JUNE 2017
ALLIANCE FOR A GREEN REVOLUTION IN AFRICA - AGRA

BASELINE STUDY IN MOZAMBIQUE

FINAL REPORT

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DRAFT REPORT

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Executive summary

This study is part of AGRA's strategy of investing in agriculture to reduce poverty and hunger, through an agricultural transformation in Africa. To this effect, AGRA works across the continent to boost farm productivity and incomes of millions of smallholder farmers in target countries. Specifically, this strategy for 2015-2020 focuses on famers' awareness and capacity building and improving smallholder farmers' access to finance, to improved seeds and fertilizer, and to market.

Agricultural transformation in Mozambique is happening very slowly, with yields of the main crops practically not changing. The study was conducted in seven central and northern provinces, out of the 11 provinces in the country. It is important to lay out two major impediments to agricultural transformation from the outset that severely affected the agricultural sector in the last two years. These will help explain the baseline results.

In the last two years, Mozambique's financial situation deteriorated due to undisclosed public debt of about USD $2 billion. This led to key donors pulling out development support (about 51% of state's budget is donor-supported), currency shortage and the increase of interest rates in commercial banks. In light of this, investments in the agricultural sector obviously suffered, and support to farmers through extension services and access to price information decreased.

On top of the financial crisis, the political situation did not help either. Armed conflict erupted again between the Government and RENAMO, and many households were displaced, particularly in rural areas of Central and Northern Mozambique.

For the present baseline survey, data were collected from seven provinces of Northern and Central Mozambique: Niassa, Cabo Delgado, Nampula, Zambézia, Tete, Manica, and Sofala. The results presented are organized into four main sections: i) demographics; ii) household welfare; iii) women empowerment in agriculture index; and iv) agricultural production and input use. In general, the results presented are in line with those from other surveys and studies conducted in Mozambique

Baseline demographics shows that about 77% of households in the central and northern provinces are male-headed. The current baseline did not include the southern provinces, where migration of male members to Maputo city and South Africa results in increased percentage of female-headed households in that region[1]. As a result, the overall percentage of male-headed households

[1] The survey focused provinces are the target provinces in the new AGRA strategy, namely Sofala, Manica, Tete, Zambézia, Nampula, Cabo Delgado and Niassa.

reported by the Ministry of Agriculture for the whole country is slightly lower, at 71%. The demographic data also show a correlation between the frequency of widowed households and HIV/AIDS prevalence rates. Data from the National HIV/AIDS prevalence survey conducted in 2009 showed that Sofala was the worst province, with 15.5% of the population infected by HIV, followed by Manica with 15.3%. These two provinces are the ones with the highest proportion of widowed household heads. The two provinces with the least infection of HIV were Niassa and Nampula, and this too is where we found the lowest proportion of widowed household heads. Polygamy appears to be quite high in Manica and relatively low in Nampula.

Adult literacy in Mozambique remains quite low, and this has historical roots. By 1975 when Mozambique got its independence from Portugal adult illiteracy rates were as high as 97%, which suggests unfavourable education policies for the locals during the colonial era. Illiteracy rates dropped quickly to 72% in just seven years after the independence, but the war took its toll and not much progress was achieved until the peace agreement that was signed in 1992.

Gender disparity in the access to education is clear from the data: about 54% of male household heads can read and write, compared to just 20% among female household heads. In Cabo Delgado province, only 7.7% of female household heads can read and write, compared to 52.5% among male-headed households in the same province. The proportion of household heads without education in twice as high among female than male household heads, and while having a college degree in rural Mozambique is a mirage, the smaller proportion is still four times greater among males.

The second major results section pertains to household welfare. Households in rural Mozambique seldom employ salaried workers. They usually pay for casual labour if they have to, in order to compensate for smaller household sizes or larger cropped area. Participation in self-employment activities is often used as a mechanism to increase household incomes, and sometimes such increase can be reinvested in agriculture, but the poor who is often the less educated usually engages in activities of low return. Except for agricultural trading, gross incomes are not the highest among households located in Cabo Delgado, compared to the other surveyed provinces. Differences in education attainment exacerbates inequality: gross incomes in the upper quartile of self-employment incomes are about 59 times greater than the incomes in the lower quartile. In addition to self-employment activities, we also looked at incomes from salaried activities. Incomes usually tend to be skewed, and data from the baseline survey show that the median wage income is zero. The mean annual wage income is about 12,000 Meticais (Figure 2), with a maximum value of 1,320,000 Meticais.

In terms of food security, maize, cassava, and rice are the three most important staples. These are also the focus crops for AGRA. About 40% of households had suffered from insufficient food resources from own production during the last 12 months, and one of the coping strategies used by smallholder farmers when they face food shortage is to rely on food aid when it is available. On average, smallholder farmers who faced food shortage relied on food aid for less than five weeks during the last 12 months. Niassa and Manica provinces were less dependent on food aid. The baseline survey also collected data on household hunger scale. Nampula and Zambezia stand out, with a higher proportion of households who often had to go for a whole day and night completely without food due to lack of resources to get food.

The results from the baseline survey show that only 2.8% of households have tried to get credit in the last 12 months –this compares well with 3% of households reported by the Ministry of Agriculture. Attempts to obtain credit were relatively more frequent in Tete, where agricultural

production is usually characterized by cultivation of cash crops such as tobacco and soybeans. Niassa and Manica also grow tobacco, but the tradition of use of improved seeds and chemical fertilizers is longer in Tete.

Household access to electricity in Mozambique is still limited. On average, about 27% of rural households had access to it. Electricity in rural areas tends to be of low quality, with frequent power cuts. This limits the development of the agro-processing industry, which would otherwise enable productivity growth in agriculture. Tete is located in a high altitude area with relatively good rainfall, and is a major producer of maize and soybeans. The animal feed industry would prosper in Tete, but only 12% of rural household had access to electricity, less than half of the average for the central and northern provinces. As we move in the direction north-south, the percentage of households with thatched roofs declines: about 86%-87% in Niassa and Cabo Delgado, 82% in Nampula, 75% in Tete, and 45% in Sofala. A similar pattern is observed with the floor material: the percentage of cement floors increases from the north moving towards the south.

The third main results section comprise the women empowerment in agriculture index, which included decision making in agriculture and women's dietary diversity. The results show that women in Zambézia and Niassa are less empowered. In total, about 54% of women in rural central and northern Mozambique are empowered, and empowerment is highest in Sofala, followed by Manica and Tete. The leadership domain of empowerment is still weak, especially in Niassa and Zambézia provinces, and this is what contributed to lower overall scores in those two provinces. In terms of women's dietary diversity, the results from the baseline survey are in line with national statistics where Nampula is the province with the highest malnutrition rates.

The fourth major results section pertains to agricultural production and input use. The results appear to comport well with what is reported by the Ministry of Agriculture: extremely low use of inputs, low productivity levels, and low participation in the market.

Below we present the summary table of key indicators produced for the baseline survey:

Table 1: Summary table of key indicators

Results Area	Indicator	Indicator definition	Data source	Disaggregation	Baseline	Target
Goal						
Catalyze and Sustain an Inclusive Agricultural Transformation in Africa to increase incomes and improve food security	**G2.** Improved food security: Average number of months of adequate household food provision (*increase*)	Number of months during which a household had enough food to meet his/her family's needs	**AGRA Household-baseline survey**	Gender (male/female)	10.7 for male and 10.1 for female headed HH	
	G3. Improved food security: Household dietary diversity index (*increase*)	Number of different foods or food groups consumed in a household. It is a qualitative measure of food consumption that reflects household access to a variety of foods, and is also a proxy for nutrient adequacy of the diet of individuals. Individual dietary diversity scores aim to reflect nutrient adequacy. This indicator is included for measure of variety of food consumption, and not necessarily for nutritional measurement	**AGRA Household-baseline survey**	Gender (male/female)	3.9 for male and 3.4 for female headed HH.	
Objectives						
1. Increased staple crop productivity for smallholder farmers	1. Average yield (MT/ha) of focus crops (*increase*)	Average change in productivity (MT/ha) of focus crops for target populations over time	**AGRA Household-baseline survey**	Seed variety, crop	Maize 0.79 ton/ha in 2014; Soybean 0.74 ton/ha	

Results Area		Indicator	Indicator definition	Data source	Disaggregation	Baseline	Target
						in 2012; Rice 0.41 ton/ha in 2014	
		2. Percent change in yield gap of focus crops (*decrease*)	Difference between average Yield potential (under optimal conditions) and average actual yield achieved by beneficiary farmers	**AGRA Household-baseline survey**	Seed variety, crop	Yields have been stable	
Outcomes (PO: Primary Outcome, IO: Intermediate Outcome)							
	IO 2.2 Increased use of inputs and other improved technology innovations	3. Percent of households using target certified seed of improved varieties, fertilizer blends and other improved productivity technologies or management practices	Proportion of farming households using targeted improved varieties, fertilizer blends and other technologies/management practices	**AGRA Household survey, farmer assessments**	Gender (male/female), technology type (seed variety, fertilizer, etc)	Chemical fertilizer 4.5%; pesticides 5.1%; herbicides 0.5%; manure 2.9%; animal traction 9.2%; improved maize seeds 7.1%	

Results Area		Indicator	Indicator definition	Data source	Disaggregation	Baseline	Target
		4. Average fertilizer use (Kg/Ha)	Total quantity of fertilizer nutrients in Kg use per ha of cultivated land	**AGRA Household survey, farmer assessments**	Fertilizer type	Less than 5kg, usually urea and various formulations of NPK	
Cross-cutting Outcomes (CCPO: Cross-cutting Primary Outcome, CCIO: Cross-cutting Intermediate Outcome)							
CCPO 10. Increased women empowerment and livelihoods in agriculture		5. Women's Empowerment in Agriculture Index (WEAI)	WEAI[i] is a measure of women empowerment in agriculture. AGRA will specifically measure: 1) Input in productive decisions under production domain, 2) Access to and decisions on credit under Resources domain, and 3) Control over use of income under the income domain	**AGRA Household-baseline survey**	-	53.7% of women are empowered	
	CCIO 10.2 Strengthened women's access to financial services	6. Percent of women farmers accessing agricultural related financing from financial institutions	Women farmers that indicate they can get financing for their agricultural activities if they wanted to	**AGRA Household-baseline survey**	Purpose of financing	About 15 people out of 67 that received credit are women. This was obtained by reading the names of	

Results Area	Indicator	Indicator definition	Data source	Disaggregation	Baseline	Target
					the person who received credit	
CCPO 11. Increased youth empowerment and livelihoods in agriculture	7. Percent of youth in target areas engaged in agricultural activities for livelihood	Proportion of youth in target areas engaged in agriculture production or entrepreneurship. A youth is an individual 18 to 35 years of age	**AGRA Household-baseline survey**	Gender (male/female), type of agricultural activity	8.1% for male and 9.1% for female youth engaged in agriculture as the main activity	

1 Introduction

The Alliance for a Green Revolution in Africa (AGRA), created in 2006, is a non-profit organization working with 16 African governments, donors, NGOs, the private sector and farmers founded to improve smallholder farm productivity while preserving the environment. AGRA primary strategy is to facilitate the creation of an efficient African food system through grants and capacity-building assistance to institutions that are helping to improve the productivity of smallholder farmers. Some of the activities are related to distribution of improved seeds, the establishment of seed companies, support for the fertilizer industry, and the development of agro-dealers.

In this context, AGRA is conducting a Baseline study in four African countries: Ghana, Mali, Mozambique and Burkina Faso. The objective of the Baseline is to collect and analyse data on a set of outcome indicators in breadbasket areas of intervention in Mozambique, in order to inform AGRA's strategy for the next five years. The target crops and value chains are maize, rice, cassava and soybeans and the assignment will cover six provinces in total: Manica, Sofala, Nampula, Tete, Niassa and Zambézia as they hold the great potential of agricultural production.

This draft report presents both the quantitative and qualitative analysis of the data collected.

2 Background

2.1 Country Background

The study was conducted in the following seven provinces: Cabo Delgado, Niassa, Nampula, Zambézia, Tete, Manica, and Sofala. These provinces hold the great potential of agricultural production. Nampula and Zambézia alone account for more than 40% of the total farming population in the country, a significant share of the total production of both staple food crops and cash crops.

The northern and central regions are very dynamic in terms of both crop production and livestock (small size). The region is believed to be endemic to tsetse flies, and hence cattle are rarely found in Niassa, Cabo Delgado, Nampula, and Zambézia under the smallholder sector. Conventional wisdom holds that lack of cattle north of the Zambezi River is due to tsetse flies. Animal traction is therefore uncommon, except for Tete and Manica where there are favourable climatic conditions and some tradition of cattle rearing, thanks to proximity to Malawi and Zimbabwe where there is a longer tradition.

Soybean production is being heavily promoted in the upper Zambézia for animal feed, and there are several stories of success. These are described in Smart and Hanlon (2013). Soybean is also produced in Nampula (for example, Malema), and in Tete province. Cassava production in Nampula and Zambézia has also increased with a significant impact on farmers' wellbeing. Cassava is being used for beer production. Rice production in Zambézia benefited from new processing plants, but the previous two agricultural seasons were quite dry, and the new rice processing factory remains widely underused.

Mozambique has open borders in general, and there is a lot of cross-border trade with Malawi (Tete, Niassa and Zambézia provinces), Zimbabwe (Manica province), and to some extent Tanzania (both Niassa and Cabo Delgado provinces). The recent discoveries of huge amounts of natural gas in Cabo Delgado is creating a new hub in the north, thus creating opportunities for farmers in the neighbouring provinces to increase crop and animal production to feed the increasing population in the northern hub in Palma and Pemba area.

Agricultural is predominantly of subsistence with low use of external inputs. Shifting cultivation is still quite common. Less than 5% of smallholder farmers use chemical fertilizers, and the average fertilizer use in 2012 was around 4kg, far below the recommended rate assuming an average cultivated area of 1.5 ha. Malabo declaration sets a target of 50kg/ha of fertilizer use, an increase from its current average in Subsaharan Africa of 8kg/ha. Mozambique is obviously below the Subsaharan average.

Agricultural productivity remains extremely low, even by Sub-Saharan Africa standards. Dzanku et al (2015) reports maize yields of 0.58 ton/ha in Mozambique in 2002, compared to 2.76 ton/ha in Malawi in that same year. Boughton et al (2006) also uses nationally representative data from 2002, and compare it with 1996 data to find no change in productivity levels. Mosca (2011) argue that productivity levels in Mozambique have not changed in the last 50 years, and Cunguara (2013) use FAOSTAT data to show that productivity levels were actually lower in 2002 than in 2012. While there are progressive farmers in Mozambique, it will not be a surprise to have average maize yields less than a tone per hectare, given the lack of significant progress in the last decades (in terms of agricultural productivity growth).

