	0.1	56.5

Table A3.2 Percentage of households practicing agroforestry and source of seed/seedlings

	Agroforestry Trees on field	Source of seed/Seedlings		
		Project/NGO	Government	Other
National	14.7	22.5	16.1	61.4
Central	15.5	12.1	80.1	7.8
Copperbelt	2.3	0.0	0.0	100.0
Eastern	15.3	33.1	12.8	54.2
Luapula	12.9	0.0	0.0	100.0
Lusaka	16.6	55.9	16.3	27.8
Muchinga	56.2	0.0	0.0	100.0
Northern	1.2	0.0	0.0	100.0
Northwestern	1.7	0.0	0.0	100.0
Southern	20.0	8.1	30.8	61.1
Western	4.7	0.0	0.0	0.0

Table A3.3: Average yield (MT/ha) by gender of household head

Crop grown	National	Male	Female
Maize	2.1	2.2	1.9
Sorghum	0.7	0.7	0.6
Rice	1.3	1.3	1.4
Millet	0.9	0.9	0.8
Groundnuts	0.7	0.7	0.6
Soya beans	0.8	0.8	1
Seed cotton	1	1	1
Mixed beans	0.5	0.5	0.5
Cowpeas	0.6	0.6	0.5
Sweet potato	4	4.2	3.3
Cassava	3.2	3.3	3.1
Sweet potato-orange fleshed	3.7	2.8	6.5
Other crops	0.8	0.8	0.6

Table A8.1: Average value of assets per household with and without housing

	With Housing	Without Housing
National	15846.5	10046.2
Central	19565.7	15099.5
Copperbelt	20003.8	11911.5
Eastern	11386.1	7512.4
Luapula	9144.2	3685.8
Lusaka	96739.0	49317.5
Muchinga	9402.3	3824.4
Northern	7092.4	3644.2
Northwestern	23584.6	12083.0
Southern	18581.1	15351.2
Western	5558.1	4487.5

Table A8.2: Average value of farm and non-farm assets

	Farm Assets	Non-farm Assets
National	583.6	2588.2
Central	1335.4	3628.3
Copperbelt	567.5	3362.3
Eastern	691.3	1762.1
Luapula	34.2	2566.0
Lusaka	975.0	8277.6
Muchinga	43.3	1708.0
Northern	31.2	1679.5
Northwestern	161.5	3970.2
Southern	1356.8	3095.0
Western	331.5	899.6