

Nutrition Baseline Survey 2019



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Acknowledgements

Musika is an independent *Zambian* non-profit company that stimulates and supports private sector investment in the smallholder market. Musika uses the Making Markets Work for the Poor (M4P) market development approach to fundamentally change the way agricultural markets work through establishment of mutually beneficial commercial linkages between the corporate clients and the relatively marginalised rural farming communities.

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Executive Summary

Background

Malnutrition has remained stubbornly high amongst Zambians over the past decade, especially amongst the rural households. Zambia is one of the countries with the highest levels of undernourishment in the world with a prevalence of about 45% (FAO *et. al.*, 2018). One of the major contributors to the high malnutrition levels are the high poverty levels experienced in the rural areas, estimated to be around 76% (CSO, 2015). It is against this background that Musika, using its market oriented approach, envisions contributing towards a reduction in malnutrition levels amongst the rural households across the country through the “Making Zambia’s Agricultural Markets Work for Nutrition” initiative. Under this specific project, Musika seeks to achieve increased consumption of a diverse range of nutritious foods among poor Zambians, especially amongst women and children and within smallholder farming and rural communities.

Methodology

In order to establish the status quo with regards to, among other key issues, knowledge, attitudes and practices around nutrition, the baseline survey was conducted in Mumbwa, Kabwe, Mazabuka and Mongu districts where 1,236 smallholder farming households were randomly interviewed.

Key Findings

- 1) **Levels of agricultural diversification are low:** On average, households grew two crops during the 2017/18 agricultural season. Households from Mumbwa district grew, on average, three crops. This was in addition to being involved in other livelihood activities such poultry and livestock rearing. This implies that generally, households from Mumbwa district were involved in more agricultural activities compared to households from the other districts. Household involvement in multiple agricultural activities could also act as a coping mechanism in the midst of unpredictable weather patterns.
- 2) **Food security is the dominant motivation on production choices, with nutrition being an insignificant motivating factor:** The study found that food security was a major motivation for households to engage in crop production. This could explain the high proportions of households involved in maize production (96%), since maize is a primary staple crop in Zambia. It was also learnt that 45% of the households were incentivized to engage in the production of crops in order to generate income. On average, only 15% of the households stated improving nutrition as a major reason for engaging in crop production. This outcome could be as a result of rural households prioritizing adequacy of food provisions as opposed to improved nutrition outcomes.

- 3) **Access to technical information on nutritious crops remains low amongst farming households:** It was found that only 16% of the households received information on nutritious crops from retailers whilst purchasing farming inputs. Access to such information was lowest in Mongu (1%). Rural retailers of agricultural products have the potential of being both a source and critical channel of information on nutrition for rural households, especially in the adoption of nutritious crops such as the orange maize, orange fleshed sweet potatoes etc. Thus, concerted efforts will be needed in improving extension service provision.
- 4) **The majority of farming households reared and consumed poultry and livestock:** The study revealed that 80% of the households were engaged in livestock and poultry activities. Village chickens were the most commonly reared poultry (70%). Goats were the second most reared livestock for Kabwe, Mumbwa and Mazabuka district whereas for Mongu district, cattle were the most commonly reared livestock followed by pigs. In terms of consumption, village chickens were the most consumed with an average of 51% of the households indicating having consumed village chickens during the 2018/19 agricultural marketing season. Village chickens have the potential of being an important source of protein given that most rural households rear village chickens. For Kabwe, Mumbwa and Mazabuka, the consumption of village chickens was followed by the consumption of other birds such as pigeons, ducks, turkey and guinea fowls. However, this finding was in sharp contrast with households in Mongu, which indicated goats as the second most consumed animals after village chickens.
- 5) **More rural households were involved in the consumption of eggs than milk:** On average, 45% of the households consumed eggs. This was more than double the number of households which indicated that they consumed milk. This is consistent with proportions of households engaged in livestock and poultry rearing. On average, households which owned poultry and livestock sold 46 eggs and 64 litres of milk per month during the 2018/19 marketing season. On average, households consumed 12 eggs from what was produced per month.
- 6) **Most farming households experience at least one month of food inadequacy during a year:** The majority of households (60%) highlighted that they had inadequate food in at least one of the months between March 2018 and February 2019. As is the trend in rural Zambia, food becomes scarce in the first and last quarter of every year mostly due to depletion of food in storage. In order to assess food security status, an average number of Months of Adequate Household Food Provisioning (MAHFP) was calculated. The average MAHFP score for the entire sample was 5.5, this means that households on average had adequate food for about 5.5 months during the previous 12 months. The majority of the households indicated that they mostly had increased food availability from February to about July when it started to decline, and this coincided with the agricultural harvest period when households tend to have plenty of food to sustain them.

- 7) **The majority of households are not consuming a well-diversified diet:** In terms of levels of dietary diversity among rural farming households, the study found that the majority of households (61%) ate foods from 5–7 different food groups in the last 24 hours out of 12 food groups. Whilst there is no established cut-off point in terms of number of food groups to indicate adequate or inadequate dietary diversity for the HDDS, households consuming foods from 9-12 different groups are classified as having a high household dietary food diversity. Thus dietary diversity remains relatively low. For instance, almost all the households consumed cereals (99%) in the previous 24 hours. There was low consumption of flesh meat (15%) and eggs (15%) and vitamin A fruits (19%) such as ripe mangoes, paw paw, etc. The World Health Organisation (WHO) recommends five servings of fruit and vegetables a day. The low consumption of vitamin A fruits could be attributed to the fact that at the time of the survey, it was off season for most common fruits in Zambia including mangoes.
- 8) **Over half of the women in farming households do not meet minimum dietary requirements:** Women's Minimum Dietary Diversity (MDD) was assessed based on a 24-hour meal recall for women aged between 15 and 49 years. The study found that 61% of the women failed to meet the minimum dietary requirements. Kabwe had the highest proportion of women (69%) falling below the minimum dietary requirement followed by Mumbwa and Mongu (62%) while Mazabuka had about half of the women below the requirement. The majority of women had at least eaten foods from four food groups (26%) followed by three (25%) and then five (20%) which is the minimum dietary diversity for women. The study found that the majority of the women had insufficient macro and micro nutrients in their diet.
- 9) **Low presence of retailers for nutritious foods:** The low dietary diversity amongst the majority of women interviewed could be attributed to the limited presence of retailers of nutritious foods, rural households travelled very long distances to access nutritious foods most of which were accessed from markets outside their villages. The majority of the households (47%) indicated that they usually accessed nutritious foods from markets outside their villages and this was consistent in all four districts. The low dietary diversity could also be as a result of the low agricultural diversity. Nutritious foods in this survey referred to kapenta, fish, eggs, village chicken, fortified foods, and leguminous foods among others. The average distance to the usual point of access to nutritious foods was 10 km.
- 10) **Low use of modern on-farm processing technologies:** The study also highlighted that generally there were low levels of on-farm processing activities happening among rural farming households especially in terms of fruits and vegetables (12%), cowpeas (27%), milk (33%) and soya beans (34%). The majority of the households that processed foods for domestic consumption used traditional/manual methods. On farm food storage technologies were also generally found to be traditional and unimproved.

- 11) **Low presence of food processors:** In terms of households' perceptions regarding the availability of non-farm businesses which process food in their communities, it was discovered that households in Mazabuka felt that they had few (49%) to many (51%) processors, this was similar to findings from Mumbwa and Kabwe district. However, Mongu was a different case as the majority highlighted that they had few (34%) to no processors (44%). Thus, generally households felt that there were few non-farm businesses engaged in the processing of foods.
- 12) **Women had relatively higher level of control over decision making for nutritious foods:** The study found that women dominated decision making over production as well as retention of groundnuts for home consumption (67%). Decision making over the selling and retention of fruits and vegetables was also dominated by female members of the household (56%). This dominance in decision making by females over legumes, fruits and vegetables could be used as an entry point for interventions which can enable women to commercialize and most importantly retain such agricultural produce for household consumption. The study also found that the majority of women owned village chickens (53%). Furthermore, decisions over the sale and consumption of village chickens were mainly made by women.
- 13) **Rural populations understood the importance of nutrition but convenience, cost and taste outranked nutrition when it came to purchase decisions:** The majority of the rural households (64%) agreed that health and nutrition played a key role in considering the choices of food they purchased and consumed. These findings suggest that the rural households understood the importance of consuming nutritious foods. Households were further asked to rank what factors they prioritized in making food choices, the majority of the households stated convenience (79%) as an important factor followed by the cost of the food (76%), and the third most important attribute was the taste of the food (70%). Health and nutrition (62%) was a fourth important factor in households' food ranking in considering purchase and consumption.

Conclusions and Recommendations

1. The relatively low diversity of crops grown by the rural households implies that generally, farmers could be susceptible to climatic shocks and other calamities. This calls for interventions which would enhance households' uptake of additional farming enterprises. One key avenue in achieving this is through improving technical information delivery through rural retail outlets where rural households purchase their farming inputs. Household involvement in multiple agricultural activities could act as a coping mechanism in the midst of unpredictable weather pattern, this could further help to reduce both agricultural production and price risk.
2. Food security was the major motivation for households' engagement in crop production. This could also explain high proportions of households which were involved in maize production, given the status of maize as the primary staple crop. It was also learnt that less

than half of the households were incentivized to engage in the production of crops in order to generate income. This could imply that farmers have inadequate marketing opportunities as a few crops were sold per household through largely informal marketing channels. There is therefore, a need to devise interventions which could enhance rural households' marketing options especially for nutritious crops like orange maize to improve the adoption of these crops.

3. The majority of rural households highlighted that they had inadequate food in at least one of the months between March 2018 and February 2019. The majority of the households indicated that they mostly had increased food availability from February to about July when it starts to decline. Food inadequacies could be related to low production levels due to low productivity, which could also be attributed to the lack of formal markets. This necessitates a need for interventions which could enhance the uptake of improved technologies. Furthermore, there is a need to improve the levels of dietary diversity among rural farming households. This might involve improving nutritional messaging regarding consumption of locally produced nutritious foods.
4. The study found that the majority of the women failed to meet the minimum dietary requirements. This implies that the majority of the women had insufficient macro and micro nutrients in their diet.
5. The study also highlighted that generally there was low processing activities happening among rural farming households. The majority of the households used traditional/manual methods in processing most of their produce.

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List of Acronyms and Abbreviations

AHS	Annual Household Survey
CI	Commercialization Index
CFS	Crop Forecast Survey
CSO	Central Statistical Office
DHS	Demographic Health Survey
FAO	Food and Agriculture Organization
HH	Household
IAPRI	Indaba Agricultural Policy Research Institute
IFAD	International Fund for Agricultural Development
MAHFP	Months of Adequate Household Food Provisioning
MoA	Ministry of Agriculture
MDD	Women's Minimum Dietary Diversity
Kg	Kilogram
Km	Kilometre
PSU	Primary Sampling Unit
RALS	Rural Agricultural Livelihood Survey
SEA	Standard Enumeration Area
SMEs	Small and Medium-sized Enterprises
WFP	World Food Programme
WHO	World Health Organisation
ZMW	Zambian Kwacha

1.0 Introduction

Malnutrition has remained stubbornly high in Zambia over the past decade, especially amongst the rural households. The 2018 Demographic Health Survey (DHS) showed that 35 percent of children below the age of five suffered from stunted growth. The country is also among the countries with the highest levels of undernourishment in the world with a prevalence of about 45 percent (FAO *et al.*, 2018). One of the major contributors to the high malnutrition levels are the high poverty levels experienced in the rural areas, estimated to be around 76 percent (CSO, 2015). Mofya-Mukuka and Hichaambwa (2016) noted that the low levels of crop diversification amongst the rural smallholder farmers have also contributed towards the high malnutrition levels among the rural households. This is because majority of these households rely entirely on their own production for food provisions.