Agricultural transformation is happening very slowly. For example, data from the national agricultural surveys show that between 2002 and 2012 the average distance to the nearest agrodealer for fertilizer and seed purchase reduced from 45 km to 34 km, and 25 km to 22 km, respectively. This explains in part the low uptake of fertilizer and other inputs in the country. There is an urgent need to improve road infrastructure. One example of the implication of poor road infrastructure is the fertilizer cost. During the period from August 2010 to July 2011 urea in the Arabic Peninsula was traded for $381/ton compared to a retail price of $827 in Mozambique (Benson et al., 2012).

During the colonial era, the Portuguese invested more in roads connecting the East to the hinterland countries such as Malawi, Zambia and Zimbabwe to fulfil their trade interest. The connect north-south is poor, and this is a missed opportunity to foster the adoption of improved technologies by stimulating the demand of food from northern provinces to supply the southern provinces. The former has arguably better soils and rainfall while the latter relies more on food imports from South Africa given the weak road connection between the surplus area in the north and the deficit area in the south. Investments in transportation and communication would result in increased demand for locally produced food, which in turn could stimulate technology adoption.

However, In the last two years Mozambique's financial situation deteriorated due to undisclosed debt of about USD $2 billion. This led to currency shortage as many donors pulled out their support, and commercial banks almost doubled their interest rates. Investments in the agricultural sector obviously suffered, and support to farmers through extension services and access to price information decreased. Larger investments such as in road infrastructure obviously suffered, too.

On top of the financial crisis due to undisclosed government debts, the political situation did not help either. Armed conflict erupted between FRELIMO and RENAMO, and many households were displaced. Many pupils fled from their schools, and the link between the south and the rest of the country was conditioned due to constant armed attacks in the only south-north highway, the EN1 (Estrada Nacional #1). The results of this baseline study should be read under such unfavourable background of political instability and financial crisis, with exchange rates more than doubling in just one year.

2.2 Kinship in Central and Northern Mozambique

Kinship influences the role of Agricultural production and livestock go hand in hand to define kinship ties in Mozambique.

2.3 AGRA Program Objectives

This study is part of AGRA's strategy of investing in agriculture to reduce poverty and hunger, through an agricultural transformation in Africa.

To this effect, AGRA works across the continent to boost farm productivity and incomes of millions of smallholder farmers in target countries. Specifically, this strategy for 2015-2020 focuses on famers' awareness and capacity building and improving smallholder farmers' access to finance, to improved seeds and fertilizer, and to market.

In the next five years, AGRA aims to implement its program in eleven countries. Taken into account the specificities of each African country, AGRA has developed its program around two types of interventions:

- In **Ghana, Mali, Burkina Faso, Ethiopia, Tanzania, and Mozambique**, AGRA is fostering agriculture transformation by investing in smallholder adoption of improved inputs, develop more efficient marketing systems, and introduce post-harvest technologies in order to close yield gaps and ensure farmers can sustainably sell quality product into a market. AGRA's intervention in these countries takes into consideration the significant barriers that farmers face in having access to agricultural inputs and to the market.

- In countries where the transformation is under way, namely in **Nigeria, Kenya, Rwanda, Uganda, and Malawi**, AGRA intervention focus on sustaining and supporting the government and partners to boost the agricultural transformation, in terms of increased productivity and access to markets and finance. In these countries, the adoption of improved inputs has increased in the last years and there are greater opportunities for leveraging private sector investment and interest.

  AGRA's programs put particular emphasis on the key role that women play in the increase of productivity, thus the promotion of women's participation in AGRA's programs in an essential goal. Another crucial element of AGRA's strategy is the adoption of science and technology to foster the agricultural transformation. AGRA resorts to innovative approaches to addressing bottlenecks in the system, reducing environmental degradation, and conserving biodiversity.

3 Study Design

3.1 Survey Objectives and key definitions

The overall objective of this assignment was to collect and analyse data on a set of outcome indicators in breadbasket areas of intervention in **Burkina Faso, Ghana, Mali and Mozambique**, in order to inform AGRA's strategy for the next five years. Further, the information collected will contribute to set appropriate targets for AGRA's future interventions and help to design and implement future interventions. This baseline study is part of a series of studies and evaluations that will inform AGRA's strategy.

For the case of Mozambique, the study targeted specific areas of AGRA's intervention projects in Manica, Sofala, Nampula, Tete, Niassa, Zambézia and Cabo Delgado Provinces, and focused on target crops and value chains are Maize, Rice, Cassava and Soybean.

For the purpose of the survey, the following key definitions were applied:

Household – all persons that have lived under the same roof and shared the same food pot over the last 12 months. It may include members who have been away for less than 3 months but who receive or send remittances.

Smallholders – a farmer with less than 10 hectares of rainfed farming area, less than 10 cattle, less than 50 goats, pigs or sheep, or less than 2,000 poultry. If the farming area is irrigated it shall be smaller than 5 hectares of size.

3.2 Sample Size and Power Analysis

3.2.1 Sample size and sampling methodology for the household survey

For the quantitative component, a sample is determined for each of the four crops since some of them are specific to some areas. For example, soybean production is not widespread in either Nampula or Sofala; rice production is more common in Zambézia and Nampula provinces than in any other province covered in the study. A representative sample of approximately 2600 households was drawn to cover all four target crops in the seven target provinces.

A total of 225 enumeration areas (EA) were purposely selected based on their agricultural potential for the crops included in this study. These enumeration areas were selected from a list of all enumeration areas in the country, based on the master sample that comes from the latest population census that was conducted in 2007. The identification of agricultural households originates from the latest agricultural and livestock census, known by its Portuguese acronym CAP (Censo Agro-Pecuário). The latest CAP was conducted in 2009-2010.

More recently, the National Bureau of Statistics geo-referenced farming households in the country, and this exercise included information about the crops grown by each household. It is from this comprehensive list of households that our sample of about 2600 households was drawn. In each enumeration area, we interviewed a total of 12 households. The advantage of interviewing fewer households per enumeration area is that we get more variability in the data.

3.2.2 Sample size and sampling methodology for the plot measurement

In each of the 225 enumeration areas, we were expected to measure the nearest plot of the first five of the sampled households. Whether the household is first, second or third in the sampling list is already a random process, so measuring all plots of households 1, 2, and 3 also guarantees randomness.

Linear regression was used where the dependent variable is the measured area and the independent variables includes head's years of education interacted with declared area. The final area variable is equal to the measured area if the household had his/her plots measured, or the predicted area from the regression model in case plots were not measured.

3.3 Data Collection and Quality Control

This baseline study combines both quantitative and qualitative methodologies to fully meet the above referred objectives. Below we present the details of both components and relevant information on the data collection process, including the quality control mechanisms applied, the challenges encountered and how we have addressed them.

3.3.1 Quantitative component

The quantitative component aimed at collecting data on the current situation and trend of the smallholder farmers in relation to the four target value chains (Maize, Rice, Cassava and Soybean).

Quantitative instruments

For the household survey, a closed-ended questionnaire was applied. The household questionnaire is common to all countries where this study has been conducted (Burkina Faso, Ghana, Mali and Mozambique) and has been revised and adapted to the Mozambican context. It addressed the following main themes:

1. Demographic information of the households
2. Housing characteristics and households' assets
3. Employment and income
4. Agronomic practises
5. Food security
6. Agricultural productivity
7. Farm associations
8. Access to productive assets, inputs, agricultural services
9. Women empowerment

Prior to approval, the questionnaire was tested for its adequacy to the Mozambican context. The approved version of the household questionnaire applied in the field is included in Appendix A.

3.3.2 Qualitative component

The qualitative component aimed to complement the quantitative data, as well as provide a more in-depth analysis of issues raised in the quantitative data and/or not clearly enough explained through the quantitative data. It aimed to contextualize the driving factors behind the statistics of interest, in order to establish the current levels of key performance indicators related to AGRA's new country strategy.

The qualitative component integrates the gender approach based in the Women Empowerment in Agriculture Index´s (WEAI). The WEAI goal is to understand the empowerment, agency, and inclusion of women in agriculture by looking at the role and extent of women's engagement in five domains: (i) decision making about agricultural production, (ii) access to and decision making power over productive resources, (iii) control over use of income, (iv) leadership in the community and (v) time use.

Qualitative instruments

The qualitative methodology is common to the other three countries where this baseline this conducted, and has been adapted to the Mozambican context.

For the purpose of instruments adaptation, the revision of relevant documents was conducted at the beginning of the project. These included national surveys/assessments, such as the *Trabalho de Inquérito Agrícola (TIA)*, *Inquérito Agrícola Integrado (IAI)* and the most updated *Anuário de Estatísticas Agrícolas* (Agricultural Yearbook). The aim of the literature review was also to provide an overview of the agricultural sector in Mozambique, particularly on the value chains of the four target crops (maize, rice, cassava and soybeans) and inform data analysis and the reporting phase. The contextualization of the agricultural sector and the four target value chains are reported above, in chapters 1 Introduction 2.1 Country Background.

The qualitative component was conducted in seven contexts built from agricultural, geographic and sociocultural criteria:

- Agricultural criteria: levels of use of fertilizer, improved seeds, animal traction, trade, production and productivity;
- Geographic criteria: coastal area, inland area and proximity to a national border, which are expected to influence on the crops produced, agricultural practices and trade of production;
- Sociocultural criteria: matrilineal kinship, patrilineal kinship and mix matri/patrilineal practices that influence on decision-making at the household level and the ownership of assets and agricultural inputs, most importantly land.

The following methods were applied: Key Informant Interviews and Focus Group Discussions and Case Studies.

The key informant interviews were conducted with a select group of individuals who were likely to provide needed information, ideas, and insights on a particular subject through individual semi-

structured interviews. In the present assignment the key informants were the Provincial Directorates of Agriculture (DPA) and District Services for Economic Activities (SDAE), as well as farmer associations.

The focus of the interviews were related to general agriculture tendencies, interaction with extension services and agro-dealers, market environment and dominant practices regarding yield, farming & off-farm income earning and income use, needs and constraints in relation to agricultural production and in relation to the commercialization of products, with a focus to the value chains of the four survey crops.

The Focus group discussions aimed to gather insights from the members of a community in relation to agricultural practices and production. They also addressed the key topics of the WEAI's gender approach, through participatory exercises that introduced the topic and stimulate group discussion. These were conducted with separate groups of men and women within the areas where the household survey took place. The participatory exercises favoured visual expression methods that suited both literate and illiterate/low literacy level groups.

The following participatory exercises were applied:

- Seasonal map: to collect information on the main occupation and employment of the community, identify vulnerability factors in the community and assess community members perceptions on their socio-economic status;

- Seasonal calendar on the availability of food: to map food (in)security periods troughout the year, understand their causes and what strategies the community applies in order to overcome food shortage;

- Agricultural inputs and production map: to identify the main agricultural inputs available, the main knowledge sources, and understand the dynamics of target crops production;

- Women empowerment in agriculture: to understand women empowerment in agriculture and explore successful women stories, through real examples;

- Potential external factors: to explore external enhancing and/or hindering factors to agricultural production; including individuals, organizations or projects that provide support to farmers and influence of supernatural believes.

During the focus group discussions, the participants identified a community member considered as a successful farmer in order to be interviewed and create case studies. The conversation aimed to explore the dynamics of the production and value chain of the target crops; and focused on the meaning of being a successful farmer, how he/she has pursuit such achievements, factors of success, and the difficulties of having success in agriculture.

Qualitative data was collected by seven qualitative researchers, supervised by the qualitative manager. The qualitative team conducted the interviews, with the support of local assistants who were fluent in the relevant local languages and translated the conversation.

3.3.3 Data collection

Data collection was conducted from November to December 2016, in the seven target provinces (Manica, Sofala, Nampula, Tete, Niassa, Zambézia and Cabo Delgado).

Household survey

Quantitative data was collected 9 field teams composed of 1 supervisor and 4 interviewers each, accounting for a total of 9 supervisors and 36 interviewers, distributed across the target provinces, according to the sample size per province. The field teams were directly supervised by four COWI's in-house coordinators, responsible for ensuring that data was collected according to the agreed field protocol.

A total of 2,174 household interviews were conducted. Out of the 255 target EAs, 43 were considered unsafe conflict areas, thus were not accessible by the data collection team. Table 2 below shows the number of EAs covered and the number of interviews completed per province.

Table 2: Accomplished sample

Description	**Province**							
	Cabo Delgado	Nampula	Tete	Niassa	Zambézia	Manica	Sofala	**Total**
N. EA accomplished	32	39	30	25	40	31	15	**212**
N. HH interviewed	381	339	320	229	424	294	187	**2,174**

Plot measurement

A total of 838 plots were measured across the target provinces. The physical measurement of the plot was made by a member of the household, with the guidance of the supervisor, through a logger which is able to capture GPS coordinates.

Qualitative Interviews

The qualitative team collected information from different sources. A total of 66 interviews were conducted. Table 3 below summarises the total numbers of interviews and the source, while 9Appendix B reports the type and number of interviews conducted per context (indicating the province, district and predominant target crop).

Table 3: Numbers of interviews conducted per respondent

Source	**Total Number of interviews**
DPA	8
SDAE	9
Extensionist	7
Focus Group Discussion	14
Case Study	14
Farmer's Association	14
Total	66

3.3.4 Quality control mechanisms

In order to ensure the quality of collected data, a number of quality control mechanisms were developed for both the collected data and the data collection process. Part of the mechanism were used in the field, by the Supervisors, while other mechanisms were performed in Maputo by the COWI team.

Data was collected with android equipment (tablet). The use of tablet for data collection strengthens the quality control of collected data. The tablet allows to verify the range and perform consistency checks, allowing any violation of these checks to immediately trigger a message that is sent to the interviewer with a practical method for correcting the error. The control system required that all questions are answered, thus avoiding non-responses rates. As part of the control system, hard and soft checks were also programmed to limit inconsistent answers as much as possible.

In addition, to ensure high quality of the data collection process and the outputs, we applied COWI's standard Quality Assurance System, which involved all team members, from the interviewers and supervisors, to the Coordinators, Survey Manager, Project Manager and Project Director. In practice, we adapted a series of data collection protocols to ensure quality and reliability of the data and of the deliverables of this project.

A total of 210 back check visits were conducted by the supervisors throughout the survey to apply a set of spot check questions, with randomly selected households that had been interviewed by the interviewers. This exercise aimed at validating the answers provided by the interviewer, and his honesty. In case any discrepancy between the supervisors and the interviewers' answers were found, both the supervisor and the interviewer had to re-conduct specific questions to the household in order to validate the answers. Interviewers found with consistent errors would be dismissed, but fortunately that was not the case with the baseline survey.

Additionally, daily meetings were held by the Supervisor with his team at the end of each survey day, to discuss difficulties in collecting data, in using the electronic application and/or in translation. These meetings were also used to pass methodological explanations and orientations to the field teams, as well as explain changes to the applications as they were introduced.

Daily phone contact was made with each supervisor by the coordinators. These contacts served to discuss issues reported from the field, provide methodological guidance, confirm data transmission and discuss administrative/ logistic issues for data collection efficiency.

Progress reports were filled-in by each supervisor for every survey day, quantifying data collected, back checks and Enumerator Observations conducted, household substitutions done, challenges faced, mitigation measures applied and support needed. These reports were shared by the supervisors with the coordinators on a daily basis.