It is against this background that Musika, using its market oriented approach, envisions contributing towards a reduction in malnutrition levels amongst the rural households across the country through the “Making Zambia’s Agricultural Markets Work for Nutrition” initiative. Under this specific project, *Musika seeks to achieve increased consumption of a diverse range of nutritious foods among poor Zambians, especially amongst women and children and within smallholder farming and rural communities*. This has since been aligned with Musika’s wider methodology of developing and improving robust and inclusive private sector-driven supply chains for nutritious food products from agricultural production to processing and marketing functions. Specifically, the project seeks to:

- i. Increase production, retention and consumption of an increased diverse range of nutritious foods throughout the year by smallholder agricultural households;
- ii. Increase capacity of the small and medium scale, rurally based food-processing sector to produce a range of high quality nutritious foods to target the ‘bottom of the pyramid’ food retail market;
- iii. Improve capacity of the food-processing sector to create commercially viable distribution channels for affordable nutritious foods and accompanying nutrition information into the rural market.

1.1 Study Objectives

The overall objective of the assignment was to conduct a baseline survey in four districts: Mongu, Mazabuka, Kabwe and Mumbwa, in order to establish the status quo with regards to, among other key issues, knowledge, attitudes and practices around on-farm nutrition in the targeted districts. This baseline was to provide the project with key data on which assessment of impact on set project targets would be based.

1.2 Data and Methods

1.2.1 Sample size

The baseline survey was conducted in four districts, namely Mongu in Western Province, Mazabuka in Southern Province, Mumbwa and Kabwe in Central Province.

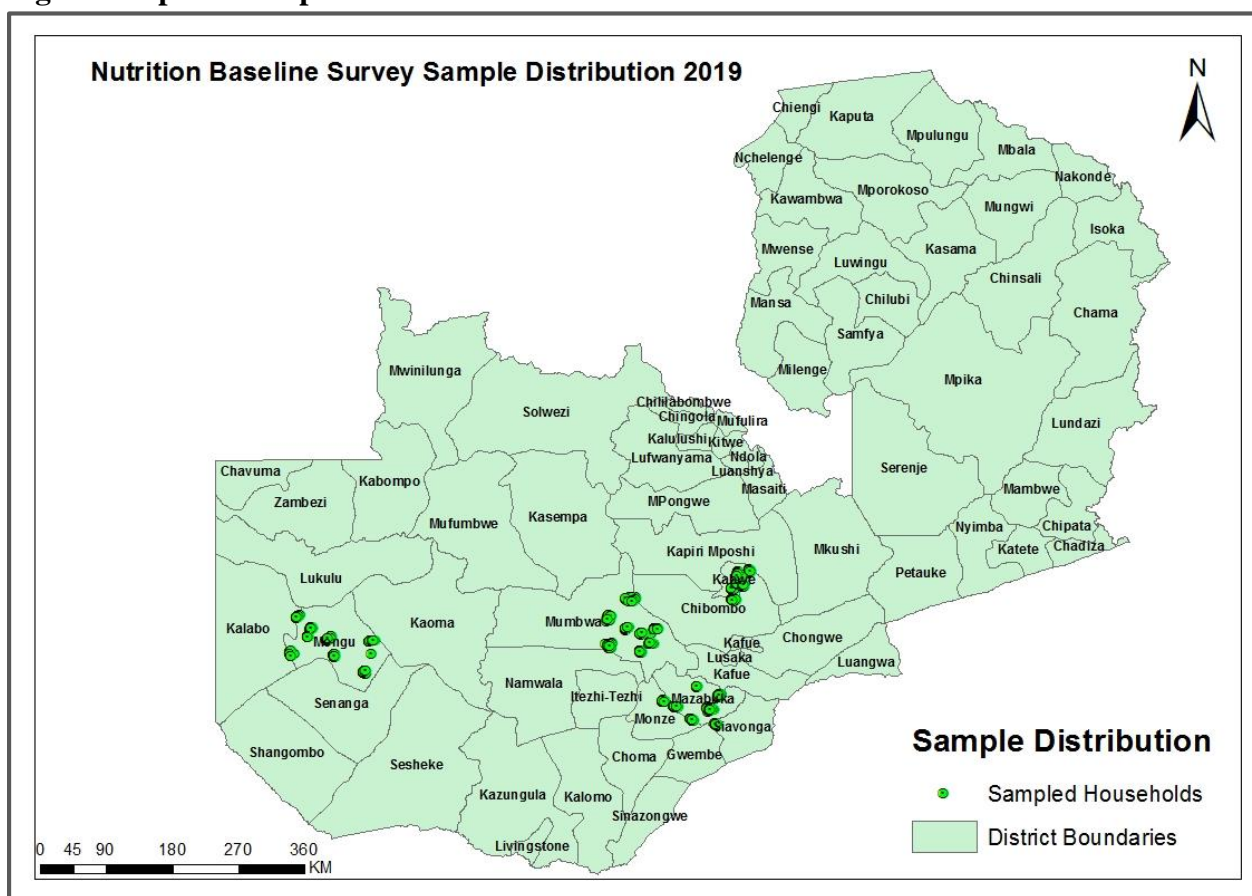
With approval from the Central Statistical Office (CSO), the study used listing rosters of the 2017/2018 Crop Forecast Survey (CFS). The CFS is a nationally representative survey conducted jointly by Ministry of Agriculture (MoA) and CSO annually. It is done shortly before each harvest to collect information on input use and area planted to various field crops. The survey also collects information on the quantities expected to be harvested and sold after harvesting. This study drew from CFS small- and medium-scale farming households cultivating less than 20 hectares of land. During the 2017/2018 farming season, 13,512 small- and medium-scale farming households were sampled.

The sampling frame for the CFS survey was drawn from the 2010 Census of Housing and Population. A stratified two-stage sample design was used for the CFS sampling. The first stage involved identifying the Primary Sampling Unit (PSU), which is defined as Standard Enumeration Area (SEA) comprising a number of agricultural households. The SEA is the smallest area with well-defined boundaries in a district. At the second stage, all households in a selected SEA 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.

Though the stratifying guidelines presented in this study are not complete, the households under category C were those with area under crops between 5.0 – 19.99 hectares. This category also includes households raising 50 or more cattle, 20 or more pigs, 30 or more goats, and/or 50 or more chickens, even if they do not qualify based on area under crops. Households under category B are those whose area under crops is between 2.0- 4.99 hectares. Category A households are those whose area under crops is less than 2.0 hectares.

Based on the listing rosters obtained from the CSO, a systematic sampling was then applied to select 38 farming households distributed across the three strata in each SEA. The total sample size was 1,236 farming households across all the four districts, with a minimum of 300 households per district. Specifically, the number of interviewed households in each district were 304 in Mongu, 300 in Mumbwa, 329 in Kabwe and 303 in Mazabuka. Figure 1 shows the spatial distribution of the sampled households.

Figure 1: Spatial sample distribution



Source: Nutrition Baseline Survey, 2019

At SEA level, the selected sample size for interviewing was on average 38 households in each of the sampled SEAs and in each district there were 8 sampled SEAs except for Kabwe where 5 SEAs were sampled. Four field team supervisors (each per district) were trained in simple random sampling using the table of random numbers and sampling interval. And the households to be interviewed were randomly selected by the supervisors. Data collection was conducted using tablets.

The sample size by district is as shown in Table 1 below:

Table 1: Summary of Sampling Procedure

District	No. of SEAs	No. of HHs sampled per SEA	No. of HHs sampled per district
Mongu	8	38	304
Mumbwa	8	38	300
Mazabuka	8	38	303
Kabwe	5	65	329
Total	29	179	1,236

Note: Sampling rosters were obtained from the CSO office

2.0 RESULTS AND DISCUSSION

2.1 Generalised findings

2.1.1 Demographic Characteristics

In terms of gender representation, 21% of the sample consisted of female headed households as presented in Table 2. The majority of household heads (66%) were in monogamous marriages. The study also found that more than half (56%) of the household heads across the districts had at least attained primary education, and 35% had attained secondary education. The average age of the household heads was 49 years while the average household size was seven across all the four districts, this was slightly above the national household sizes (average household size of six) for the targeted districts (IAPRI, 2016). Mazabuka had the largest representation of households with children under the age of five, contributing 27% to the total number of children captured in the age group of interest. Mongu which had the highest proportion of households with women of child bearing age (15-49), contributed 28% to the total sample, see Table 2. Furthermore, the average age of the women of productive age across the sample was 29 years.

Table 2: Demographics

	Mazabuka	Mongu	Mumbwa	Kabwe	Total/Average
Total number of households	304	303	300	329	1,236
Mean Age of household head (years)	48	50	47	50	49
Household Size (Average)	7	6	7	6	7
Sex of Household head					
Male	97%	65%	78%	77%	79%
Female	3%	35%	22%	23%	21%
Marital Status					
Divorced	4%	14%	4%	5%	7%
Monogamously Married	73%	60%	63%	69%	66%
Never Married	1%	5%	2%	4%	3%
Polygamous Married	10%	4%	19%	5%	10%
Separated	1%	1%	2%	2%	2%
Widowed	11%	16%	10%	15%	13%
Educational Level					
None	1%	1%	2%	0%	1%
Pre-school	3%	2%	2%	2%	2%
Primary	52%	64%	56%	50%	56%
Secondary	36%	32%	36%	37%	35%
Tertiary	8%	1%	4%	5%	5%

Table 2: Demographics ...Cont'd

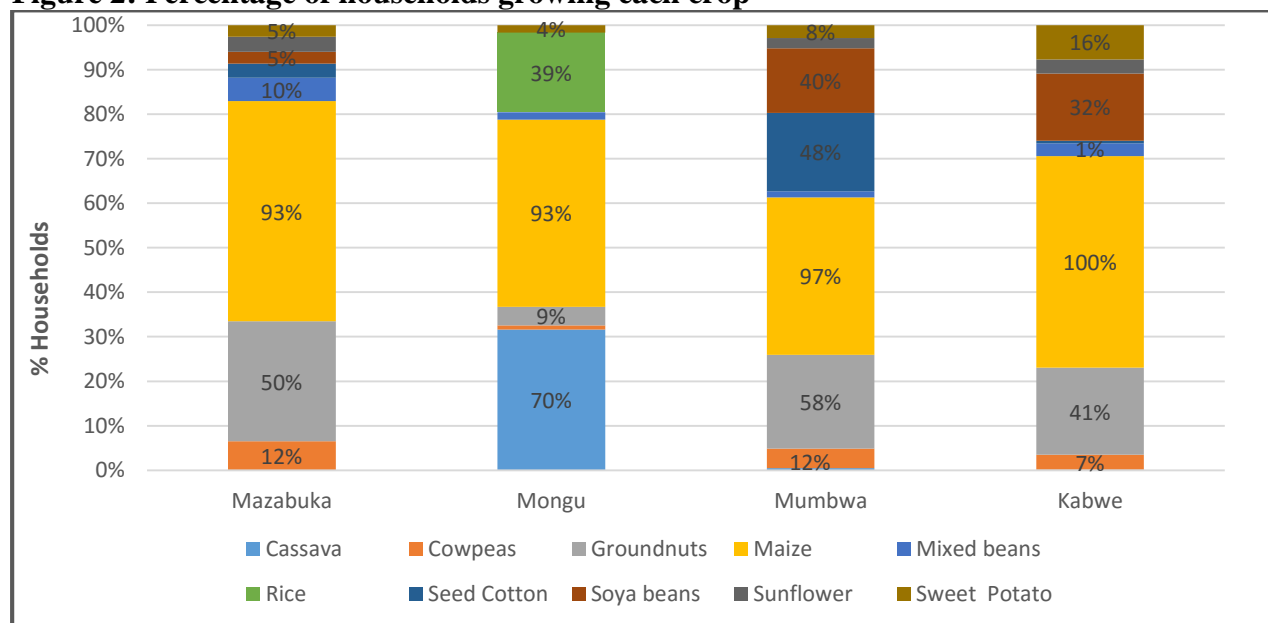
	Mazabuka	Mongu	Mumbwa	Kabwe	Total/Average
Distribution of Children under 5					
Number of Households with Children under-5	170	157	162	145	634
Male Children	59%	47%	54%	63%	56%
Female Children	41%	53%	46%	37%	44%
Distribution of Women of Reproductive Age					
Number of Households with Women aged (15 -49)	232	250	186	229	897
Mean Age	29	28	29	29	29

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.2 Levels of Agricultural Diversification Were Found to be Low

The research found that 96% of the households in the selected districts grew maize. These findings are consistent with estimates obtained from the Rural Agricultural Livelihood Survey (RALS) of 2015 (IAPRI, 2016). Maize production was followed by groundnuts, with 40% of the households engaged in the production of groundnuts. Mumbwa district had more households participating in the production of other crops such as cotton and soya beans than households in the other districts. The study further found that Mongu had more households who participated in cassava production (70%) than the number of households from the other districts. The third most popular crop grown in Kabwe after maize and groundnuts was soya beans. See Figure 2.

Figure 2: Percentage of households growing each crop¹



Source: Nutrition Baseline Survey, 2019 and authors' computations

¹ The 10 top crops grown by the households have been displayed in the graph to make it easier to distinguish the colour coding.

On average, households grew two crops during the 2017/18 agricultural season. Households from Mumbwa district grew an average of three crops (as presented in Table 3), in addition to the households being involved in other livelihood activities such as poultry and livestock rearing. This implies that households from Mumbwa were involved in a wider range of agricultural activities than households from Kabwe, Mazabuka and Mongu, offering a better coping strategy in view of unpredictable weather patterns. On average, households grew 2 types of vegetables, and had on average a livestock population consisting of 12 animals. Rural households from Mazabuka kept much more livestock than the other districts, see table 3.

Table 3: Level of agricultural diversification by activity

District	Average Crops Grown	Fruits	Vegetables	Poultry	Livestock
Mazabuka	2	1	1	30	15
Mongu	2	0	2	13	7
Mumbwa	3	1	2	30	14
Kabwe	2	1	1	24	13
Average	2	1	2	24	12

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.3 Food Security is the dominant Motivation on Production Choices, with Nutrition Being an Insignificant Motivating Factor

Food security was the major motivation for 91% of households' engagement in crop production which could explain the high proportions of households involved in maize production (96%), given the status of maize as Zambia's primary staple crop. It was also learnt that 45% of the households were incentivized to engage in the production of at least one crop in order to generate income, see Table 4. Only 15% of the households stated nutrition as a major reason for engaging in crop production. Given the high poverty levels in the rural communities, the focus is usually to have adequate food provisions as opposed to nutrition. Poverty is well linked to malnutrition as a consequence as well as a determinant of it and it's clear that poverty being linked to food and nutrition insecurity reduces the households access to basic dietary diversity needs.

Table 4: Motivation for engaging in crop farming

District	Climate mitigation	Household food security	Improve nutrition	Improve income
Mazabuka	5%	86%	20%	27%
Mongu	2%	95%	9%	25%
Mumbwa	2%	91%	15%	78%
Kabwe	1%	91%	14%	48%
Average	3%	91%	15%	45%

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.4 Use of Improved Seed (Purchased) and Access to Information for Nutritious Food was Found to be Low

Adoption of improved technologies by farmers has the potential of improving economic outcomes for their farming enterprises through improved production and productivity. Generally, use of improved seed² was found to be low, except for the maize crop, see Table 5. The low levels of use of improved inputs for nutritious crops could be attributed to availability of markets for the inputs.

Table 5: Use of improved seed by district

Crops grown	% households using improved seed by district				
	Average	Mazabuka	Mongu	Mumbwa	Kabwe
Cowpeas	3	4	0	5	2
Groundnuts	12	15	1	22	10
Maize	70	85	32	77	84
Millet	0	0	1	0	0
Mixed beans	2	5	0	1	3
Rice	2	0	7	0	0
Soya beans	11	4	0	25	16
Sunflower	2	3	0	3	2
Sweet potato(white and Yellow)	1	1	1	1	2

Source: Nutrition Baseline Survey, 2019 and authors' computations

The yields across the districts were also found to be low, below the national averages, see Table 6. Generally, yield levels were comparatively higher in districts where greater proportions of households used hybrid seed with an exception of groundnuts. This further augments the link between use of improved seed and crop productivity.

Table 6: Crop yield levels across the districts

Crops	Average crop yields in kg/ha by district			
	Mazabuka	Mongu	Mumbwa	Kabwe
Cassava	-	1,250	5,342	714
Cowpeas	318	341	583	356
Groundnuts	490	2,395	1,217	1,619
Maize	1,807	853	1,731	1,658
Millet	-	336	683	-
Mixed beans	445	739	674	743
Orange maize	690	-	-	575
Pigeon peas	-	-	100	176
Rice	-	1,967	-	-

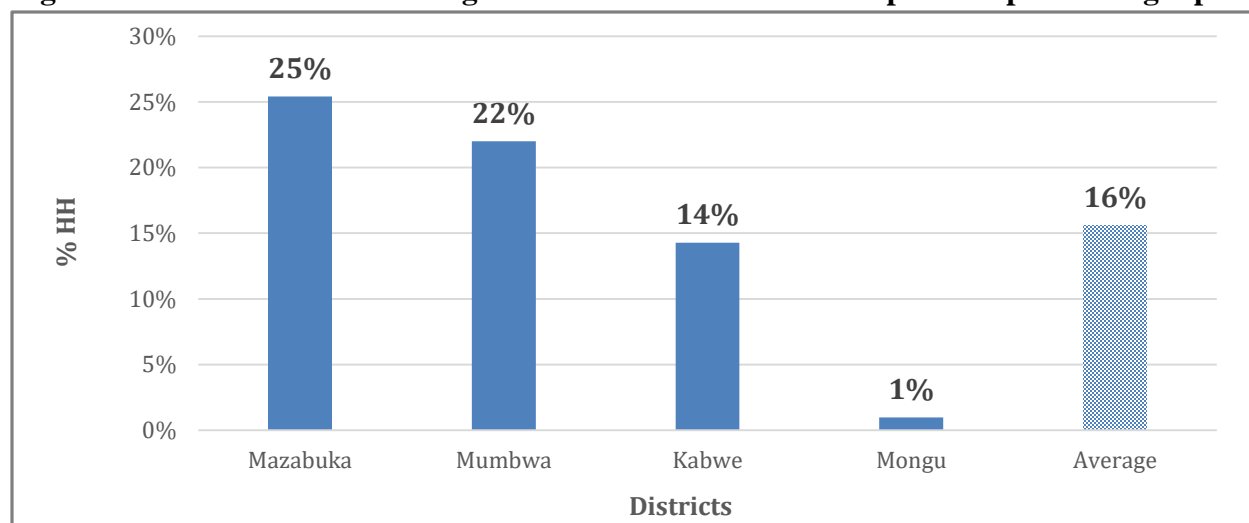
² Monela (2014) defined improved seeds as seeds that aim at increasing the quality and production of crops by having characteristics such as drought tolerance, high yielding, and early maturity.

Table 6: Crop yield levels across the districts...Cont'd

Crops	Average crop yields in kg/ha by district			
	Mazabuka	Mongu	Mumbwa	Kabwe
Soya beans	416	-	965	732
Sunflower	358	-	464	394
Sweet potato(Orange fleshed)	-	-	-	2,927
Sweet potato (White and Yellow)	2,623	6,557	5,521	5,897

Source: Nutrition Baseline Survey, 2019 and authors' computations

Access to information on nutritious crops remains low amongst farming households. The study found that 16% of the households received information on nutritious crops from retailers whilst purchasing farming inputs. Access to such information was lowest in Mongu (1%), see figure 3 below. Retailers of agricultural products have the potential of being a critical channel of information on nutrition for rural households, especially in the adoption of nutritious crops such as orange maize, orange fleshed sweet potatoes etc. Thus, concerted efforts will be needed in improving extension service provision.

Figure 3: % Households accessing information on nutritious crops when purchasing inputs

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.5 Low Commercialisation and Consumption Levels for a Number of Nutritious Crops and Vegetables

The study also found that 61% of the farmers were involved in the marketing of at least one crop. The research further found that households sold, on average, 2 crops across the districts. A crop Commercialization Index (CI) was used to examine the intensity of households' participation in the markets in terms of quantities sold. CI measures the quantity of crop sold relative to the quantity produced. Soya beans was found to have the highest level of commercialization; households from Kabwe district had sold the highest proportions, see Table 7. Much of soya beans was sold as most of the households lacked the means to process it, and for the households which managed to process it, they preferred mixing it with maize meal. In terms of sunflower, the observed low commercialization levels in Mumbwa could be explained by observations by field teams that households in Mumbwa were engaged in processing of the sunflower into oil for home consumption, hence, low quantities sold. In general, the results showed that for a number of crops (refer to Table 7), there was a small proportion of the crop sold. This could mean either farmers growing for home consumption or there was simply no market for the crops. For crops like orange maize and cowpeas, the small proportion sold did not necessarily mean that the rest was retained for consumption but rather wasted.

Table 7. Commercialisation Index per region and crop³

Crops	% sold crops by district			
	Mazabuka	Mongu	Mumbwa	Kabwe
Cowpeas	29	34	10	66
Groundnuts	17	18	24	60
Maize	27	4	30	54
Millet	-	13	44	-
Mixed beans	34	5	8	62
Orange maize	6	-	-	36
Rice	-	46	-	-
Soya beans	65	-	86	90
Sunflower	86	-	26	76
Sweet potato(white and Yellow)	18	16	10	53
Sweet Potatoes (orange fleshed)	-	-	-	30

Source: Nutrition Baseline Survey, 2019 and authors' computations

³ The commercialisation index was only generated for food crops.

In terms of vegetables, the survey found that the most common types of vegetables grown and consumed were rape (23%) followed by pumpkin leaves (15%) and cassava leaves (15%). Mangoes were the most produced and consumed fruits (22%). Basically, the number of households involved in the production of the aforementioned fruits and vegetables corresponded to the number of households involved in the consumption of the fruits and vegetables. The implication of this is that households produced fruits and vegetables for both consumption and selling purposes. And of the total number of households which were involved in fruit and vegetable production, 44% sold fruits and vegetables.