Geographic coordinates of the surveyed households and the coordinates of the plots measured were verified by a GIS technician to identify coordinates that were incorrect (i.e. fell outside the survey AE) or lacking precision (i.e. few digits).

Our supervision approach also included a visit of supervision of the Coordinators and the Survey Manager to the target areas with the aim of closely following-up the data collection process, providing any technical assistance and addressing any constraint that may occur during the

fieldwork. The visits took place at the commencement of the data collection process to ensure a common understanding of the methodology, strategy and approach.

3.3.5 Data analysis

The data analysis for the quantitative survey was performed by resorting to a systematic tabulation plan. The plot measurement and the quantitative were merged into a single information unit, to be able to link and map household information to plot information concurrently.

The analysis of the qualitative data was done by compiling matrixes of analysis on relevant topics. The results of the qualitative data analysis was cross-compared with the analysis of the quantitative data, for a comprehensive analysis of all baseline data gathered.

3.3.6 Challenges and limitations

Over the course of the assignment, a number of challenges were faced concerning the design of the applications, data collection and data management. For each of the challenges, measures were introduced to mitigate them. **Error! Reference source not found.**The table below presents t he main challenges encountered and mitigation measures applied:

Table 4: Challenges and mitigation strategies applied

Topic	Challenges encountered	Mitigation strategy applied
Data collection	Political tension and impossibility of collecting data in same EAs	Substitution of some EA, within AGRA's project area
	Selected Households provided by INE not available	Substitution of HHs
	Difficulty to reach remoted AE	Teams contact local authorities for suggestions and assistance on how to reach difficult areas
	Problems in using tablet (due to low charge, lack of energy)	Use of paper-based questionnaire and manual digitalization into the system at the end of the day
Data transmission from tablets to the main server	Difficulties on data transmission, due to Internet connection	Field teams were provided with routers and air time from a cell phone provider with the widest and strongest Internet connectivity outside urban areas in Mozambique.

4 Descriptive characteristics

The present chapter covers descriptive statistics from the survey focusing on demographics, level of education and literacy of the households surveyed.

4.1 Demographics

The majority of households in Mozambique are male-headed. Data from the national agricultural surveys conducted by the Ministry of Agriculture and Food Security (MASA) show that in 2015 about 71% of household heads were male, and this is in line with the current baseline, showing that about 77% of households are male headed (out of 2,174 households interviewed, see Table 1 above). The MASA agricultural statistical yearbook also show an average household size of about five members, which is also comparable to what we found in the current baseline survey (Table 5 below).

Table 5 Household size, gender and age of the household head

Province	% male-headed HH	Mean head's age (years completed)	Mean HH size (number of members)
Niassa	73.6	40.8	4.1
C.Delgado	71.8	44.7	4.0
Nampula	81.5	43.8	4.7
Zambezia	75.3	42.8	3.9
Tete	76.3	43.4	4.8
Manica	76.9	46.5	5.8
Sofala	77.0	52.4	5.8
Total	76.6	44.3	4.6

About 65% of household heads are monogamously married (Table 6 below), but there are some variations across provinces. The proportion of household heads who are monogamously married is considerably smaller in Zambézia province, and highest in Tete province. The percentage of widowed household heads is correlated with the prevalence of HIV/AIDS in the country. Data from the National HIV/AIDS prevalence survey conducted in 2009 showed that Sofala was the worst province, with 15.5% of the population infected by HIV, followed by Manica with 15.3%. These two provinces are the ones with the highest proportion of widowed household heads among the baseline surveyed population (Table 6). The two survey provinces with the least infection of HIV were Niassa and Nampula, and this too is where we found the lowest proportion of widowed household heads. Polygamy appears to be quite high in Manica, relatively low in Nampula.

Table 6 Marital status of the household head by province

Province	Single (%)	Monogamous married (%)	Polygamous married (%)	Divorced (%)	Widowed (%)	Separated (%)
Niassa	13.0	60.9	1.3	3.55	11.2	10.1
C.Delgado	10.3	69.1	2.4	3.11	11.1	3.9
Nampula	20.0	70.3	0.6	1.77	7.0	0.3
Zambezia	31.7	47.9	2.0	3.69	11.8	2.9
Tete	0.7	73.7	3.6	4.01	15.4	2.6

Province	Single (%)	Monogamous married (%)	Polygamous married (%)	Divorced (%)	Widowed (%)	Separated (%)
Manica	1.5	68.1	8.1	2.49	16.9	2.9
Sofala	3.5	71.9	1.9	0.88	20.5	1.3
Total	14.3	65.3	2.6	2.87	12.2	2.8

4.2 Education and Literacy

Adult literacy in Mozambique remains quite low. Historically, during the colonial period that ended in 1975 Mozambicans had limited access to education. As a result, by independence in 1975 adult illiteracy was around 97%, which dropped to 72% within seven years after the independence (Mario and Nandja, 2005). However, there has always been gender disparity in the access to education in the country, with 38% of men (>15 years old) being illiterate in 2004, compared to 69% among women, and illiteracy rates are usually higher in the rural areas (Mario and Nandja, 2005).

This same pattern is observed with the current baseline data. About 54% of male household heads can read and write, compared to just 20% among female household heads (Table 7). As Mario and Nandja (2005) put it, in a country as large and diverse as Mozambique, regional variations are to be expected, and they too found that Cabo Delgado had the highest illiteracy rates, and this is confirmed by the baseline data. Only 7.7% of female household heads can read and write, compared to the overall average of 20% (Table 7). Tete was another province with very low literacy rates among women.

Table 7 Literacy among household heads by province and gender

Province/ Gender of HH head	HH head can read (%)		HH head can write (%)	
	Male	Female	Male	Female
Niassa	54.3	22.6	53.4	22.6
C.Delgado	52.5	7.7	53.4	7.7
Nampula	47.2	19.2	45.5	17.6
Zambezia	48.3	34.3	48.5	34.4
Tete	46.0	6.2	49.0	6.2
Manica	84.0	30.1	83.5	27.5
Sofala	73.3	28.6	73.3	28.6
Total	54.1	20.2	54.2	19.7

In Table 8, we look at educational attainment of the household head, male and female combined. There is a higher proportion of household heads without any education in Cabo Delgado and Tete provinces, as expected, based on the results previously presented in Table 7. About 40% of household heads have completed between grades 1 and 5, which is the first cycle of the primary school. The proportion of household heads who completed college is negligible.

We look at education because it affects agricultural productivity in several ways. First, more education usually translates into higher nonfarm incomes, which can be reinvested in the agricultural sector in acquiring improved inputs and modern agricultural equipment. Second, better educated households can easily absorb extension messages conducive to agricultural productivity growth. Third, better educated households can have a higher bargaining power in

selling their produce, and have better access to price information, which work as an incentive to produce more assuming they are able to sell larger quantities at a better price (Reardon et al, 2000).

Table 8 Educational attainment of the household head, male and female combined

Province	No education (%)	Primary School 1/5 (%)	Primary School 6/7 (%)	Secondary School 8/12 (%)	College or higher (%)
Niassa	27.4	33.2	16.4	22.4	0.7
C.Delgado	45.1	36.5	10.4	7.8	0.2
Nampula	30.3	39.9	15.3	14.5	0.0
Zambezia	27.4	31.7	18.5	21.6	0.8
Tete	31.8	49.2	9.3	9.8	0.0
Manica	13.4	46.5	22.6	17.3	0.2
Sofala	21.4	47.6	14.1	16.1	0.9
Total	29.6	40.0	15.0	15.1	0.3

Given the large differences that we observed with literacy rates between male and female household heads, we looked at differences in education attainment in the same way, and these results are presented in Tables 9 and 10 below. The proportion of household heads without education is twice as high among female than male household heads, and while having a college degree in rural Mozambique is a mirage, the smaller proportion is still four times greater among males.

Table 9 Educational attainment of the male headed household

Province	No education (%)	Primary School 1/5 (%)	Primary School 6/7 (%)	Secondary School 8/12 (%)	College or higher (%)
Niassa	21.2	34.8	17.5	25.6	0.9
C.Delgado	34.6	41.5	13.7	9.8	0.3
Nampula	25.8	42.8	16.2	15.2	0.0
Zambezia	26.5	31.2	19.1	22.1	1.1
Tete	23.8	54.0	11.7	10.5	0.0
Manica	5.0	46.9	26.0	21.8	0.3
Sofala	12.6	51.8	15.8	19.2	0.6
Total	23.4	42.6	16.8	16.7	0.4

Table 10 Educational attainment of the female headed household

Province	No education (%)	Primary School 1/5 (%)	Primary School 6/7 (%)	Secondary School 8/12 (%)	College or higher (%)
Niassa	44.8	28.6	13.0	13.6	0.0
C.Delgado	71.8	23.7	1.9	2.7	0.0
Nampula	50.3	27.2	11.2	11.3	0.0
Zambezia	30.4	33.0	16.6	20.1	0.0
Tete	57.5	33.6	1.4	7.6	0.0
Manica	41.1	44.9	11.4	2.5	0.0
Sofala	51.0	33.2	8.1	5.8	1.9
Total	49.7	31.2	9.0	9.9	0.1

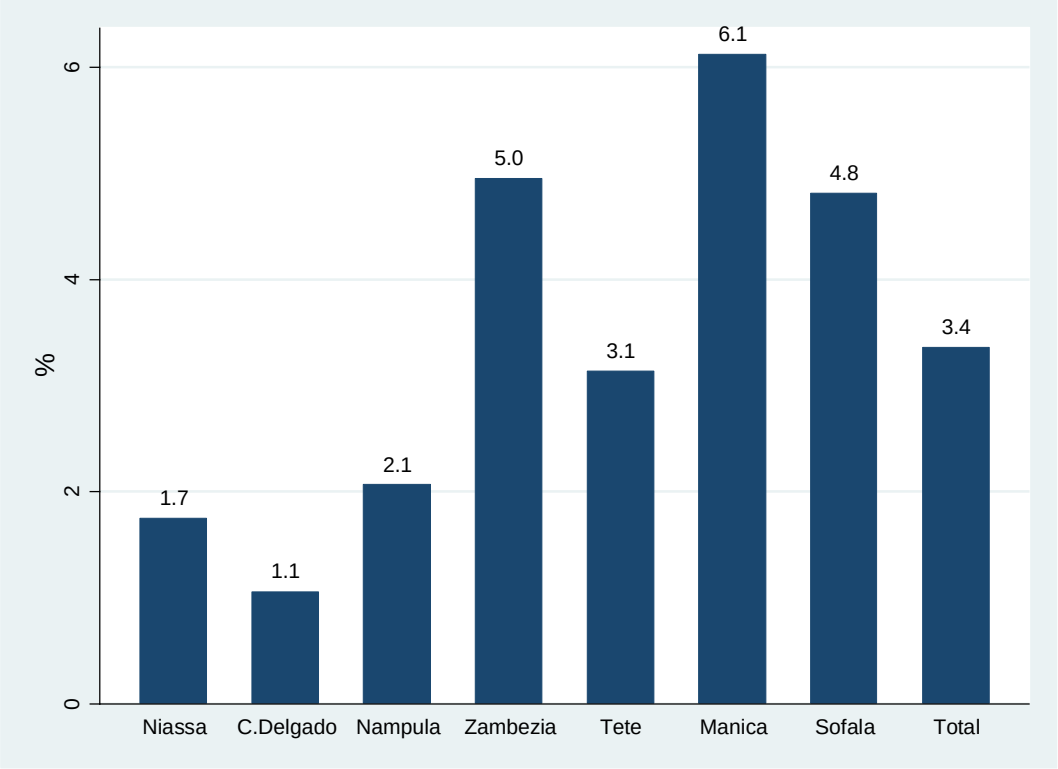
5 Household Welfare

This chapter presents a summary of the findings produced the socio-economic survey indicators, with the aim of measuring the welfare level of the surveyed households. Specifically, the chapter analyses the level of income and employment of households, food security, credit and savings, and asset ownership.

5.1 Income and Employment

In Figure 1 below we show the percentage of surveyed households who had employed others in the last 12 months. In total about 3.4% of households had salaried employees but there was a marked variation across provinces: 1.1% in Cabo Delgado compared to 6.1% in Manica. One reason to keep salaried employees is to rear cattle, and this would be applicable to Manica, Tete and Sofala, but not in Zambézia because cattle are not found in the latter in the smallholder sector. Another reason to employ permanent workers is to ensure timely agricultural operations as farm sizes become larger. Third, households could be hiring employees to compensate for their smaller household size; this could be the case for Zambézia as previously shown in Table 5. The Northern provinces of Niassa, Cabo Delgado and Nampula are more isolated and have less forward and backward economic linkages to the rest of the national economy.

Figure 1 Percentage of HH who had salaried employees in the last 12 months



Since less than 5% of surveyed households had salaried employees, the average annual amount paid would be zero to about 95% of the population, and this is the reason why in Table 11[2] below, referring to the average annual amount paid, we present percentiles 75 and 95, and the maximum

[2] We converted the values initially reported in the local currency (Meticais) to USD using the World Bank PPP conversion factors for 2015. This allows for comparisons across countries.

amount paid, in addition to both the mean and the median. Note that zero values were included in the computation of the mean value, so a lower average pay may not reflect lower payments among those who are employed. For example, while the mean is lower in Cabo Delgado than in Niassa, the maximum value is actually greater in the former; a similar pattern is observed between Sofala and Manica. Lower mean values reflect that there are fewer households with salaried workers.

Table 11 Average annual amount paid to salaried employees (in 2015 USD PPP) – all sample

Province	Mean	Median	Percentile 75	Percentile 95	Max
Niassa	$ 10	$ -	$ -	$ -	$ 1,045
C.Delgado	$ 5	$ -	$ -	$ -	$ 1,456
Nampula	$ 16	$ -	$ -	$ -	$ 3,689
Zambezia	$ 33	$ -	$ -	$ -	$ 5,372
Tete	$ 38	$ -	$ -	$ -	$ 4,297
Manica	$ 62	$ -	$ -	$ 358	$ 4,297
Sofala	$ 45	$ -	$ -	$ -	$ 5,372
Total	$ 28	$ -	$ -	$ -	$ 5,372

Table 12 is similar to the previous Table, but the analysis is restricted to those who had salaried employees. On average, salaried employees cost about $740/year, but wages tend to be lower in Tete and higher in Cabo Delgado em Nampula. The 75th percentile salaries are equal to the 95th and to the maximum paid in salaries in Niassa, Cabo Delgado, and Nampula, indicating lower proportion of households who employed salaried employees, as shown in Figure 1 above.

Table 12 Average annual amount paid to salaried employees (in 2015 USD PPP) – among those who had salaried employees only

Province	Mean	Median	Percentile 75	Percentile 95	Max
Niassa	$ 858	$ 859	$ 1,045	$ 1,045	$ 1,045
C.Delgado	$ 1,259	$ 1,253	$ 1,444	$ 1,456	$ 1,456
Nampula	$ 1,845	$ 1,074	$ 3,689	$ 3,689	$ 3,689
Zambezia	$ 945	$ 716	$ 1,050	$ 5,372	$ 5,372
Tete	$ 1,169	$ 582	$ 1,074	$ 4,297	$ 4,297
Manica	$ 1,028	$ 836	$ 1,074	$ 4,297	$ 4,297
Sofala	$ 1,359	$ 955	$ 1,743	$ 5,372	$ 5,372
Total	$ 1,132	$ 740	$ 1,074	$ 4,297	$ 5,372

We looked at net incomes from self-employment activities, but the costs involved in engaged in those activities were also quite high. This led to many negative incomes, and this is why in Table 13 below we report gross incomes only. The literature on participation in nonfarm income generating activities discusses entry barriers, and education is one of them (Reardon et al., 2000). If we recall from the demographic section above, illiteracy rates were higher in Cabo Delgado. As a result, there are many empty cells in Table 13 for Cabo Delgado because farmers in that province are unable to surmount the education barrier and engage in activities such as accounting. A second pattern is that the poor who are often the less educated usually engage in activities of low return. Except for agricultural trading, gross incomes are not the highest among households

located in Cabo Delgado, compared to the other provinces. Third, results breakdown by activity allows us the identification of activities with higher returns, but households usually engage in more than one activity. Therefore, it is also informative to aggregate the incomes at the activity level to the household level, and results from such exercise are presented in Table 12 below.

Table 13 Gross income in 2015 USD PPP from each self-employment activity

Activity code	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala
Accounting Clerk	$ 1,469	$ -	$ 89	$ 81	$ 2,095	$ 860	$ -
Agricultural Trading	$ 1,536	$ 9,502	$ 494	$ 389	$ 5,793	$ 1,384	$ 0
Bar Operator	$ 567	$ 367	$ -	$ 31	$ -	$ 4,775	$ 1
Battery Charging	$ -	$ -	$ -	$ -	$ -	$ -	$ 3
Bicycle (repair/transporter)	$ 95	$ -	$ -	$ 72	$ 2,352	$ -	$ -
Brick making	$ -	$ -	$ -	$ 780	$ 170	$ 1,854	$ 326
Brokerage	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Building	$ 1,194	$ -	$ 161	$ 12	$ -	$ 2,060	$ 355
Butcher	$ -	$ -	$ -	$ -	$ -	$ 1,261	$ -
Carpentry	$ 657	$ 1,023	$ 1,191	$ 8,797	$ -	$ 2,716	$ 1,431
Casual worker	$ -	$ -	$ 36	$ -	$ -	$ -	$ 955
Charcoal burning	$ -	$ -	$ 617	$ 70	$ -	$ 2,763	$ 982
Clothes/Shoe business	$ 1,867	$ -	$ -	$ 2,387	$ 4,491	$ 3,070	$ 2,546
Curio trader	$ 728	$ -	$ -	$ 582	$ -	$ 1,308	$ 1
Driver	$ -	$ -	$ -	$ -	$ 10,744	$ 1,899	$ -
Earning dividends	$ 2,149	$ -	$ -	$ -	$ -	$ -	$ 555
Electrician	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Farm kibarua	$ 221	$ -	$ 165	$ 331	$ 175	$ 851	$ -
Fish trading	$ 574	$ -	$ 282	$ 143	$ -	$ 127	$ 406
Hairdresser/barber	$ -	$ -	$ -	$ -	$ 1,970	$ -	$ -
Harrowing	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Harvesting	$ -	$ -	$ -	$ 691	$ -	$ -	$ -
Hawker	$ 1,656	$ -	$ 970	$ 415	$ 743	$ -	$ 31
hiring out a bull	$ -	$ -	$ -	$ -	$ -	$ -	$ -
income from other farm	$ -	$ 215	$ -	$ 364	$ -	$ -	$ -
Jaggery (Sukaringuuru)	$ -	$ -	$ -	$ 537	$ -	$ -	$ -
Livestock trading	$ -	$ 818	$ -	$ -	$ 954	$ -	$ -
Local brewing	$ 696	$ -	$ -	$ -	$ 1,155	$ 1,293	$ 268

Activity code	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala
Lumbering/Wodd cutting	$ -	$ -	$ 1,355	$ 152	$ -	$ -	$ -
making pots	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mercenary	$ 552	$ 2,686	$ 265	$ -	$ -	$ 17,441	$ 412
matatu business	$ -	$ -	$ -	$ -	$ -	$ 2,686	$ -
Mining	$ -	$ -	$ -	$ -	$ -	$ 4,726	$ -
Nurse	$ 4,715	$ -	$ -	$ -	$ -	#VALUE!	$ -
Pet breeder	$ -	$ -	$ -	$ -	$ -	$ 3,999	$ -
Planting	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ploughing	$ -	$ -	$ 170	$ -	$ 119	$ -	$ -
Plumber	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Posho milling	$ 2,331	$ -	$ -	$ -	$ 1,397	$ 2,596	$ 1,850
Renting out properties	$ -	$ -	$ -	$ 859	$ -	$ -	$ 286
Retail shop/kiosk/ Shopkeeping	$ -	$ 6,603	$ -	$ -	$ 7,521	$ 3,432	$ -
Selling mandasi	$ 251	$ 429	$ -	$ 78	$ 151	$ 993	$ 467
Selling water	$ -	$ -	$ 66	$ -	$ -	$ -	$ -
Surveyor	$ -	$ 654	$ -	$ -	$ -	$ -	$ -
Tailor	$ 859	$ -	$ 117	$ 1,571	$ -	$ 2,937	$ 994
Teacher, part time	$ -	$ 4,656	$ -	$ 15,996	$ -	$ -	$ -
Tout/turnboy	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Trading timber	$ -	$ -	$ -	$ -	$ -	$ 1,385	$ -
Traditional doctor	$ -	$ 215	$ 205	$ 492	$ 2,447	$ 1,194	$ 4,656
Transporter (goods)	$ -	$ -	$ 537	$ -	$ 2,149	$ 782	$ -
Tree seller, commercial	$ -	$ 955	$ 1,309	$ 1,623	$ -	$ 2,149	$ -
Vehicle mechanic	$ -	$ -	$ -	$ 1,343	$ -	$ -	$ -
Village elder	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Welding/Painting/Black smithing	$ -	$ -	$ -	$ -	$ 358	$ 2,775	$ -
Other(specify)	$ 1,788	$ 3,888	$ 160	$ 6,433	$ 3,634	$ 1,346	$ 1,384

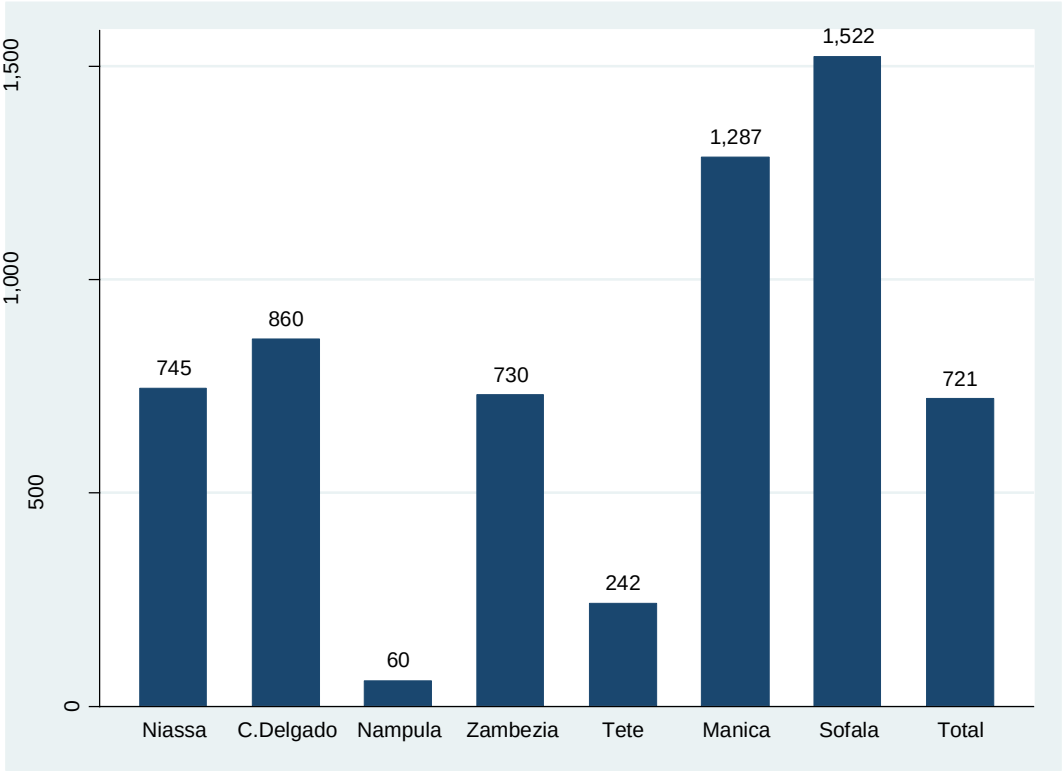
We look at averages by quartiles of gross income because there is usually a large variation in incomes by poverty profile. Overall, gross incomes in the upper quartile are about 59 times greater than the incomes in the lower quartile, and inequality levels vary by province (Table 14 below).

Table 14 Mean of total gross HH income in 2015 USD PPP from self-employment activities by quartile and province

Quartile of gross income	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Low	$ 38	$ 159	$ -	$ -	$ 135	$ 451	$ -	$ 94
Low to middle	$ 405	$ 673	$ 39	$ 17	$ 323	$ 1,230	$ 4	$ 528
Middle to High	$ 982	$ 2,852	$ 337	$ 573	$ 966	$ 2,124	$ 467	$ 1,001
High	$ 3,720	$ 11,169	$ 1,844	$ 10,878	$ 6,313	$ 5,974	$ 2,787	$ 5,529
Total	$ 1,225	$ 3,481	$ 543	$ 2,590	$ 1,864	$ 2,414	$ 793	$ 1,696

In addition to self-employment activities, we also looked at incomes from salaried activities. Incomes usually tend to be skewed, and data from the baseline survey show that the median wage income is zero. The mean annual wage income is about $721 (Figure 2), with a maximum value of $78,787. The mean wage income is lower in Nampula because we only had 12 observations or households with wage income out of 339 that were sampled. In other words, there are far more zero incomes in Nampula in the computation of the mean values than in any other province.

Figure 2 Mean wage income in USD (2015 PPP) from salaried activities



We also computed the mean wage income among those who had such income source, and Nampula remains the province with the lowest average: $1,696 Meticais/year in Nampula against $2,756 Meticais in Tete, $3,480 Meticais in Sofala, $3,701 Meticais in Manica, $4,168 Meticais in Niassa, $6,278 Meticais in Zambézia and $6,637 Meticais in Cabo Delgado.

5.2 Food Security

Maize, cassava, and rice are the three most important staple crops in Mozambique (Table 15 below)[3]. Although Mozambique does not produce wheat, except for a few districts in Tete province, wheat consumption is quite high, and most of it is imported. Cassava is mainly consumed in Nampula, Cabo Delgado, and Zambézia while maize consumption is widespread across all seven provinces included in the baseline survey.

Table 15 Most commonly consumed food crops during the last 12 months (%)

Food crop	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Maize, dry	33.3	30.9	26.4	23.8	33.2	33.2	29.6	29.6
Cassava	10.7	25.0	28.4	27.5	1.0	2.7	7.7	16.5
Lemon grass	9.6	6.8	14.0	7.0	26.5	9.5	5.0	11.4
Rice	13.0	9.4	6.2	17.8	0.6	7.7	29.6	11.1
Wheat (drought resistant)	10.5	14.5	6.6	8.2	3.2	3.7	1.3	7.3
Pineapples	0.2	6.0	5.7	1.7	7.4	2.0	2.5	3.9
Sweet potatoes	0.3	1.1	0.1	3.0	3.7	1.9	12.9	2.7
Squash	0.2	0.2	0.0	0.4	10.2	6.1	0.5	2.5
Oranges	3.4	0.0	0.0	0.2	0.1	12.9	0.5	2.2
Green peas	7.0	1.2	0.9	0.0	0.0	0.0	0.2	1.1
kales (sukuma wiki)	1.3	0.0	0.2	0.0	2.9	1.8	0.5	0.9
Passion fruit	0.2	1.0	1.2	0.3	0.4	0.7	2.7	0.8
Strawberries	0.2	0.2	0.0	0.2	2.8	1.9	0.4	0.8
Watermelon	2.8	0.5	0.7	0.2	0.3	0.1	0.9	0.7
Coconuts, green	0.0	0.0	0.0	0.2	2.2	1.4	0.2	0.6
Other	7.6	3.4	9.8	9.7	5.2	14.2	5.6	8.0

Note: Percentages normalized to add to 100% in each column (multiple response question)

Indeed, cassava is considered to be more important than maize as the main food crop in Nampula and Zambézia provinces (Table 16). In the central provinces of Tete and Manica maize is by far the most important food security crop, whereas households in Sofala tend to have a more diversified choice, which includes rice and cassava, in addition to maize.

Table 16 Main food crop consumed during the last 12 months (%)

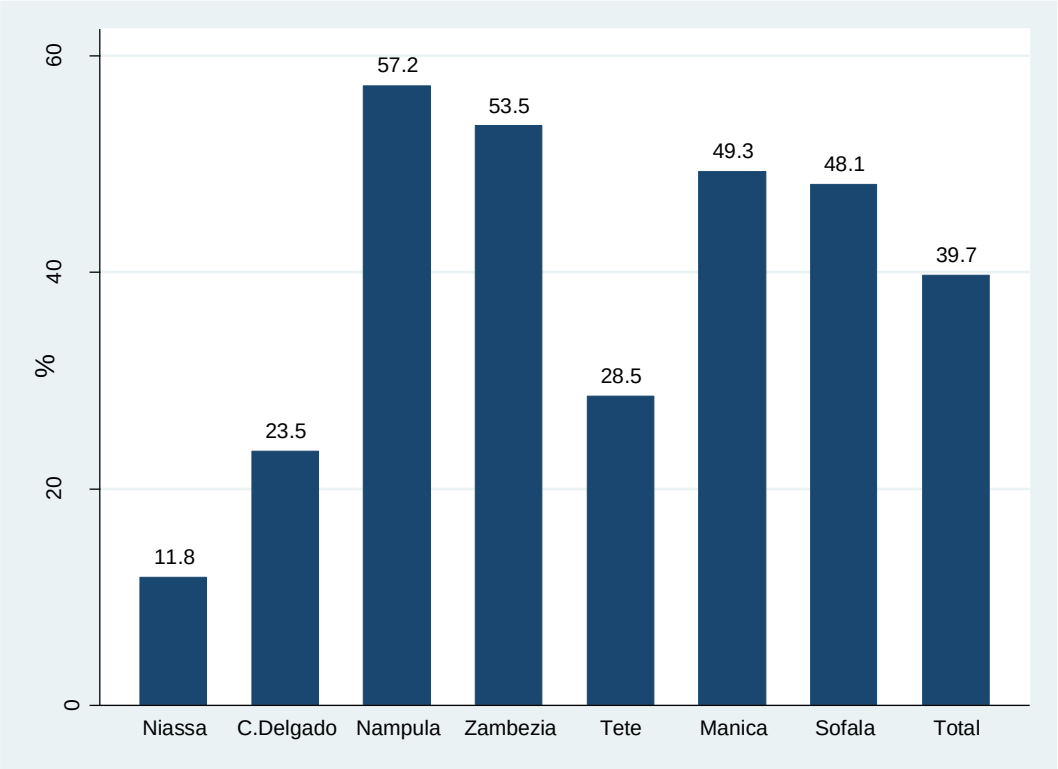
Main food security crop	Niassa	C.Delgado	Nampula	Zambézia	Tete	Manica	Sofala	Total
Maize, dry	99.3	50.7	37.3	22.7	99.9	99.1	55.4	58.5
Cassava	0.0	45.0	55.3	59.1	0.0	0.2	6.4	32.7
Rice	0.0	2.1	0.3	11.7	0.0	0.4	37.8	5.3
Wheat (drought resist	0.0	0.8	0.3	1.6	0.0	0.0	0.0	0.5
Sweet potatoes	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.2

[3] These are also the focus crops for AGRA.