2.1.6 Low Presence of Commodity Buyers for Nutritious Crops

Access to markets is critical for farmers to re-invest in their own production, and to improve their livelihoods from the income generated. The study found that households from Mongu generally covered the longest distances to the nearest point of sale, and this was followed by Mumbwa. Households in Kabwe, generally, covered relatively lesser distances to points of sale for their commodities than other districts. This could be attributed to Kabwe being largely peri-urban. Across the districts, on average, households covered the least distance to the point of sale for groundnuts with the exception of Mumbwa, see Table 8 below. For Mazabuka and Mumbwa, households covered relatively longer distances for nutritious crops (soya beans, sunflower and orange maize) compared to the other crops with the exception of groundnuts. Households in Mongu covered the longest distance to the nearest point of sale for their mixed beans.

Table 8: Average distances to the nearest point of sale (km)

Crops sold	Average distances (km) to the nearest point of sale by district			
	Mazabuka	Mongu	Mumbwa	Kabwe
Cassava	-	19	0	-
Cowpeas	11	18	28	3
Groundnuts	3	2	14	4
Maize	8	11	31	7
Mixed beans	5	120	9	3
Orange maize	20	-	-	15
Rice	-	18	-	-
Soya beans	48	-	37	5
Sunflower	11	-	36	11
Sweet Potato(Orange fleshed)	-	-	-	15
Sweet Potato(White and Yellow)	0	16	4	4

Source: Nutrition Baseline Survey, 2019 and authors' computations

The study also found that there was a variation in terms of marketing channels for the different districts. For example, households in Mazabuka and Kabwe district mainly sold to small-scale traders whilst households in Mongu district utilized retailers/marketers to sell their crops. Households in Mumbwa largely sold to large scale traders followed by small scale traders, see Table 9 below. Thus households, generally, utilised informal marketing channels.

Table 9: Crop buyers by district

Crop buyers	Mazabuka	Mongu	Mumbwa	Kabwe
Directly to Miller Processor	1%	0%	1%	8%
Miller Processor through Agent	0%	0%	3%	8%
Large scale trader wholesaler	5%	1%	25%	26%
Other Households For Consumption	6%	4%	10%	20%
Out grower	0%	0%	3%	1%
Retailer Marketer	2%	10%	2%	24%
FRA	1%	0%	0%	5%
Schools Hospitals or Health Centres	1%	0%	0%	0%
Small scale Trader	10%	3%	11%	30%

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.7 Purchasing of Household Food Requirements was the Third Most Important Use of Household Crop Revenue

In terms of use of revenue from crop sales, most households (27%) used their income on education necessities, followed by purchasing of farming inputs (19%), see Table 10. It was further discovered 17% of households highlighted that they use income from crop sales to purchase household food requirements, this could be because small-scale farmers traditionally grow the food they eat and only spend cash to purchase food stuffs that they cannot produce or have run out of. Despite households owning notable numbers of poultry and livestock, households spent the least amount on veterinary drugs and services. Access to veterinary drugs and services is critical as it has been shown to correlate with livestock productivity (AHS, 2018). This then suggests a need for both extension information and also interventions which could improve households' access to such services.

Table 10: Use of income

Activity/Item	% households using income from crop sales by activity by district				
	Kabwe	Mazabuka	Mongu	Mumbwa	Average
Education necessities	25%	29%	30%	23%	27%
Financing Off Farm Trade	3%	0%	1%	3%	2%
Health Requirements	2%	1%	2%	2%	2%
Purchase Assets	6%	13%	3%	20%	10%
Purchase Farming Implements	5%	5%	3%	2%	4%
Purchase Farming Inputs	23%	24%	10%	19%	19%
Purchase of Household Food Requirement	20%	12%	21%	15%	17%
Purchasing Non Food Groceries	16%	9%	31%	13%	17%
Social Activities	2%	4%	0%	1%	2%
Veterinary Drugs and Services	0%	1%	0%	1%	1%

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.8 The Majority of Households Reared and Consumed Village Chickens

The study also revealed that 80% of the households were engaged in livestock and poultry activities. Village chickens were the most commonly reared (70%). Goats were the second most reared livestock for Kabwe, Mumbwa and Mazabuka districts whilst for Mongu district, cattle were the most reared livestock followed by pigs, see Table 11.

Table 11: % of households involved in particular livestock and poultry activities

	Mazabuka	Mongu	Mumbwa	Kabwe
Cattle	45%	18%	56%	26%
Ducks/Geese	9%	2%	9%	8%
Goats	57%	4%	60%	30%
Guinea fowls	14%	0%	21%	6%
Pigeons	10%	0%	9%	5%
Pigs	14%	13%	4%	6%
Rabbits	1%	0%	0%	1%
Sheep	2%	0%	5%	1%
Turkey	3%	0%	4%	3%
Village chickens	81%	42%	89%	69%

Source: Nutrition Baseline Survey, 2019 and authors' computations

The study also found that 64% of the households participated in livestock and poultry farming mainly to improve their household income, see Table 12. The second most important reason that prompted households to engage in livestock and poultry activities was to improve the food security status of their households (24%). Nutrition was ranked third of rural households' priorities in engaging in livestock and poultry.

Table 12: motivation to engage in livestock and poultry.

Motivation for engaging in Livestock and poultry	Mazabuka	Mongu	Mumbwa	Kabwe	Average
Climate Risk Mitigation	16%	1%	0%	6%	6%
Household Food Security	11%	6%	45%	32%	24%
Improve Nutrition	12%	10%	2%	3%	7%
Improve Income	61%	84%	52%	59%	64%

Source: Nutrition Baseline Survey, 2019 and authors' computations

In terms of consumption, village chickens were the most consumed, 51% of the households consumed village chickens during the 2017/18 agricultural season; households owned average of 14 village chickens, see Table 13. On average, 6 village chickens were slaughtered for home consumption during the period of interest. For Mumbwa, Kabwe and Mazabuka, the consumption of village chickens was followed by the consumption of other birds such as pigeons, ducks, turkeys and guinea fowls. However, this finding was in sharp contrast to households in Mongu, which indicated goats as the second most consumed livestock after village chickens. Thus village chickens are an important source of proteins for rural households.

Generally, among all livestock, households across the districts obtained most of their revenue from the selling of cattle and pigs. These two sources alone contributed 74% to the household gross revenue obtained from the sale of livestock and poultry.

Table 13: Farmers' level of involvement in livestock and poultry

Type of livestock	Average number owned	% consumed	Value sales (ZMW)
Cattle	11	2	1,779
Ducks Geese	9	30	80
Goats	8	19	385
Guinea fowls	7	23	41
Pigeons	18	26	56
Pigs	9	5	2,006
Sheep	10	3	318
Turkey	5	23	343
Village chickens	14	51	125
Average	12	29	627

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.9 More Rural Households Were Involved in the Consumption of Eggs than Milk

On average, 45% of the households produced and consumed eggs. This was double the number of households which indicated that they were engaged in the production of milk, see Table 14 below. This is consistent with proportions of households engaged in livestock and poultry rearing. On average, households sold 46 eggs and 64 litres of milk in a month between May, 2018 and April, 2019. Households from Mongu district sold more milk than households in other districts.

Table 14: Consumption and Sales of Eggs and Milk per month from Own Production⁴

	Consumption and Sale of eggs			Consumption and Sale of Milk		
	% HHs Consuming Eggs from their Own Production	Average number of eggs Consumed	Average number sold	% HHs Consuming Milk from their Own Production	Average amount Milk Consumed(litres)	Average amount sold (litres)
Mazabuka	38%	9	80	20%	7	41
Mongu	25%	4	4	10%	12	104
Mumbwa	72%	11	45	35%	30	48
Kabwe	43%	22	56	15%	34	62
Average	45%	12	46	20%	21	64

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.1.10 Purchasing of Household Food Requirements was the Second Most Important Use of Household Revenue from Livestock and Poultry Sales

As was the case with crops, the largest proportion of households spent their income on education requirements. However, unlike the case of crops where the second most important use was purchase of agricultural inputs, the second important use of revenue from livestock and poultry sales was purchase of household food requirements, see table 15 below. Thus livestock and poultry have the potential to contribute to household nutritional requirements through the supply of animal protein, and also in generating household income which could allow households to substitute foods.

⁴ The number of households involved in the production of eggs and milk corresponded with the number of households which consumed the eggs and milk

Table 15: Use of income from livestock and poultry sales

Income use	Mazabuka	Mongu	Mumbwa	Kabwe	(%) Average
Education Necessities	28%	32%	26%	29%	29%
Financing Off Farm Trade	1%	0%	4%	3%	2%
Health Requirements	3%	2%	4%	3%	3%
Purchase Assets	4%	1%	10%	2%	4%
Purchase Farming Implements	4%	1%	2%	4%	3%
Purchase Farming Inputs	11%	2%	13%	15%	10%
Purchasing Non-food good groceries	23%	20%	22%	20%	21%
Purchase of HH Food Requirement	19%	40%	17%	20%	24%
Social Activities	3%	1%	2%	2%	2%
Veterinary drugs and Services	4%	2%	0%	1%	2%

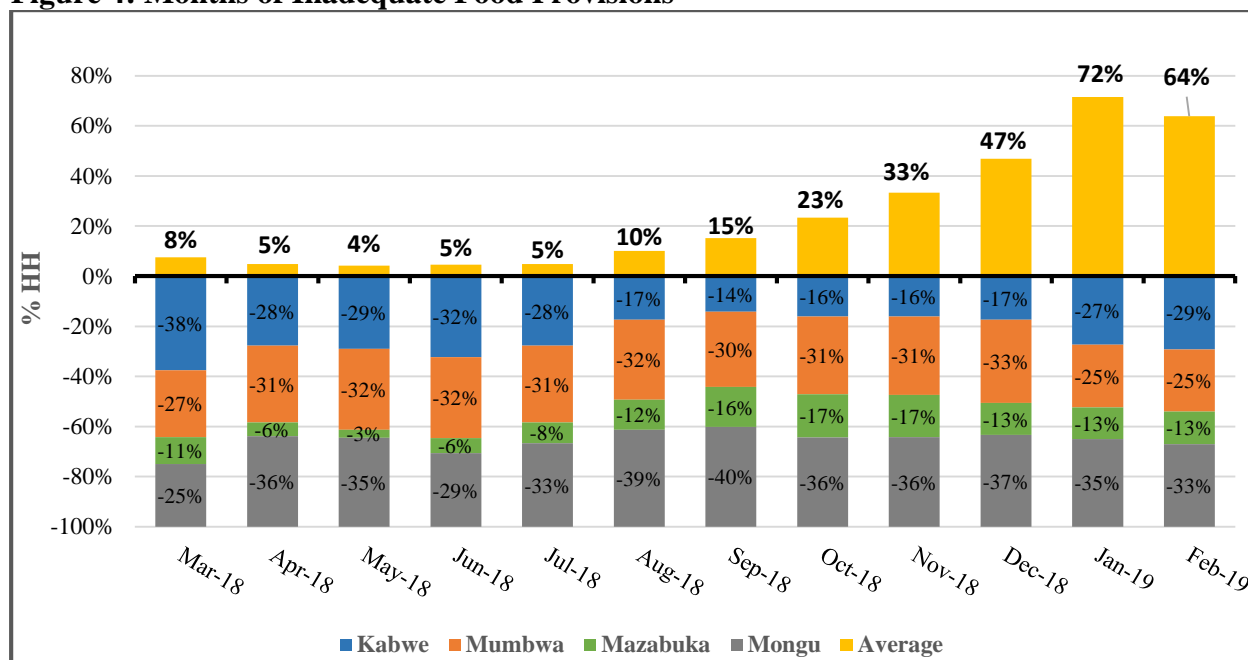
Source: Nutrition Baseline Survey, 2019

2.2 Most Farming Households Experience At least One Month of Food Inadequacy During the Year

Food security occurs when “all people, at all times have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (Pinstup-Andersen, 2009). This is important because members from food secure households are less likely to be undernourished and thus are more likely to provide relatively more labour during production compared to those from food insecure households. In measuring food security, this study firstly assessed the Months of Adequate Household Food Provision (MAHFP) to measure food security.