Main food security crop	Niassa	C.Delgado	Nampula	Zambézia	Tete	Manica	Sofala	Total
Other	0.7	1.5	6.9	4.0	0.1	0.4	0.4	2.8

About 40% of households had suffered from insufficient food resources from own production during the last 12 months (Figure 3). Access to food from own production is a bit puzzling in Nampula and Zambézia, two provinces of relatively high agricultural potential, based on the rainfall patterns and soil quality. As we will discuss later, chronic malnutrition rates are high in those two provinces, despite the agronomic potential. Chronic malnutrition figures come from national surveys on nutrition. One explanation for not having sufficient food resources from own production is that households may be selling a high proportion of their harvest right after harvesting due to poverty levels and the immediate need to have cash. This period (harvesting) is when prices are usually the lowest, but households are tempted to sell to make up for lower incomes from nonfarm incomes (see Table 13 above, for Nampula). This is in line with previous studies (Handa and Mlay, 2007).

Figure 3 HH had insufficient food resources from own production during the last 12 months (%)

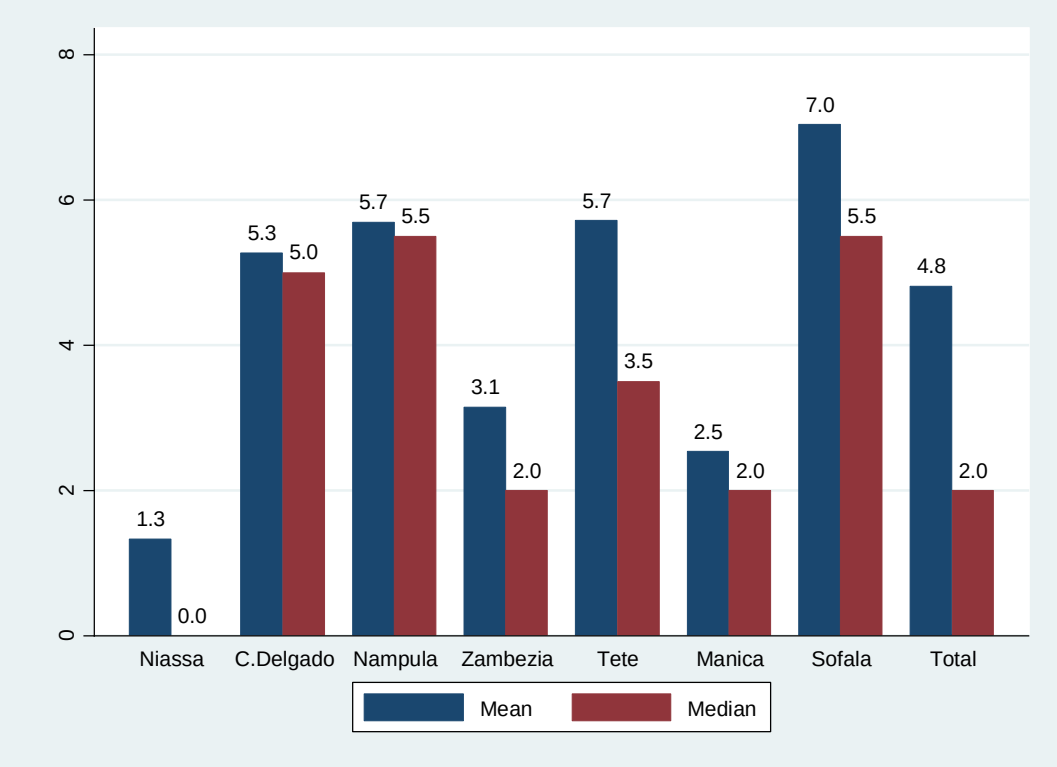


Additionally, participants of the FGD considered the lack of rain, plagues and to some extent the lack of inputs, as the main drivers of food insecurity.

One of the coping strategies used by smallholder farmers when they face food shortage is to rely on food aid when it is available. On average, smallholder farmers who faced food shortage relied on food aid for less than five weeks during the last 12 months. Niassa and Manica provinces were less dependent on food aid (Figure 4 below). Another coping strategy to mitigate food insecurity, according to the FGD, is to get involved in income generating activities. This is the most mentioned strategy to overcome hard periods of food shortage. Selling charcoal, traditional beverages, engage in *ganho-ganho* (external labour used for various activities such as land preparation,

weeding, ploughing, and others), engage in *biscatos* (specific unskilled paid activities) are the most common practiced income generating activities which enable households to buy available food and differentiate their diet. Another coping strategy is to seek the help of parents, neighbours or friends who live in better socio-economic conditions, and may be willing to share some food.

Figure 4 Number of weeks the HH primarily relied on Food Aid



Depending on the period of the year, households will purchase more (or less) food based on availability from their own harvest. Handa and Mlay (2007) argue that the lean season in Mozambique is usually between September and February when food reserves from the previous season begin to scarce and the crops from the current season are still in the field. The results from the baseline survey also show that the lean season is between October and December, and January to March, which are the two quarters when there is a higher proportion of households purchasing selected food commodities. The data gathered in the FGD is in line with this, showing that food security is largely dependent on the household farming production, regardless the province. Households who are less exposed to food insecurity are the ones that can diversify crop production, and have more plots employed for food production. Families are more food secure during the harvesting, storage, consumption and food sale period of the farming cycle (from May to September), and are more vulnerable to food insecurity during the land preparation and sowing, when no food is available from their own harvest.

This is true for maize, but not for cassava. Cassava is less traded in rural Mozambique, except in a few districts in Nampula and Zambézia province where farmers have access to the beer brewing industry. Unless someone purchases soybeans from neighbours to assembly a larger quantity to resell, households usually do not purchase soybeans because almost all of it goes to the animal feed industry.

Table 17 Percentage of households who purchased selected food commodities

Commodity	Quarter	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Rice	Oct - Dec 2015	11.2	15.4	22.8	20.3	30.9	74.2	40.8	28.4
	Jan - Mar 2016	4.0	14.9	12.3	10.7	12.8	36.7	28.3	15.6
	Apr - Jun 2016	9.4	12.6	12.4	7.8	6.7	41.3	18.5	13.9
	Jul - Sep 2016	5.9	15.2	11.9	8.7	11.2	50.1	32.0	16.7
Maize flour	Oct - Dec 2015	0.2	5.2	18.8	18.5	0.0	1.4	21.7	10.7
	Jan - Mar 2016	0.0	4.8	15.2	10.1	0.3	2.0	12.6	7.6
	Apr - Jun 2016	0.0	3.6	7.9	8.1	0.0	2.9	10.5	5.1
	Jul - Sep 2016	0.2	3.1	7.3	7.3	0.3	6.1	23.2	5.9
Cassava	Oct - Dec 2015	0.0	0.1	0.6	1.9	0.1	5.6	16.6	2.2
	Jan - Mar 2016	0.0	0.0	2.3	1.7	0.1	2.0	8.4	1.7
	Apr - Jun 2016	0.0	0.0	0.9	1.1	0.1	2.8	7.2	1.2
	Jul - Sep 2016	0.0	0.0	0.3	1.3	0.0	2.3	9.0	1.2
Maize in grain	Oct - Dec 2015	11.7	6.6	22.5	30.9	12.6	25.1	53.1	21.7
	Jan - Mar 2016	3.5	2.2	17.7	18.9	10.3	21.4	34.1	14.9
	Apr - Jun 2016	4.1	1.5	8.3	15.4	2.3	19.2	30.2	10.1
	Jul - Sep 2016	6.5	4.0	7.1	14.8	6.6	46.6	40.8	14.5
Maize sifted	Oct - Dec 2015	0.7	0.8	13.9	13.5	2.3	1.6	3.5	7.1
	Jan - Mar 2016	1.0	0.1	9.1	6.2	0.9	0.7	2.1	3.9
	Apr - Jun 2016	0.4	0.0	6.1	6.2	0.5	1.6	1.8	3.1
	Jul - Sep 2016	0.0	0.5	4.4	6.0	1.6	1.1	4.4	3.0
Soybeans	Oct - Dec 2015	0.0	0.5	2.6	1.6	2.0	0.6	1.1	1.5
	Jan - Mar 2016	0.0	0.4	1.5	0.3	0.0	0.4	0.0	0.5
	Apr - Jun 2016	0.0	0.0	0.3	0.6	1.0	0.7	0.5	0.5
	Jul - Sep 2016	0.0	0.0	0.9	0.9	2.0	0.0	1.9	0.8

The baseline survey also collected data on household hunger scale (Table 18 below). Nampula and Zambézia stand out again, with a higher proportion of households who often had to go for a whole day and night completely without food due to lack of resources to get food.

Table 18 Household hunger scale (col %)

Coping strategy	Frequency	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Had to go for a whole day and night completely without food due to lack of resources to get food	Never	62.7	74.4	38.0	28.5	85.9	57.3	42.8	53.4
	Rarely	33.5	23.3	31.3	32.1	11.2	22.6	31.8	26.2
	Sometimes	3.1	2.3	24.8	33.1	2.6	18.6	23.7	17.3
	Often	0.7	0.0	5.9	6.4	0.3	1.5	1.6	3.1
Had to sleep at night hungry because there was not enough food	Never	59.6	70.8	27.5	24.6	68.5	55.6	35.3	45.8
	Rarely	30.8	26.5	36.5	33.5	23.4	21.9	32.0	30.0
	Sometimes	9.7	2.0	30.2	32.4	8.1	20.3	28.8	20.2
	Often	0.0	0.8	5.9	9.5	0.0	2.2	3.9	4.0
Had to go a whole day and night without eating anything at all because there was not enough food	Never	63.8	73.1	36.9	27.1	84.5	58.6	37.3	52.3
	Rarely	27.2	25.0	33.4	32.5	12.9	21.9	29.3	26.7
	Sometimes	7.4	2.0	23.0	33.0	2.6	15.1	30.1	17.1
	Often	1.7	0.0	6.8	7.4	0.0	4.5	3.2	4.0
Had to limit the frequency of meals because of lack of resources	Never	60.3	59.4	19.8	17.8	74.7	36.9	33.6	39.8
	Rarely	29.8	32.1	36.3	34.2	19.3	20.1	32.7	30.0
	Sometimes	7.2	7.4	26.9	37.3	5.4	27.3	26.6	21.3
	Often	2.7	1.2	17.0	10.8	0.7	15.7	7.1	8.9
Had to eat a smaller meal than you felt you needed because of lack of resources/food	Never	61.2	61.5	21.6	16.7	75.4	32.7	32.9	40.0
	Rarely	27.5	30.0	36.0	30.6	18.5	18.3	32.6	28.4
	Sometimes	9.4	8.1	25.6	40.5	5.4	29.9	28.6	22.3
	Often	1.9	0.4	16.8	12.2	0.7	19.1	5.9	9.3
Had to eat food that you did not like to eat because of a lack of resources to obtain other types of food	Never	64.9	58.6	23.1	17.7	80.9	31.0	33.7	41.1
	Rarely	27.5	29.8	29.2	27.7	11.7	15.9	28.6	24.6
	Sometimes	5.0	11.1	28.7	43.4	6.7	31.7	28.3	24.2
	Often	2.5	0.6	19.1	11.2	0.7	21.4	9.4	10.2
Had to limit the variety of foods you ate because of lack of resources	Never	61.0	58.6	20.9	13.7	70.6	30.9	34.3	37.9
	Rarely	27.4	29.7	32.8	31.7	20.7	14.3	30.1	27.6
	Sometimes	9.9	10.0	26.9	38.1	7.6	30.8	29.4	22.9
	Often	1.7	1.7	19.4	16.5	1.1	24.0	6.2	11.6

5.3 Access to Credit and Savings

The results from the baseline survey show that only 2.8% of households have tried to get credit in the last 12 months. There were only 67 observations of households trying to access credit, out of a total of 2,174 surveyed households, i.e. less than 3% of the survey sample, which is in line with the Ministry of Agriculture's statistical yearbook. Attempts to obtain credit were relatively more frequent in Tete, where agricultural production is usually characterized by cultivation of cash crops such as tobacco and soybeans. Niassa and Manica also grow tobacco,

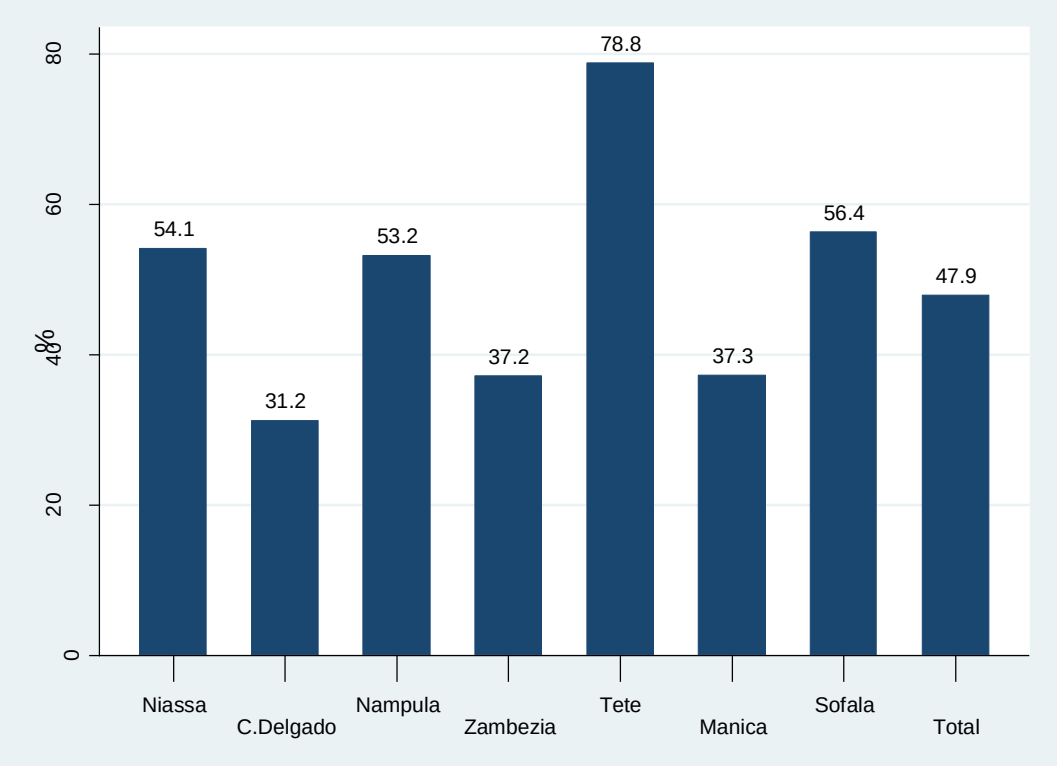
but the tradition of use of improved seeds and chemical fertilizers is longer in Tete, as we will discuss later. Commercial farming is more common in Tete than in the remaining provinces. High interest rates and lower profitability were the main reasons for not trying to get credit among rural households (Table 19 below).