The study found that the majority of households (60%) highlighted that they had inadequate food in at least one of the months between March 2018 and February 2019. As is the trend in rural Zambia, food becomes scarce in the last and first quarter of every year mostly due to depletion of food in storage and this could explain why most households indicated inadequacies in household food availability. The majority of the households indicated increased food availability after March, and this coincides with the agricultural harvest period when households tend to have plenty of food to sustain them. It was also observed that Mongu district had relatively more households indicating months of inadequate food availability than the other districts. Mazabuka district had a lower number of households indicating food inadequacy. For instance, out of 64% of the households which indicated inadequate food availability in February 2019, 33% were from Mongu, 29% from Kabwe and 13% were from Mazabuka, see figure 4. Mulenga (2013) also noted that rural farming households tend to have inadequate food for consumption three (3) to four (4) months before harvest.

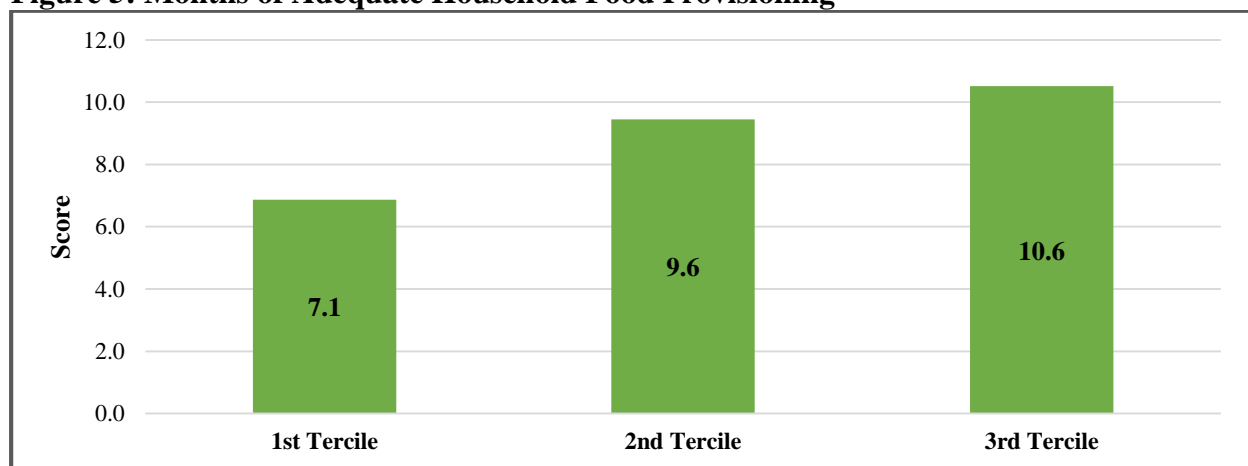
Figure 4: Months of Inadequate Food Provisions



Source: Nutrition Baseline Survey, 2019 and authors' computations

The study also computed the average number of MAHFP, and the average MAHFP score for the entire sample was found to be 5.54. This means that households on average had adequate food for about 5.5 months during the previous 12 months. However, a new average was calculated based on one-third (1/3) of the households that scored highest on the MAHFP scale, see figure 5. This was to come up with a target/expected number of MAHFP. Of the three divisions, the third tercile was found to have the highest average score of 10.6 months, this figure could be used as a target for the interventions or projects aimed at reducing the number of months of food adequacy in rural farming households. This represents a demonstrable level of achievement of food adequacy for the targeted districts (Swindale and Bilinsky, 2006).

Figure 5: Months of Adequate Household Food Provisioning

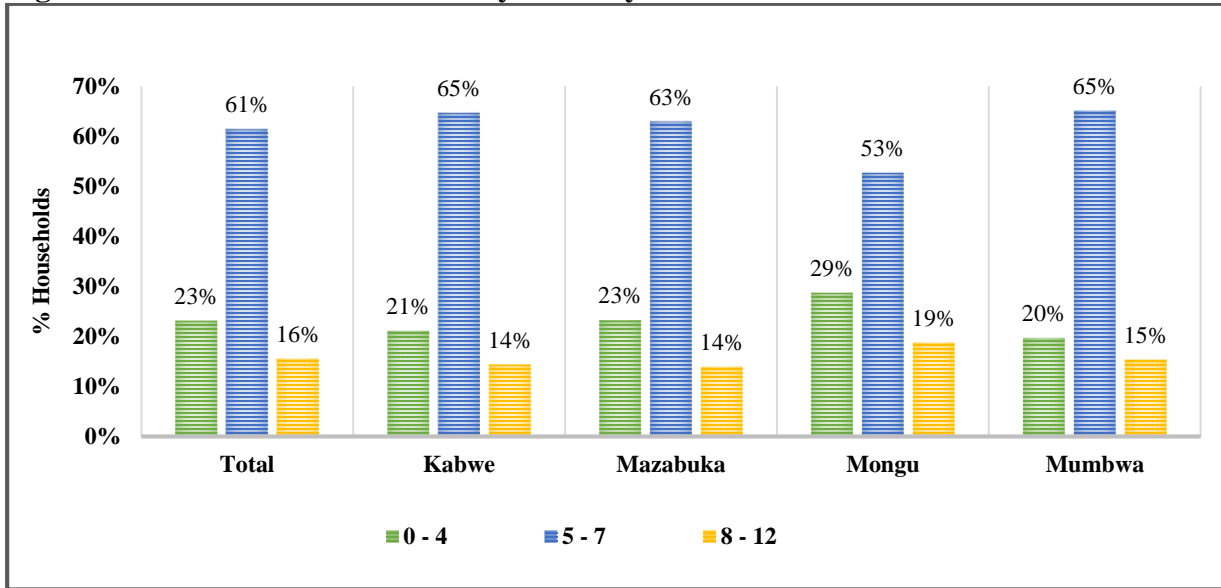


Source: Nutrition Baseline Survey, 2019 and authors' computations

2.3 There are Low Levels of Dietary Diversity in Rural Households

Figure 6 below shows the levels of dietary diversity among rural farming households, and from the analysis, the majority of the households (61%) had at least one member who had eaten foods from 5 to 7 different food groups. These results were consistent at district level, and only 16% of the total households indicated having had at least one member that had eaten foods from at least 8 out of the 12 food groups.

Figure 6: Levels of household dietary diversity



Source: Nutrition Baseline Survey, 2019 and authors' computations

Table 16 shows results from a 24-hour recall of rural households by district. The majority of the households had consumed cereals (99%), vitamin A rich vegetables and tubers (92%), condiments, beverages and spices (95%) and oils and fats (79%). However, there was low consumption of flesh meat (15%), eggs (15%) and vitamin A fruits (19%). The low consumption of vitamin A fruits could be attributed to the fact that at the time of the survey, it was off season for most common fruits in Zambia including mangoes – a common fruit source of vitamin A in Zambia. The study also found that there was low retention and consumption of flesh meat such as chicken with a yearly household consumption rate of 5, 6, 7 and 8 chickens for Mongu, Mazabuka, Kabwe and Mumbwa respectively.

Table 16: Percentage of households consuming selected products in the last 24-hours

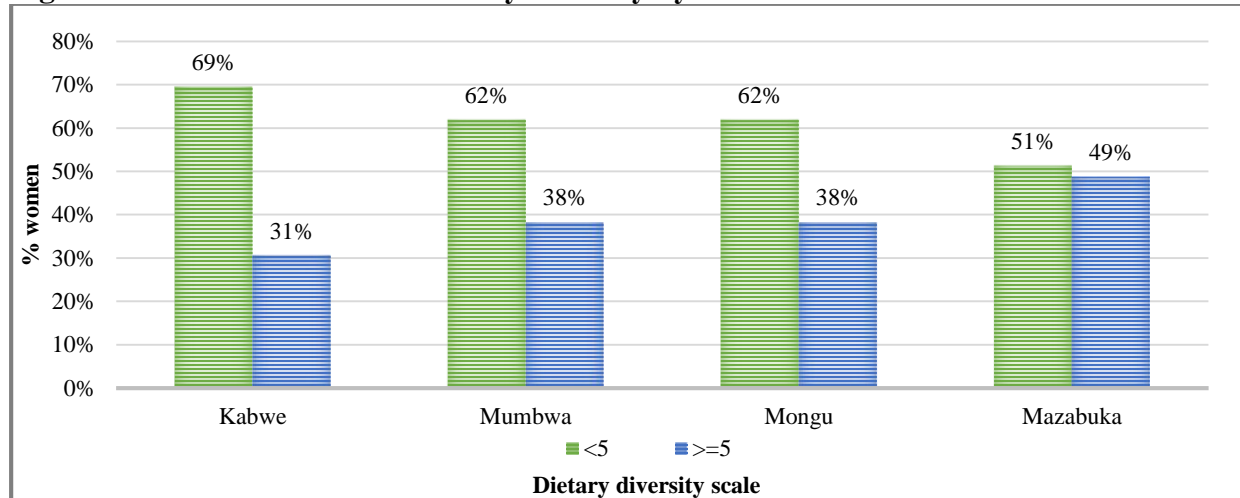
Food products	Total	Kabwe	Mazabuka	Mongu	Mumbwa
CEREALS - Any corn/maize, rice, wheat, millet or any other grains or foods made from these grains (e.g. nshima, porridge, bread, biscuits, noodles)?	99%	100%	99%	95%	100%
ROOTS and TUBERS – Any white or yellow-fleshed sweet potatoes, Irish potatoes, yam, white cassava, or other foods from roots?	20%	8%	5%	61%	7%
VITAMIN A RICH VEGETABLES AND TUBERS – Any pumpkins, carrots, squash, or sweet potatoes that are orange inside and other available vitamin A rich vegetables?	92%	94%	87%	91%	94%
VITAMIN A RICH FRUITS – Any ripe mango, ripe pawpaw?	19%	13%	19%	21%	25%
FLESH MEAT – Any beef, pork, lamb, goat, game meat, crocodile, chicken, duck, guinea fowl, pigeon, quail, or other birds, insects?	15%	19%	15%	7%	21%
EGGS - Any eggs from chicken, duck, guinea fowl, any other birds, crocodile?	15%	18%	15%	9%	15%
FISH - fresh or dried fish (e.g. kapenta, bream, chisense etc.)?	38%	36%	38%	53%	23%
LEGUMES, NUTS and SEEDS – Any dried beans, groundnuts, or other foods made from these (e.g. peanut butter)?	42%	41%	47%	23%	55%
MILK AND MILK PRODUCTS - Any milk, cheese, yoghurt, sour milk, or other milk products?	23%	19%	23%	21%	28%
OILS AND FATS – Any oils, fats or butter added to food or made for cooking?	79%	91%	83%	62%	78%
SWEETS - sugar, honey?	38%	49%	41%	30%	32%
CONDIMENTS, BEVERAGES, SPICES – Any coffee, tea, alcoholic beverages?	95%	94%	93%	95%	98%

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.4 Over Half of the Women in Rural Households do not Meet Minimum Dietary Diversity (MDD)

Women's MDD was assessed by administering a 24-hour meal recall questionnaire to women aged between 15 and 49, otherwise known as the reproductive age group. The indicator was meant to measure the adequacy of macro and micro nutrients of women and to get the minimum required nutrients. To get an indication of the adequacy of these micronutrients, a woman needs to have eaten foods that fall in at least 5 out of 10 food groups. Figure 7 shows that of the 897 women interviewed in all the four districts, the majority failed to meet the minimum dietary requirement for a woman. MDD is a proxy measure of nutrition adequacy for the whole community as well as an indication of diet quality. Kabwe had the highest proportion (69%) of women falling below the minimum requirement followed by Mumbwa and Mongu at 62% each. However, Mazabuka almost had a balance as about half of the women interviewed were below the requirement and the others above.