Table 19 Percentage of households who tried to obtain credit, and reasons for not trying

Province	% HH who tried to get credit last 12 months	Why didn't the household try to get credit (row %)								
		HH does not need a loan	The interest rate is too high	Farming doesn't give me enough to repay the debt	I don't want to put my land at risk as collateral	I don't want to worry/ I am afraid to obtain credit	Lenders are too strict	The place where I could obtain credit is too far	There is too much paper work to obtain a loan	The costs of applying are too high
Niassa	2.9	37.5	6.2	10.0	0.6	3.3	11.4	2.5	23.0	5.4
C.Delgado	1.6	20.3	19.6	22.9	3.7	25.3	2.3	2.4	1.5	2.1
Nampula	2.3	9.0	28.2	37.6	2.1	11.8	0.6	8.0	1.5	1.2
Zambezia	1.2	10.5	20.9	20.5	6.0	19.9	4.0	6.7	8.2	3.4
Tete	7.0	27.9	7.9	26.0	8.7	12.0	0.7	14.3	1.5	1.1
Manica	2.0	5.8	14.1	17.5	12.8	35.5	5.0	2.2	6.3	0.8
Sofala	2.3	21.0	17.7	13.8	18.1	17.5	4.4	3.3	3.1	1.2
Total	2.8	16.4	18.5	24.4	6.3	18.0	3.0	6.5	5.0	2.0

Only 3% of the households said they did not try to obtain credit because lenders are too strict (Table 19 above). However, about half of the households would have applied had they been certain that their application would be approved (Figure 5 below). In Tete almost nobody said that lenders are too strict and this is why they did not attempt to get credit, but almost 79% of the households in Tete said that they would have applied if they were certain about the approval of their application.

Figure 5 HH who would apply for credit if they were certain their application would be approved (%)



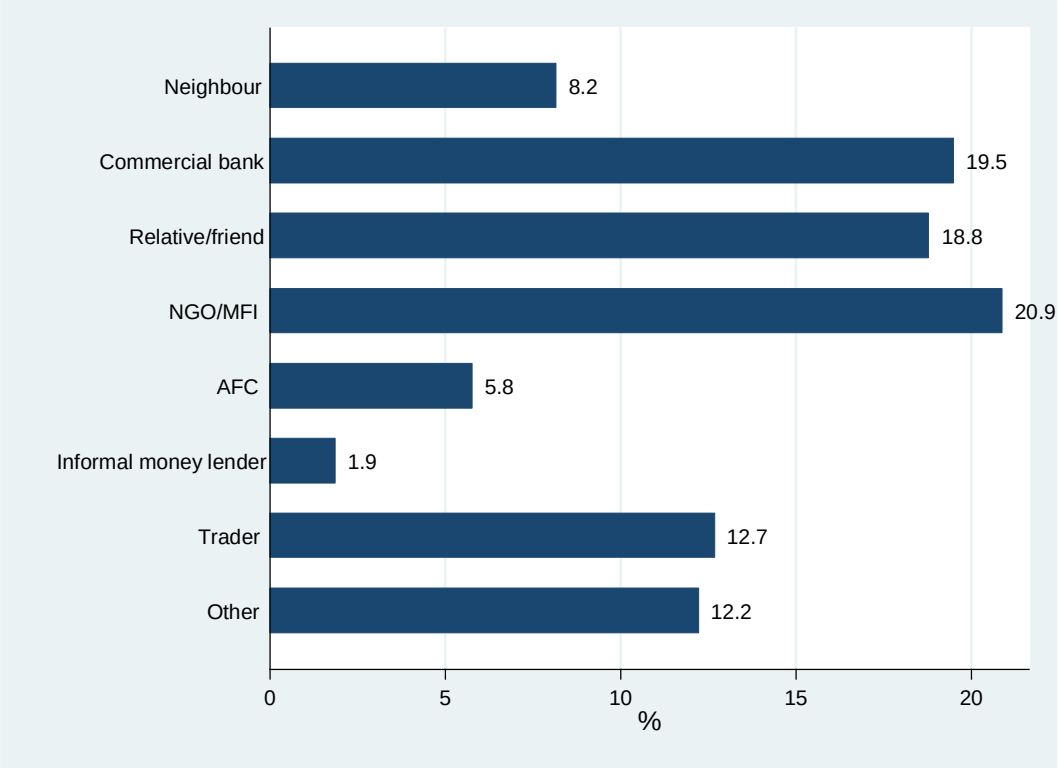
Even if they were certain they would get the credit, the other half of the households who would not apply said that the main reason for not applying is that they do not want to worry or they are afraid to obtain credit (Table 20 below). High interest rates is another major impediment for seeking credit. The commercial banks charge an interest rate of around 30%.

Table 20 Reasons for not applying for credit even if they were certain their application would be approved (%)

Province	Household does not need a loan	The interest rate is too high	Farming doesn't give me enough to repay the debt	I don't want to put my land at risk as collateral	I don't want to worry/ I am afraid to obtain credit	Lenders are too strict	The place where I could obtain credit is too far	There is too much paper work to obtain a loan	The costs of applying are too high
Niassa	60.3	10.1	10.1	2.2	11.9	0.0	0.0	3.4	1.9
C.Delgado	6.6	30.9	18.7	4.7	35.4	0.2	1.7	0.6	1.3
Nampula	7.7	26.6	25.5	7.1	23.4	3.1	3.9	0.7	2.0
Zambezia	6.3	28.1	20.6	7.6	16.8	5.0	3.9	3.4	8.4
Tete	18.1	12.2	11.6	10.4	46.0	0.0	0.0	1.7	0.0
Manica	4.9	15.0	16.1	11.4	45.0	3.3	2.4	1.2	0.7
Sofala	7.4	34.2	15.7	17.2	13.1	7.6	0.0	0.6	4.1
Total	10.5	24.9	19.2	7.8	27.2	2.9	2.5	1.6	3.3

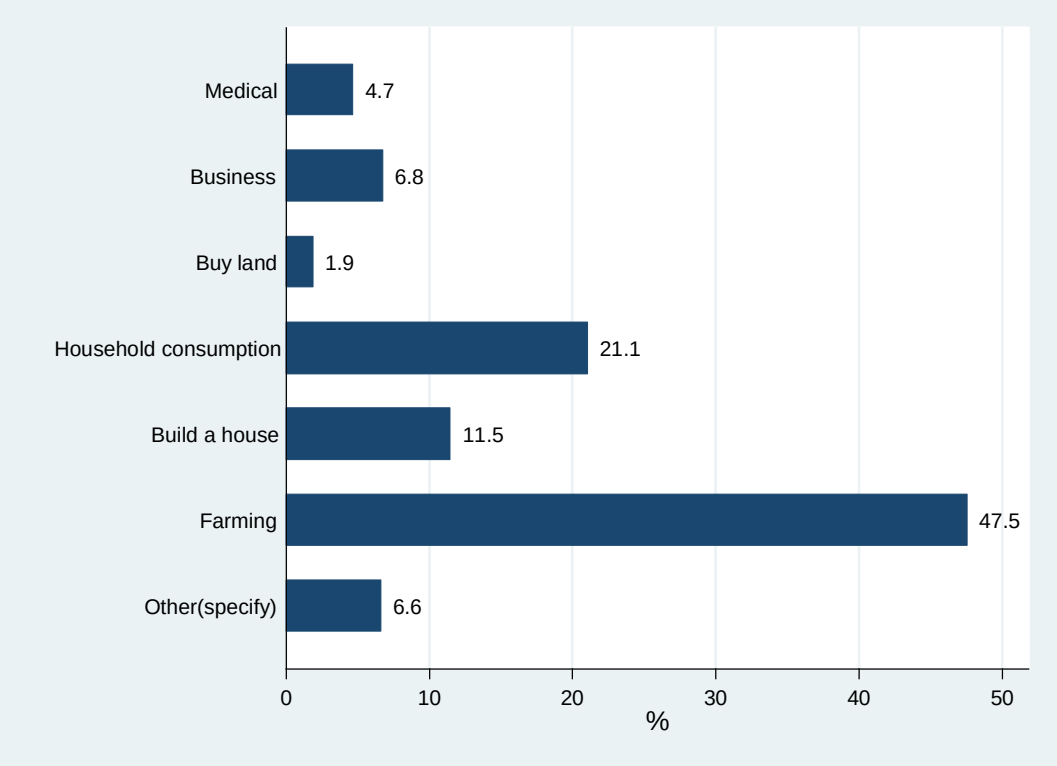
Since there were only 67 surveyed households that tried to obtain credit, Figure 6 below does not disaggregate the analysis by province. NGOs are the main source of credit, followed by commercial banks and relatives or friends. Traders and other sources were also important, and here other sources refers to companies promoting contract farming (Mozambique Leaf Tobacco). The amount of credit applied for is quite variable, with a mean value of around 37,000 Meticais and a median of 10,000 Meticais.

Figure 6 Source of credit (%)



The intended purpose of the credit is usually farming (47.5%) (Figure 7), since the survey was conducted in rural areas where agriculture is by far the main economic activity. It is surprising to see that some households borrow money for household consumption, but these are usually smaller amounts borrowed to neighbours, friends and relatives. Although in a small proportion, it is also surprising that some households have borrowed money to buy land. Officially, the land belongs to the State and it is not for sale, but can be trespassed from one household to the other. But in practice, especially in urban and peri-urban areas, people buy and sell their land.

Figure 7 Intended purpose of the credit (%)



Now turning to savings, only 11.6% of rural households own a bank account (Table 21 below). The most common reason for not having a bank account is lack of money to save. Of note is that Mozambique suffered from severe inflation of its currency in the last two years or see, and the cost of living as increased quite dramatically. This is reflected in its official poverty rates which show little progress since 2003. The second reason for not having a bank account is that commercial banks are usually located in the city and peri-urban areas, and rural residents have to travel far to access them.

Table 21 Percentage of households who have a bank account and reasons for not having one

Province	% HH who have a bank account	Reasons for not having a bank account (row %)							
		No money to save	Have to travel far to access account	No need	Ignorance	Planting to open at a later time	Had account but closed it	Saves elsewhere (eg. mobile money, group)	Other
Niassa	12.8	92.2	2.5	1.1	0.6	2.6	0.0	0.0	1.0
C.Delgado	5.9	88.3	5.3	1.8	2.0	0.8	0.0	1.8	0.0
Nampula	5.8	77.7	13.6	1.6	4.0	1.3	0.0	0.9	1.0
Zambezia	8.3	77.5	9.6	1.2	2.6	7.3	1.2	0.0	0.6
Tete	11.7	74.7	16.4	4.5	1.1	2.0	1.2	0.0	0.0
Manica	26.2	77.5	7.9	2.3	0.8	6.2	2.5	0.8	2.1
Sofala	31.7	80.0	12.0	2.6	2.6	1.4	1.4	0.0	0.0
Total	11.6	80.0	10.5	2.1	2.3	3.1	0.8	0.6	0.6

Among those who own a bank account, they still use the traditional method of having their savings in a commercial bank (Table 22 below). Mobile money, with the exception of Zambézia province, and to some extent Nampula and Manica, is not widespread. One reason is that both Mcel and Vodacom (the two mobile companies with more experience in mobile money in the country) do not have a good network coverage in rural areas. Movitel, in turn, has a good network coverage in rural areas but only recently introduced mobile money technology.

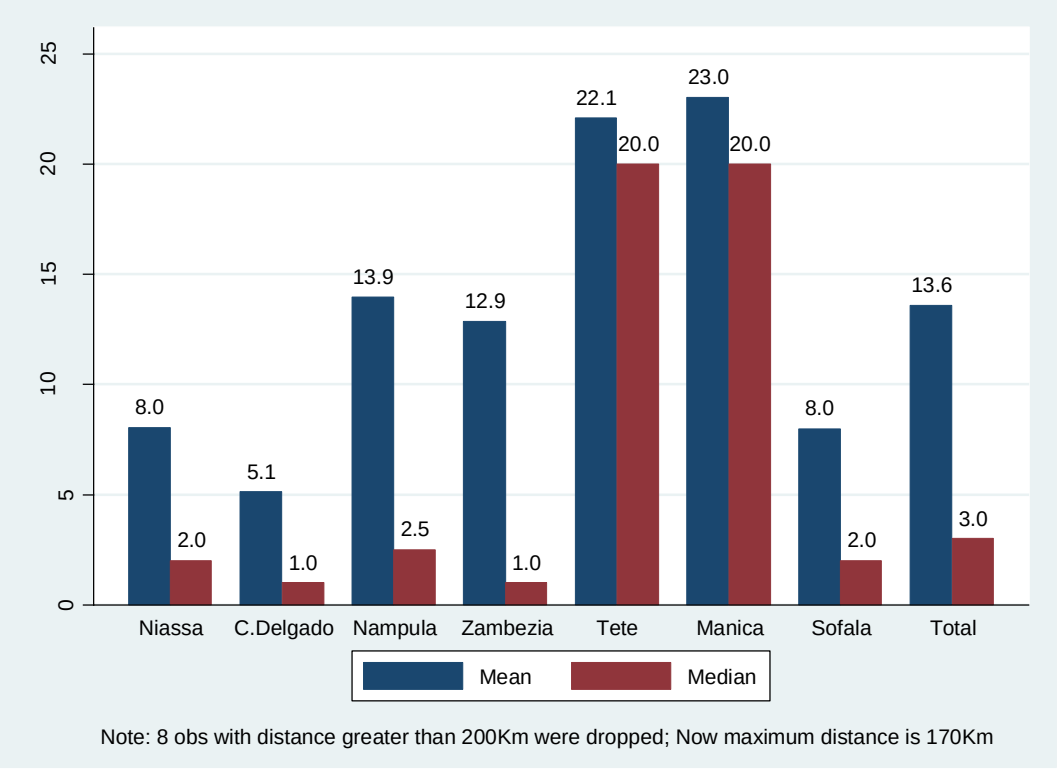
Some NGOs and international research institutions like IFPRI have tried to promote the use of mobile money as a saving mechanism to smallholder farmers. IFPRI was promoting the use of mobile money saving in Nampula province, whereby farmers where encouraged to open an account, and would instantly receive 50 Meticais in their account. If they purchased inputs using mobile money they would receive a subsidy, and those who saved mobile money by the end of the season they would receive a bonus which was some proportion of the saved money. In rural Mozambique the *Banco Oportunidades* has a mobile banking unit, but its coverage is likely to be small.

Table 22 Where is the bank account held (%)

Province	Commercial bank	SACCO	Groups (ROSCAs)	Village bank/ rural bank	Phone bank	Total
Niassa	98.8	1.2	0.0	0.0	0.0	100.0
C.Delgado	100.0	0.0	0.0	0.0	0.0	100.0
Nampula	82.0	0.0	0.0	13.5	4.5	100.0
Zambezia	84.3	3.1	1.7	0.0	10.9	100.0
Tete	97.6	0.6	0.0	1.8	0.0	100.0
Manica	87.5	5.1	2.2	1.1	4.0	100.0
Sofala	100.0	0.0	0.0	0.0	0.0	100.0
Total	91.8	2.0	0.8	2.1	3.2	100.0

In Table 21 above the distance to the nearest bank was mentioned as one of the impediments to open a bank account. Figure 8 shows that the average distance to a commercial bank is about 14 kms (median = 3 kms). It is in Manica and Tete provinces where the nearest bank points are located quite far from the household.

Figure 8 Distance to the nearest banking point



5.4 Households Assets

Household access to electricity in Mozambique is still limited. On average, about 27% of rural households had access to it (Figure 9). Electricity in rural areas tends to be of low quality, with frequent power cuts. This limits the development of the agro-processing industry, which would otherwise enable productivity growth in agriculture. Tete is located in a high altitude area with relatively good rainfall, and is a major producer of maize and soybeans. The animal feed industry would prosper in Tete, but only 12% of rural household had access to electricity, less than half of the average for the central and northern provinces.

Figure 9 Percentage of households with access to electricity

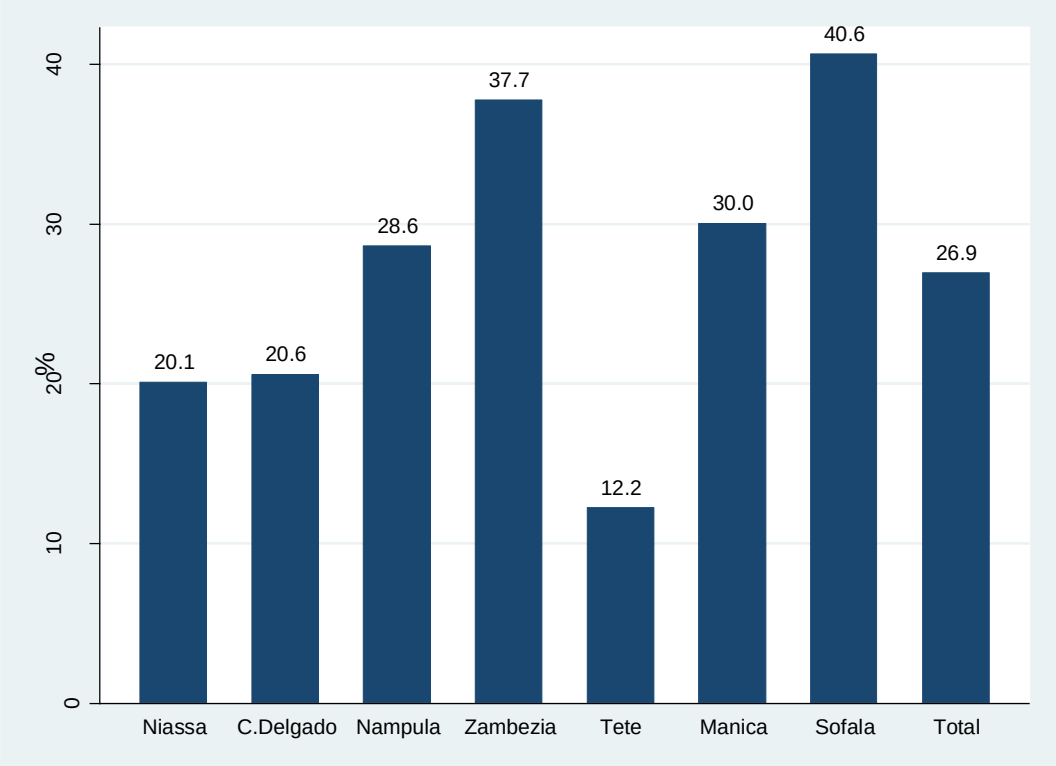


Table 23 shows asset ownership by province. Bicycle ownership is very common in almost all seven provinces included in the baseline survey. Pestle and mortar are still very common in rural areas, except in Manica, which is correlated with low development of the milling industry as a result of low access to electricity. Ownership of agricultural mechanization equipment (including irrigation) is still at its infancy as subsistence rainfed agriculture with limited external inputs still predominates.

Table 23 Percentage of HH who own selected assets

Asset ownership	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Animal traction plough	0.0	0.0	0.6	4.8	0.3	12.9	1.6	2.7
Battery	2.5	6.4	5.4	11.3	11.2	7.1	14.8	8.3
Beehive	0.0	0.0	0.6	2.8	0.3	1.1	0.4	0.9
Bicycle	51.3	38.5	28.4	40.9	42.3	43.9	47.9	39.2
Boom sprayer	0.8	0.1	0.6	2.5	0.0	0.7	0.0	0.8
Borehole	0.2	0.0	0.0	2.7	0.0	0.4	1.7	0.7
Car	0.0	1.1	0.6	2.7	0.7	1.8	0.9	1.2
Cart	0.0	0.0	0.0	2.2	3.6	8.0	0.8	2.0
Chaff cutter	0.0	0.0	0.0	1.9	0.3	0.0	0.0	0.4
Computer	1.1	0.5	0.0	2.9	0.7	0.7	0.0	0.9
Oil press	0.0	0.0	0.3	1.9	0.0	0.0	0.8	0.5
Donkey	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.4
Fridge	3.9	1.4	2.0	5.4	0.2	6.6	2.4	3.0
Gas cylinder	0.2	0.2	0.0	2.1	0.0	0.7	0.0	0.5
Generator	0.2	0.3	1.2	2.4	0.0	0.0	1.6	0.9

Asset ownership	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Grinder	0.0	0.0	0.3	1.9	0.0	0.0	0.0	0.5
Hummer or posho mill	0.2	0.5	0.0	1.9	0.3	1.1	1.6	0.8
Harrow or tiller	0.2	0.0	0.3	1.9	0.0	0.4	0.4	0.5
Houses residential	7.9	0.4	13.1	33.3	46.2	63.1	2.9	25.1
Irrigation equipment	0.5	0.3	0.3	2.4	0.3	2.2	0.0	0.9
Landline telephone	0.0	1.1	0.3	4.8	0.0	0.0	0.0	1.2
Motorcycle	5.4	6.1	9.1	9.6	10.3	7.2	3.9	8.1
Zero grazing units	0.0	0.0	0.9	1.9	0.0	4.0	0.0	1.0
Oxen	0.0	0.0	2.4	2.4	10.9	21.1	2.8	5.3
Pestle and mortar	51.1	62.5	80.2	83.9	0.5	76.4	84.9	63.3
Mobile phone	30.1	27.1	31.8	32.4	35.7	72.4	65.2	38.2
Piggery houses	1.3	3.6	1.8	5.1	12.2	4.2	4.3	4.8
Planter	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.4
Ploughs for tractor	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.4
Poultry houses	9.4	5.5	2.1	13.2	27.8	20.2	12.1	12.2
Power saw	0.0	0.0	0.0	3.0	0.3	0.0	0.4	0.7
Radio	43.2	38.5	28.0	39.0	42.4	60.7	49.0	40.1
Ridger or weeder	0.0	0.0	1.2	2.8	0.0	4.5	0.0	1.4
Sewing or knitting machine	0.7	0.8	0.9	2.1	0.3	0.4	0.0	0.9
Sheller	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.4
Solar panels	11.6	16.3	13.3	14.9	21.1	30.1	19.5	17.4
Spray pump	0.0	0.4	0.3	2.5	0.0	0.0	0.0	0.7
Tractor	0.0	0.0	0.0	2.1	0.0	0.0	1.2	0.5
Trailer	0.0	0.0	0.0	1.9	0.0	0.4	0.4	0.5
Truck	0.0	0.0	0.3	2.1	0.0	0.0	0.4	0.5
TV	10.5	5.1	7.8	12.9	1.6	21.8	24.3	10.2
Water pan	0.2	0.4	0.3	2.4	0.0	0.0	0.0	0.6
Water pump	0.0	0.0	0.0	2.1	0.0	0.0	1.7	0.5
Water trough	0.0	1.5	0.0	2.2	0.0	0.0	0.0	0.7
Well	2.7	3.6	1.5	5.8	0.8	5.8	4.9	3.3
Wheel barrow	1.9	0.1	0.9	4.8	0.1	3.4	1.5	1.8

5.5 Housing Characteristics

As we move in the direction north-south, the percentage of households with thatched roofs declines: about 86%-87% in Niassa and Cabo Delgado, 82% in Nampula, 75% in Tete, and 45% in Sofala (Table 24). A similar pattern is observed with the floor material: the percentage of cement floors increases from the north moving towards the south.

Table 24 Construction material of the main house (col %)

Province		Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Roofing material of the main house	Grass/ thatch	85.5	86.5	81.8	69.6	74.6	55.3	44.6	73.8
	Iron sheets	14.3	13.3	17.3	30.1	25.5	44.2	54.3	25.7
	Tiles	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.1
	Other	0.2	0.0	0.9	0.0	0.0	0.6	1.1	0.4
Exterior wall material of the main house	Mud	85.8	94.9	90.4	71.2	60.6	55.2	61.8	76.3
	Bricks /stones	7.5	1.5	3.8	22.5	37.7	33.8	18.0	17.2
	Iron sheets	0.4	0.1	0.0	0.0	0.3	0.4	0.0	0.1
	Wood	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
	Plastered	5.0	3.5	4.4	4.5	1.4	8.8	11.5	4.8
	Other	1.4	0.0	1.5	1.8	0.0	1.5	8.7	1.5
Floor material of the main house	Earth	89.5	94.0	88.4	84.5	91.4	66.8	61.7	85.0
	Cement	9.5	6.0	10.5	14.4	8.3	33.3	38.3	14.4
	Wood	0.9	0.0	0.3	0.7	0.3	0.0	0.0	0.3
	Tiles	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
	Other	0.2	0.0	0.9	0.2	0.0	0.0	0.0	0.3

The majority of the houses are owned by the household (Table 25). Unlike in urban areas where many households rent a house, in rural areas less than 1% rented a house, and higher percentage of house rental were found in Sofala and Manica provinces. We showed earlier in Figure 2 that it is in these two provinces where households had the highest wage incomes, relative to the rest of the provinces included in the baseline.

Table 25 Mode of ownership of the main house

Province	Owned	Rented	Owned by a relative	Other	Total
Niassa	97.6	0.5	1.3	0.5	100.0
C.Delgado	97.7	0.5	1.4	0.3	100.0
Nampula	96.8	0.6	0.8	1.8	100.0
Zambezia	97.9	0.8	1.0	0.3	100.0
Tete	99.3	0.1	0.7	0.0	100.0
Manica	97.8	1.5	0.7	0.0	100.0
Sofala	97.4	2.6	0.0	0.0	100.0
Total	97.8	0.8	0.9	0.6	100.0

In terms of sanitation, latrines were more common in Niassa (Table 26). Of note is that JICA implemented a water and sanitation program in Niassa for the last three years, which consisted in opening boreholes and other water points for the communities, building a latrine both in primary schools and in the community for the households to use them. JICA's water and sanitation program in Niassa also promoted hygiene practices. In contrary, in Zambézia province more than half of the rural population still relies on the bush and do not own a toilet.

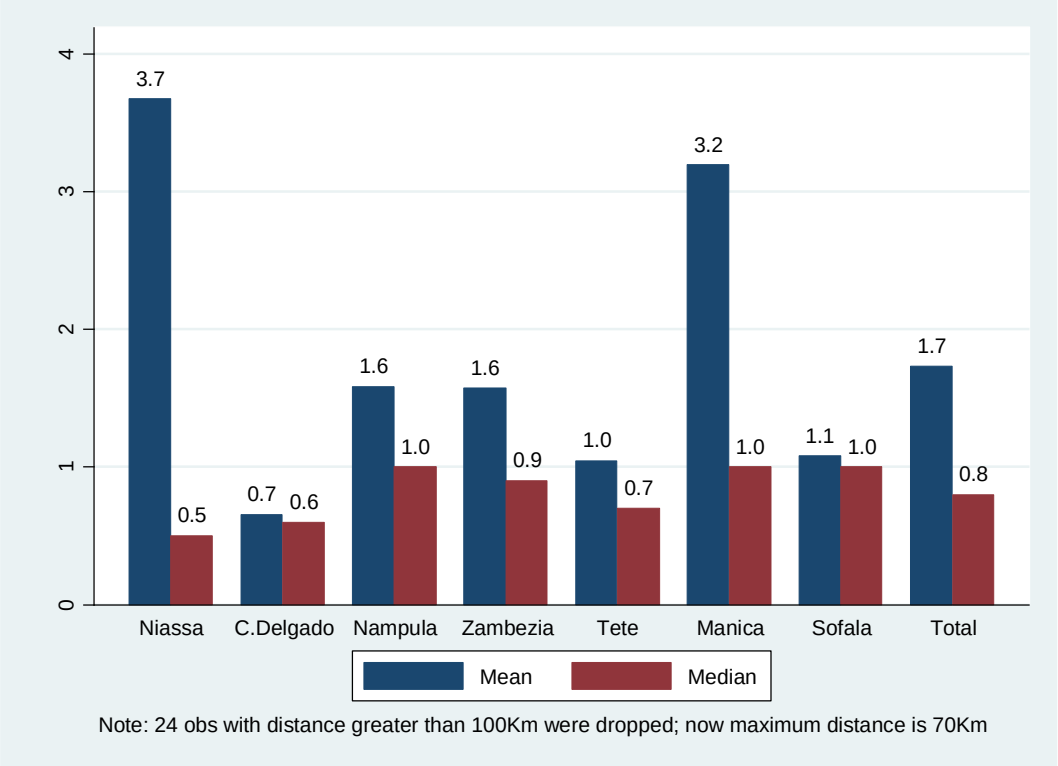
Perhaps linked to the JICA program in Niassa 2013-2016, proportionally we found more households in Niassa that use a borehole as the main source of water than in any other province.