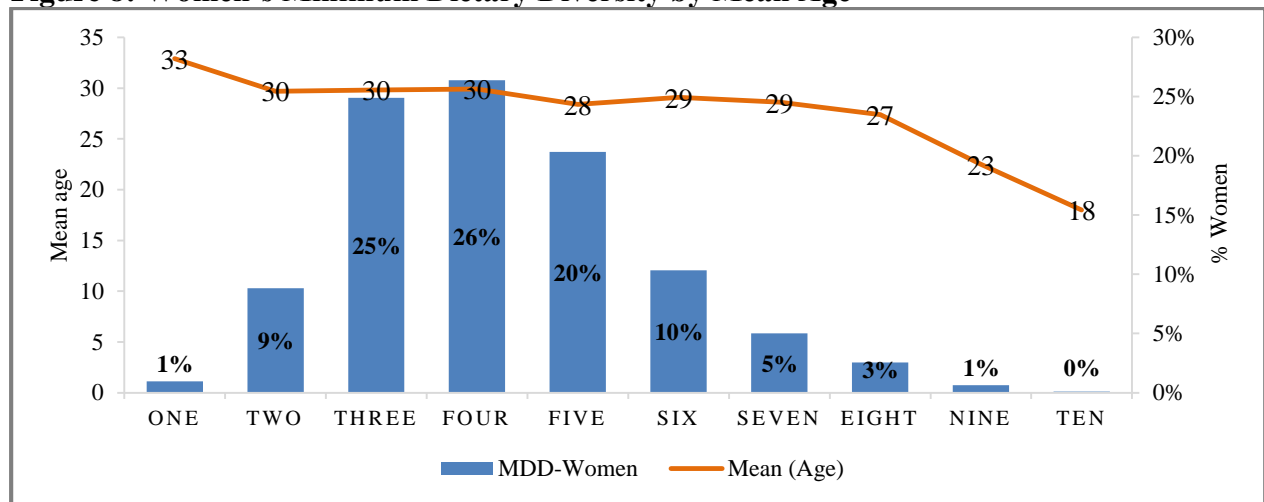
Figure 7: Women’s minimum dietary diversity by district



Source: Nutrition Baseline Survey, 2019 and authors’ computations

Figure 8 below shows the general distribution of the different number of food groups that women indicated to have eaten from in the previous 24 hours. The majority ate foods from four (26%) food groups followed by three (25%) and then five (20%) which is the minimum dietary diversity for women. The data showed a somewhat normal distribution with slight skewness towards the right as can be seen from the graph showing that the majority of the women had insufficient macro and micro nutrients in their diet. The study also attempted to show a correlation between women’s minimum dietary diversity and age. The study showed that younger women had consumed relatively more foods from different food groups than older women within the 15-49 age range.

Figure 8: Women’s Minimum Dietary Diversity by Mean Age



Source: Nutrition Baseline Survey, 2019

2.5 Inadequate Retail Access Points for Nutritious Foods

The lack of diversity among the majority of women interviewed could be attributed to the challenges in accessing these foods as the households, generally, had to travel very long distances to access nutritious foods most of which were accessed from markets outside their villages.

For instance, the majority of the households (47%) indicated that they usually accessed nutritious foods from markets outside their villages and this was consistent in all four districts. Nutritious foods in this survey referred to kapenta, fish, eggs, village chicken, fortified foods, and leguminous foods among others. The average distance to the usual point of access to nutritious foods was 9.9 km, with Mumbwa recording the lowest distance of 5.8 km, which is less than half the average distances that Mazabuka and Mongu rural smallholder farmers covered, see Table 17. The farmers in Kabwe covered an average distance of 6.5 to access nutritious foods.

Table 17: Points of Access to Nutritious Foods

Sources District	Fellow farmer	Market in village	Market outside village	Middleman individual	Small shop /kantemba	Supermarket	Wholesaler	Distance to POA (KM)
	Mazabuka	0%	26%	43%	1%	17%	12%	1%
Mongu	0%	9%	46%	2%	43%	0%	0%	13.9
Mumbwa	1%	32%	33%	1%	26%	3%	4%	5.8
Kabwe	0%	18%	63%	0%	7%	8%	4%	6.5
Average	0%	21%	47%	1%	23%	6%	2%	9.9

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.6 Low Use of Modern Processing Technologies

The study also highlighted that generally there were low levels of processing activities happening amongst rural farming households especially in terms of fruits and vegetables (12%), cowpeas (27%), milk (33%) and soya beans (34%), see Table 18. It was observed that the highest proportion of households were engaged in the processing of groundnuts. However, most of the households (74%) used traditional methods of processing groundnuts, traditional methods of processing food were utilised by the majority of the households except for soya beans. This could be because soya bean is rarely consumed in an unprocessed form as it is usually processed, this requires grinding it with a hammer mill, and then mixed with mealie meal or used in baking traditional cakes.

Table 18: Food Processing by Rural Households

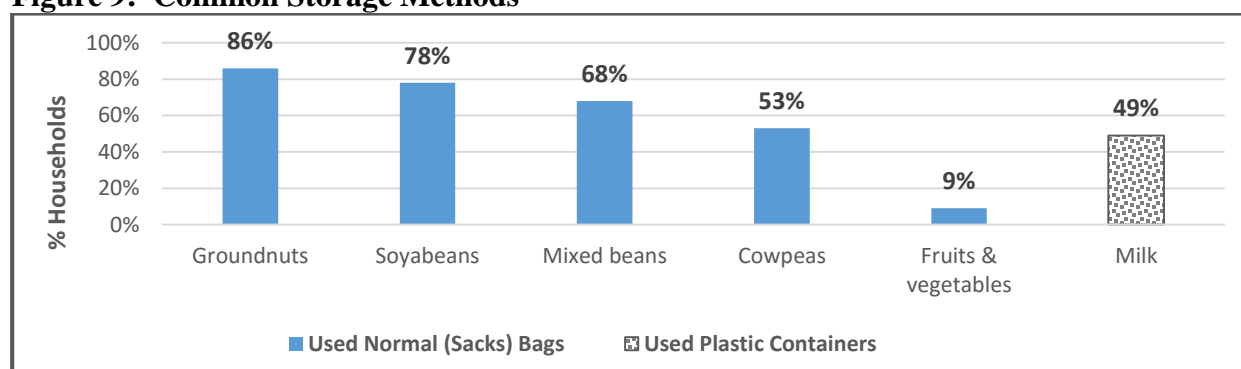
Crop/Fruit/vegetable/milk	% HH Engaged in Food Processing	Processing Method Used	
		Traditional/Manual	Mechanised
Fruits & vegetables	12%	100%	0%
Cowpeas	27%	96%	4%
Milk	33%	99%	1%
Soya beans	34%	42%	58%
Mixed beans	58%	100%	0%
Groundnuts	86%	74%	26%

Source: Nutrition Baseline Survey, 2019 and authors' computations

2.7 The Majority of Farming Households Used Normal Bags/Containers for Storing their Produce

Post-harvest losses are a serious issue in Zambia (Lubinga *et al.*, 2018). Because of these losses, rural farming households experience reduced income and food which leads to poverty. Losses in maize grain for instance are estimated at 30% of the farmers' produce (Hays *et al.*, 2014). This study attempted to identify the major storage facilities used by rural households in order to identify gaps to fill and reduce post-harvest losses. The study highlighted that the majority of the storage facilities being used by farmers were traditional i.e. normal bags for grains and fruits and vegetables whilst milk was mostly stored in plastic containers, see figure 9. Interesting to note though was the low levels of post-milking losses despite the milk being stored in plastic containers. Of all the farmers that stored milk, only 4.3% indicated that they experienced losses and only 3.4% lost milk due to rotting. Farmers used traditional methods of storing milk yet they somewhat seemed to have mastered the art of preserving milk.

Figure 9: Common Storage Methods



Source: Nutrition Baseline Survey, 2019 and authors' computations

2.8 The Majority of Farming Households Felt that There was an Inadequate Number of Food Processors in Their Communities

Table 19 below shows the perceptions of farming households about the availability of processors in their communities. On average, it was discovered that Mazabuka farming households felt that they had few (49%) to many (51%) processors, this was similar to findings from Mumbwa and Kabwe district. In contrast, the majority of households in Mongu felt that there were no processors available in their communities, this observation was followed by households indicating that there were a few processors present. Generally, most households indicated to have either a few or no processors present in their communities.

Table 19: Farmers' perceptions on availability of processors in their community

District	No processors	A few processors	Many processors
Mazabuka	0%	49%	51%
Mongu	44%	34%	22%
Mumbwa	9%	58%	33%
Kabwe	7%	60%	33%

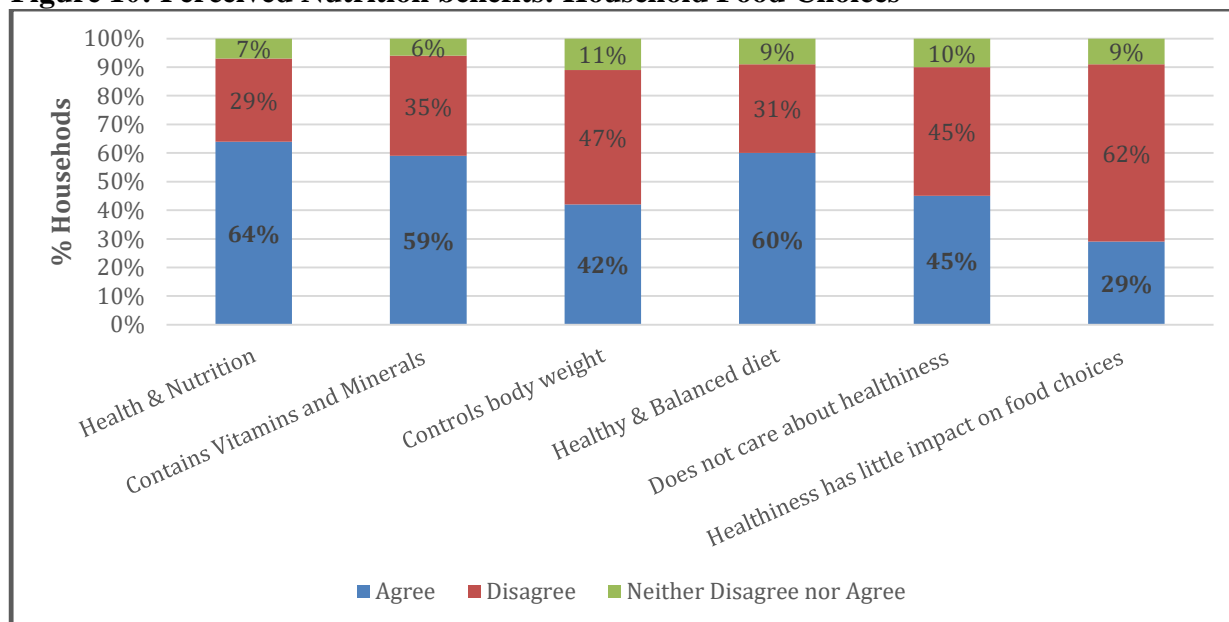
Source: Nutrition Baseline Survey, 2019

2.9 Household Food Choices

Even though nutritious foods need to be contextualized in terms of the target groups, nutritious foods can generally be defined as foods which provide beneficial nutrients (e.g. Vitamins, major and trace minerals, essential amino acids, essential fatty acids, dietary fibres etc) and minimize potentially harmful elements.

In this survey, households were asked about their perceptions and choices towards what would constitute a good food choice for their household as well as assess the type of benefit they would acquire from consuming nutritious foods as a household; food choices are guided by different factors. IFAD (2015) found that having correct knowledge on foods, food processing and consumption were important predictors for food processing and consumption behavior. In figure 10 below, 64% of the households agreed that health and nutrition had an effect on their food choice, and in agreement with this statement, 62% disagreed that the healthiness had little impact on the household food choices. These findings suggest that the rural households understood the importance of purchasing and consuming nutritious foods.

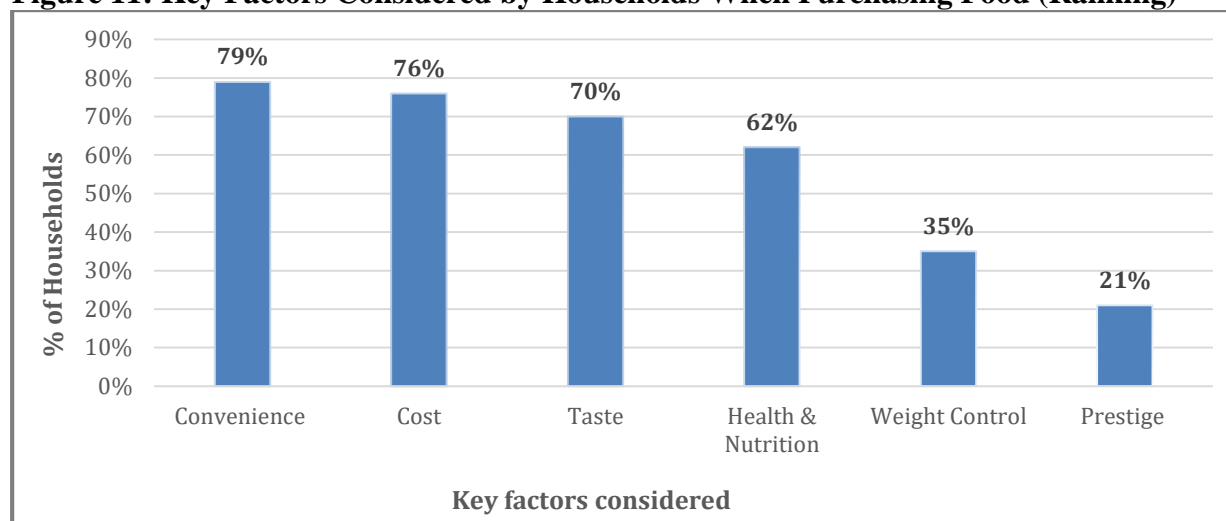
Figure 10: Perceived Nutrition benefits: Household Food Choices



Source: Nutrition Baseline Survey 2019 and authors' computations

The survey also tried to ascertain other factors that would have a bearing on how households prioritise what food they produce, retain and purchase for consumption. These choices are guided by different factors, other factors that influence the consumption of food within a household are the traditional norms and the attitude towards the certain food groups. Figure 11 below shows the rankings of the key influencers, the majority of the households stated convenience (79%) as an important factor followed by the cost of the food (76%), and the third most important attribute was the taste of the food (70%). Health and nutrition (62%) was a fourth important factor in households' ranking when considering foods to purchase and consumption.

Figure 11: Key Factors Considered by Households When Purchasing Food (Ranking)



Source: Nutrition Baseline Survey 2019 and authors' computations

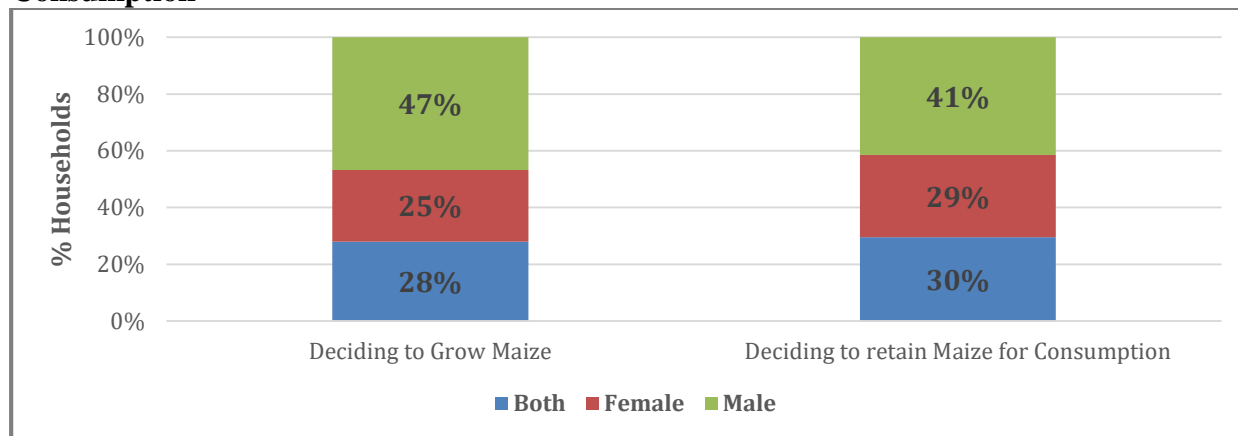
2.10 Gender and decision making

This survey also assessed the decision making levels in the household among different genders as well as the role women in particular play in the households' nutrition dynamics such as; consumption of nutritious foods, decision of quantity retained from households' own production and decision to engage in marketing of the specific crop. Women contribute significantly in decision making. Rural women especially take important responsibilities to achieve all pillars of food provision and consumption. Women's role in the agricultural value chain is therefore paramount in all stages; i.e. right from cultivating family farms, family food preparations and serving it. However, their contribution has been underrated and limited to accessing major family resources and employment opportunities. Rural women farmers also contribute to food security through food availability related to the food supply through production and through food access to decision making regarding allocation of food (Twahirwa *et al.*, 2018).

In looking at gender and decision making, the study looked at three crops: Maize, groundnuts and soya beans. These crops were looked at mainly for the fact that they were the major crops grown, besides gender issues can only be meaningfully analyzed within context. Furthermore, decision making over fruits and vegetables was also assessed as well as female ownership of livestock and poultry.

The study found that decision making over maize was dominated by males, this was the case both at production and retention of the crop for consumption, see figure 12. This is consistent with the findings by Sichilima *et al.*, (2016) who found that men dominated decision making over maize. However, women participation from production to deciding as to whether to retain some for consumption improved as well as their participation in joint decision making. This improvement in participation in decision over retention for consumption could be due to the nature of the crop as it has a food security connotation (Twahirwa *et al.*, 2018).

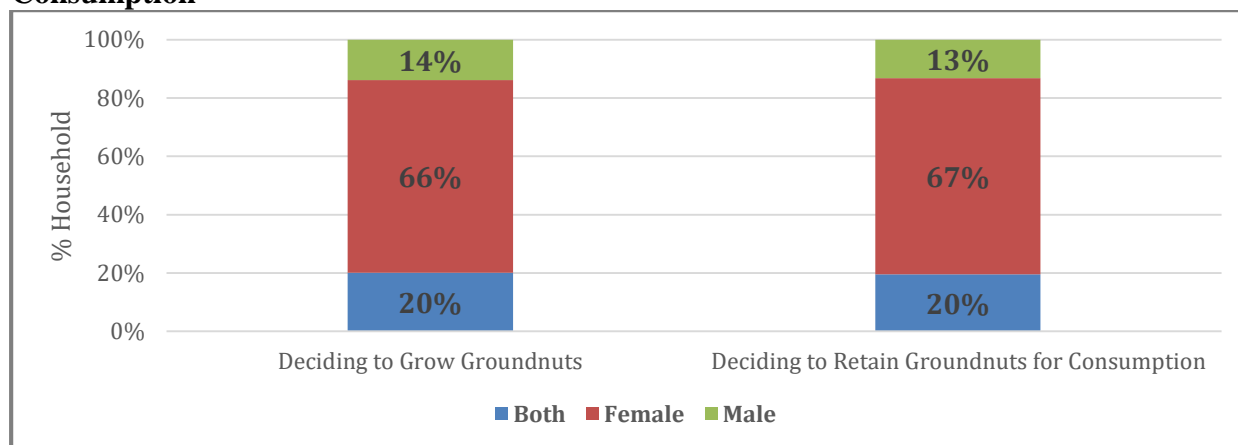
Figure 12: Gender & Decision Making Over Production and Retention of Maize for Consumption



Source: Nutrition Baseline Survey 2019

The study found that women dominated decision making over production as well as retention of part of groundnuts for home consumption. For instance, the participation of women from production to retention of the crop for home consumption increased slightly whilst the participation of men in decision making reduced by the same margin, see figure 13. This is consistent with findings by Orr *et al.*, (2015) that women farmers felt they controlled all the major decisions over groundnuts. Therefore, gender interventions that are market oriented could consider targeting the groundnuts sector as it does not only empower women financially but also increases household food security and nutrition levels.

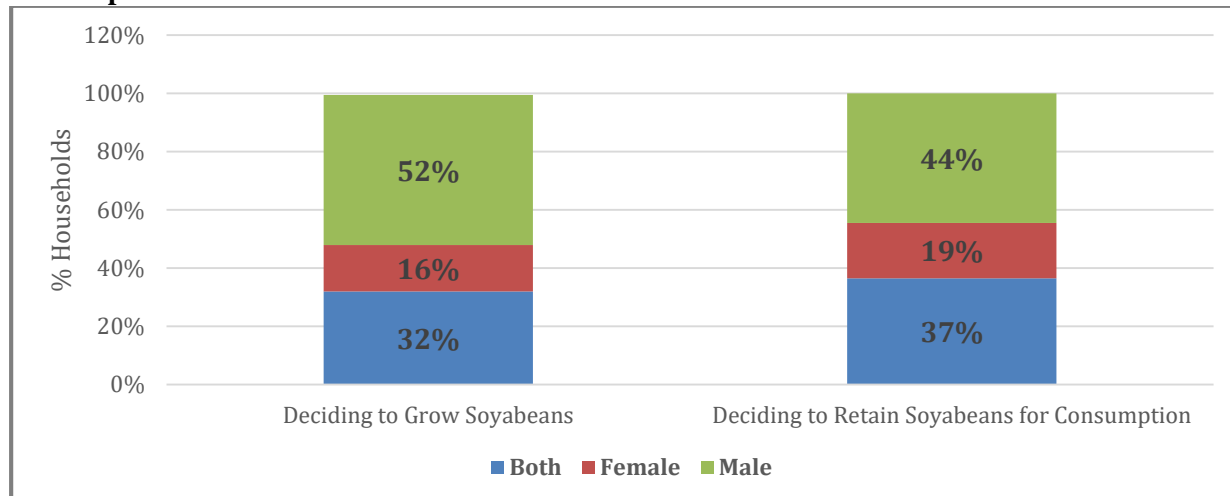
Figure 13: Gender & Decision Making Over Production & Retention of Groundnut for Consumption



Source: Nutrition Baseline Survey 2019

Decision making over production and retention of soya beans for consumption was dominated by male household members, see figure 14 below. Women’s participation in decision making slightly improved from production to retention for consumption whilst men’s participation in decision making from production to retention of soya beans for consumption declined. It was also observed that joint decision making improved from production to retention of the produce.

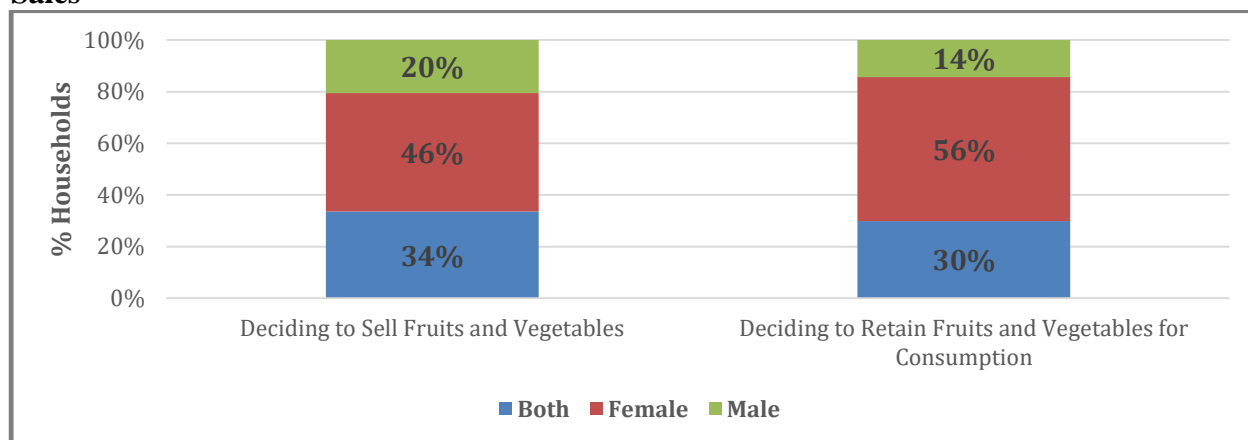
Figure 14: Gender & Decision Making Over Production and Retention of Soya beans for consumption



Source: Nutrition Baseline Survey 2019

In terms of fruits and vegetables, decision making on both selling and retaining some for consumption was dominated by female members of the household, see figure 15 below. This dominance in decision making by females over the fruits and vegetables could be used as an entry point for interventions which can enable women to commercialize and most importantly retain such agricultural produce for household consumption. It might also be necessary to find innovative ways that could enable women to gain control over the earnings from the produce. For example, village savings groups could be one way which could strengthen women control over the resources.

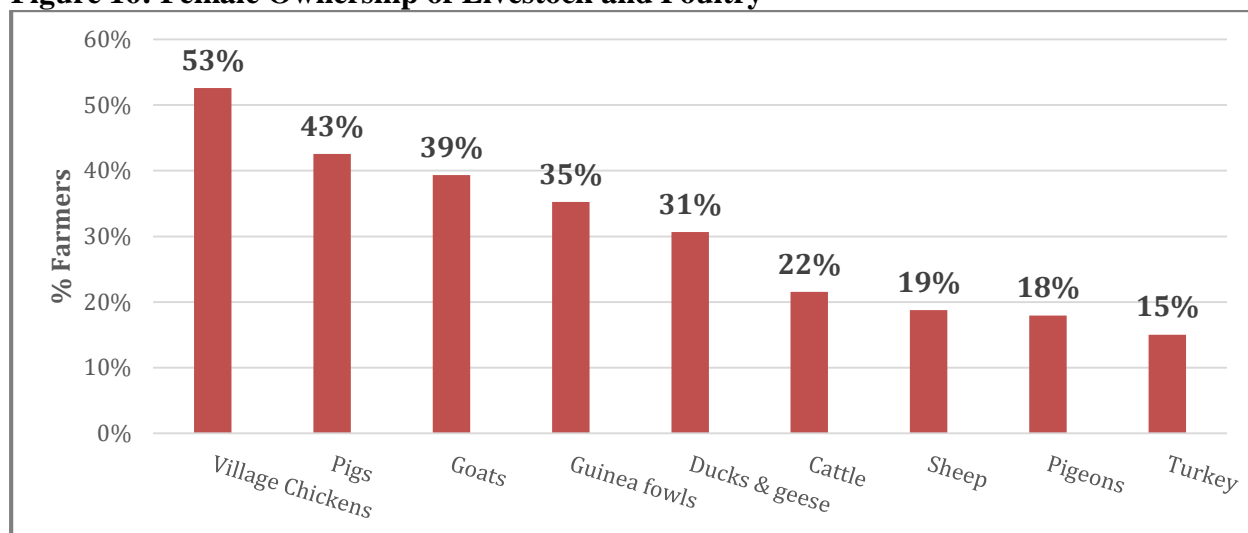
Figure 15: Gender & Decision Making: Fruit & Vegetable retention for consumption and Sales



Source: Nutrition Baseline Survey 2019

The study also found that women’s ownership of high value livestock such as cattle was relatively lower than their ownership of small livestock and poultry i.e. pigs, goats and village chickens. The highest proportion of women owned village chickens (53%), see figure 16 below.

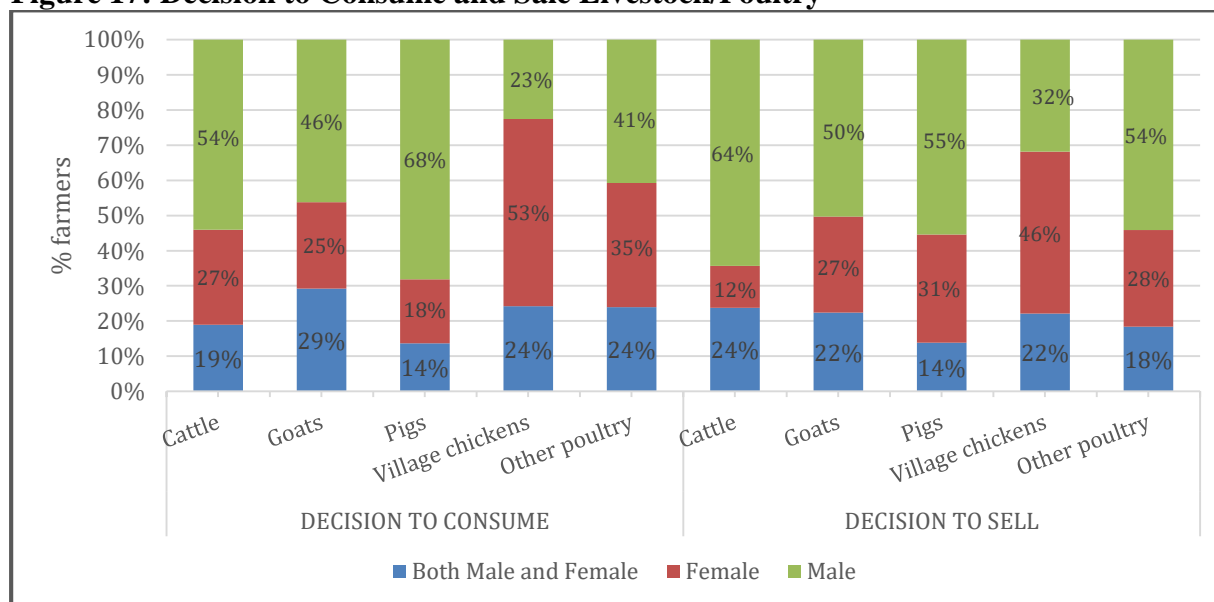
Figure 16: Female Ownership of Livestock and Poultry



Source: Nutrition Baseline Survey 2019 and authors' computations

This ownership distribution of livestock and poultry has the potential of affecting women's decision making over livestock given that women owned less than half of the livestock owned by the households across all the districts, see figure 17. However, interventions promoting the increased consumption and commercialisation of poultry i.e. village chickens could have the potential of improving nutrition levels among rural households and economically empowering women involved in poultry farming respectively.

Figure 17: Decision to Consume and Sale Livestock/Poultry



Source: Nutrition Baseline Survey 2019 and authors' computations

3.0 CONCLUSION AND RECOMMENDATIONS

In an effort to assess consumption levels of nutritious foods among poor Zambians, within smallholder farming and rural communities, the baseline survey was conducted in four districts namely Kabwe, Mumbwa, Mazabuka and Mongu. The survey captured 1,236 rural households which were randomly selected across the selected districts.

Food security was the major motivation for households' engagement in crop production. Nutrition was only a third priority for rural households in engaging in crop production. This could also explain high proportions of households which were involved in maize production, given the status of maize as the primary staple crop. This calls for interventions which could promote nutritious crops such as orange maize. Rural retail outlets for farming inputs could be an important source of both nutritious crops and information.

The study also revealed that the majority of the households were engaged in livestock and poultry activities. Village chickens were the most commonly reared, and consumed poultry. This might need to be encouraged whilst encouraging use of improved management systems, which could enhance productivity; chickens provide readily available source of proteins, vitamins and micronutrients.

The majority of households highlighted that they had inadequate food in at least one of the months between March 2018 and February 2019. The average number of Months of Adequate Household Food Provisioning score for the entire sample was five and a half months. Moreover, dietary diversity among rural farming households was found to be low, the study found that the majority of households ate foods from 5–7 different food groups in the last 24 hours out of 12 food groups. The majority of the households consumed cereals. This status will require deliberate interventions which would encourage adoption and consumption of nutritious crops such orange maize, orange fleshed sweet potatoes etc. In certain instances, simply improving access to nutrition information will be required over crops that rural households are already engaged in production.

The study also found that the majority of the women failed to meet the minimum dietary requirements. This implies that the majority of the women had insufficient macro and micro nutrients in their diet. This suggests a need to improve accessibility to nutritious foods. Generally, the majority of households travelled very long distances to access nutritious foods most of which were accessed from markets outside their villages.

The study highlighted that generally there was low processing activities happening among rural farming households. The majority of the households used traditional/manual methods in processing most of their produce except soya beans and this could be because soya beans is rarely consumed unless when mixed with mealie meal or in baking traditional cakes which require grinding it with a hammer mill. In terms of households' perceptions regarding the availability of food processors in their communities, the majority felt that they were few processors.

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