Table 26 Type of toilet and main source of water (col %)

Province		Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Type of toilet	Pit latrine	67.3	39.9	26.2	35.4	23.4	30.5	34.0	33.5
	Bush	9.1	14.5	38.2	54.3	8.4	41.1	40.4	31.6
	Flush toilet	14.7	14.9	6.3	2.5	0.0	1.0	4.0	5.7
	VIP toilet	0.0	0.5	0.3	1.0	0.0	0.7	2.5	0.6
	Other(specify)	8.9	30.1	29.1	6.8	68.2	26.6	19.1	28.7
Main source of water for domestic use during the dry season	Pond	1.5	0.0	2.1	2.4	3.0	0.0	0.3	1.6
	Dam/sand dam	0.0	0.0	0.0	0.9	0.3	1.1	0.7	0.4
	Lake	5.9	0.4	1.2	1.9	1.0	0.4	0.0	1.3
	Stream/river	11.6	8.6	35.6	30.6	11.5	11.0	14.4	20.9
	Unprotected spring	5.1	0.0	2.1	0.3	0.0	0.6	0.8	1.0
	Protected spring	0.0	0.0	0.3	0.1	0.0	9.7	0.0	1.2
	Well	25.7	65.9	32.7	38.2	34.5	30.6	21.4	37.7
	Borehole	45.0	24.0	23.7	20.0	48.7	32.4	54.3	31.4
	Piped into compound	0.2	0.4	0.6	1.7	0.1	2.2	1.8	0.9
	Piped outside compound	2.7	0.6	0.3	2.6	0.6	9.0	5.3	2.3
	Water tankers	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1
	Water hawkers-cart/ b	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
	Other(specify)	2.4	0.1	1.4	0.9	0.3	3.1	0.9	1.2

On average, households travel about 1.7km to the main source of water during the dry season (median = 0.8km). However, it is puzzling that, despite a better access to boreholes in Niassa, households have to travel the largest distance (means) in that provinces to find water during the dry season (Figure 10). Looking at the median distance, Niassa is not that bad, in fact, it has the smallest distance. This suggests the influence of a few observations in the mean calculation, even after dropping 24 observations in total (see the note in Figure 10). The same pattern holds for the average distance to the water source during the wet season (Figure 11).

Figure 10 Distance to the main source of water for domestic use during the dry season

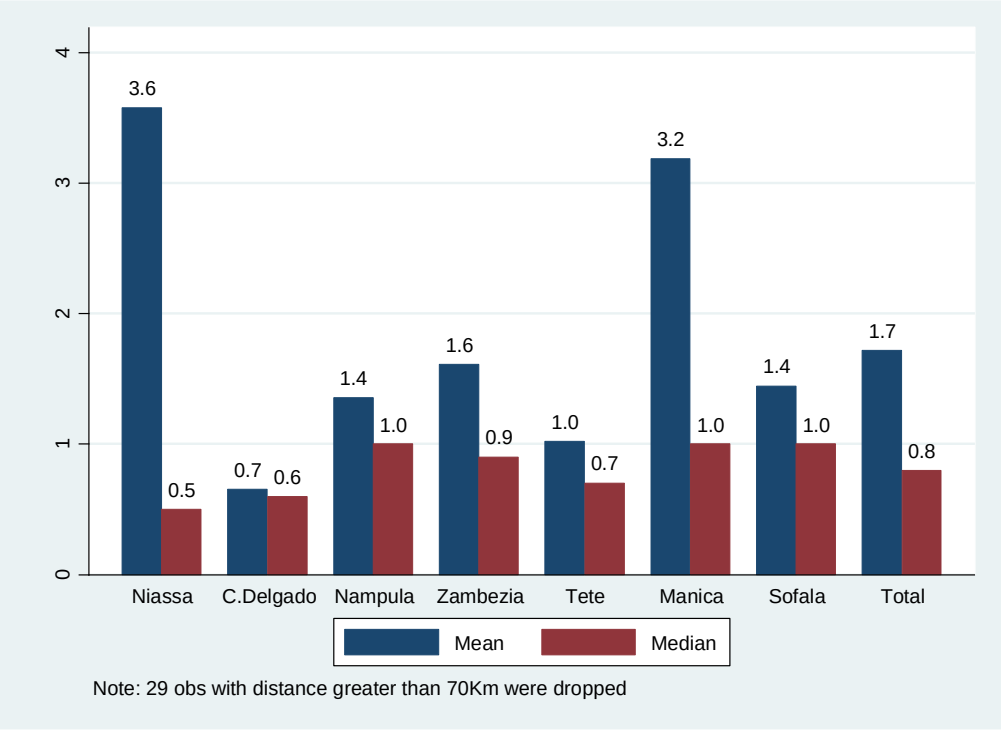


Households can have access to water from multiple sources. Using multiple responses, we normalize the figures presented in Table 27 to make them add to 100% in each province. During the wet season, boreholes and wells are the main water sources in all provinces. Piped water is still uncommon.

Table 27 Main source of water for domestic use during the wet season (col %)

Main source: wet season	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Pond	2.5	0.0	6.0	2.6	3.6	0.4	0.3	2.8
Dam/sand dam	0.0	0.0	0.0	0.6	0.3	1.1	1.0	0.4
Lake	4.5	0.4	2.4	1.8	1.3	0.4	0.0	1.6
Stream/river	10.7	8.1	32.9	30.5	11.5	13.9	12.3	20.3
Unprotected spring	6.3	0.0	3.9	1.6	0.1	0.6	1.1	1.8
Protected spring	0.0	0.0	0.6	0.0	0.0	6.1	0.0	0.8
Well	28.3	67.1	31.0	37.2	32.6	30.1	22.2	37.1
Borehole	42.4	22.4	20.4	20.7	49.6	33.3	54.6	30.6
Piped into compound	0.2	0.2	0.6	2.0	0.1	3.0	2.2	1.1
Piped outside compound	2.3	0.8	0.6	2.4	0.6	8.3	5.3	2.2
Roof catchments	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Water hawkers-cart	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Other(specify)	2.9	0.9	1.7	0.7	0.3	3.1	0.9	1.3

Figure 11 Distance to the main source of water for domestic use during the wet season



As discussed previously, only 12% of the rural population in Tete province had access to electricity, and as expected, about 95% of households in that province rely on firewood as the main cooking fuel (Table 28). The use of piped or liquid propane is still low in all province, but recent discoveries of massive amounts of natural gas in Cabo Delgado will increase its use in the near future when gas explorations begin in Palma district. Electricity is also seldom used for lighting in Tete, compared with the other provinces.

Table 28 Type of cooking fuel and lighting used by the household (col %)

Province/ type of cooking fuel or lighting		Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Cooking fuel	Electricity	0.5	0.4	1.8	3.5	0.0	0.0	0.0	1.2
	Kerosene	0.0	0.4	1.2	1.1	0.0	0.2	0.8	0.7
	Firewood	88.4	90.8	82.0	76.9	94.6	88.1	74.4	84.9
	Piped/ liquid propane	1.8	0.0	3.3	2.0	2.4	0.0	0.0	1.7
	Biogas	2.6	0.0	7.3	7.8	1.7	1.8	16.8	5.1
	Charcoal	6.5	8.1	0.9	7.5	0.7	9.7	7.5	5.1
	Solar power	0.0	0.4	0.0	1.2	0.3	0.0	0.0	0.4
	Other(specify)	0.2	0.0	3.6	0.0	0.3	0.2	0.4	1.0
Type of lighting	Electricity	11.1	6.4	8.0	16.4	1.2	20.4	21.6	10.8
	Pressure lamp	2.5	16.5	5.3	8.6	0.0	0.7	6.4	6.2
	Tin lamp	7.8	16.4	11.8	16.2	1.0	3.7	7.0	10.2
	Fuel wood	22.0	6.0	13.1	15.0	3.6	2.1	2.3	9.6
	Lantern	38.6	19.3	35.5	34.1	50.9	39.0	34.9	35.8
	Solar power	4.2	2.3	5.3	3.9	4.9	3.1	4.3	4.1
	Other (specify)	13.9	33.1	21.0	5.8	38.3	31.1	23.5	23.3

6 Women Empowerment in Agriculture Index

The present chapter aims to analyse the women empowerment in agriculture through of the WEAI index, framed within the kinship ties of the studied area. The chapter also presents and analyse the women's dietary diversity.

6.1 The WEAI and kinship ties in Central and Northern Mozambique

For the present study, we use a modified version of the WEAI index, the women empowerment in agriculture index. This index has been developed by the Feed the Future.

The computation of the index requires data on five domains of empowerment, and each domain receives a score of 1/5. These domains are the following:

- i) production (input in productive decision receives a score of 1/10; and autonomy in production also receives a score of 1/10). Adding the two sub-domains of the production component results in a total score of 1/5.
- ii) income, which is essentially who has control over the use of income. Since there are no sub-domains under this category, it receives a weight of 1/5.
- iii) resources, with three sub-domains (asset ownership; purchase, sale or transfer of assets; and access to and decisions on credit). Each of the three sub-domains would receive a score of 1/5 divided by three if data on all three sub-domains were collected. Since the data only included one sub-domain (ownership of assets), and not the other three, this receives the weight of 1/5.
- iv) leadership, subdivided into group member and speaking in public, each carrying a weight/score of 1/5 divided by 2; and
- v) time, which include leisure and workload.

The fifth domain (time) was not included in the survey, so we readjust the weights of the four domains in order to add to 1. Each of the four domains included in the computation of the "5 domains of empowerment" thus receives a weight of 1/4, and if there are subdomains, we divide 1/4 by the number of sub-domains.

The results of the WEAI were analysed with the qualitative data, to better understand the subjectivities of empowerment. As already explained in Section 3.3.2, the qualitative data was gathered from selected contexts that considered sociocultural criteria, mostly related to kinship and decision-making power.

Kinship systems in Mozambique are strongly related to agricultural and livestock production. The Zambezi valley divides the country into two main kinship realms: the Southern region, mostly patrilineal, the Northern region, mostly matrilineal, and the Central region, where the valley is

located, presenting a combination of elements of both (2009[4]). Livestock production, practiced by men, gave rise to a patrilineal kinship system in which the man had power over the woman. The low livestock production up North of the Zambezi Valley, due to the endemic tsetse flies, and the predominance of agriculture (a woman's activity) for subsistence, led to the formation of matrilineal kinship ties in Central-Northern Mozambique. Parallel to this, the stronger livestock production in the Southern region, topped with waged labour (migrant male labour to the cities and mines), led to the formation of patrilineal kinship ties in the Southern region.

The development of matrilineal and patrilineal kinship systems was further influenced by historical factors such as the colonial ruling and its forced labour policy, as well as the Muslim religion, Arab culture and trade in the Northern coast of Mozambique. While it is not the intention of the present report to dwell into the complexities of kinship systems in Mozambique, it is important to highlight the impact of kinship in decision making and production at the Mozambican household level.

In a matrilineal household, the offspring belong to the mother's family, kinship and inheritance are transmitted via the mother and wealth, goods and power and inherited through the mother's lineage. Upon marriage, the male spouse moves in to live with his wife's family. The important decisions of this household are made by the wife's uncle. Therefore the male members of a woman's lineage – her father or older brother – are expected to have strong influence over her, her household, assets and children, even after she married.

The Southern region of the country, which is not covered by the present study, is mostly patrilineal. Children belong to their father, and a household's wealth, goods and power are inherited through the father's lineage. Power is passed on from father to son. Upon marriage, the female spouse moves in to live with her husband's family. The important decisions of a household are made by the husband and, overall, his family has a strong influence over the household, its members and assets.

This is not to say that in Mozambique women are void of agency and mere spectators of external decision making in either kinship system. Women actively seek space, voice and power, within the power relations of kinship they are embedded in (CMI, 2010[5]).

6.2 Decision-Making and Empowerment

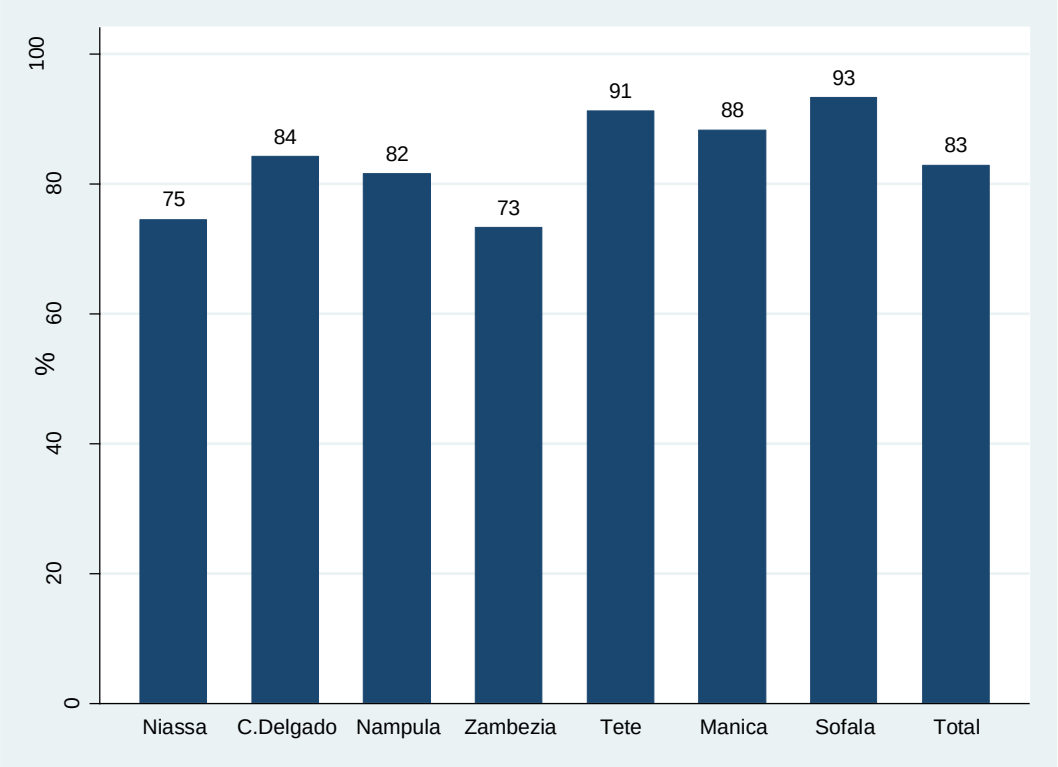
The average score for the four dimensions of empowerment that were computed for the present study is 83% (Figure 12 below). An individual is considered to be empowered if his/her score is above 80%. So on average women in Zambézia and Niassa are less empowered, comparatively

[4] Christian Michelsen Institute (CMI), 2009. *If men and women were equal, we would simply be people: gender and poverty in Northern Mozambique*. Based on a review of key literature on kinship in Mozambique. Report available at: https://issuu.com/cmi-norway/docs/3557-se-homens-e-mulheres-fossem-iguais

[5] CMI (2010). *A woman should not be the boss when a man is presente.* Report available at: https://issuu.com/cmi-norway/docs/3779-a-woman-should-not-be-the-boss-when-a-man-is

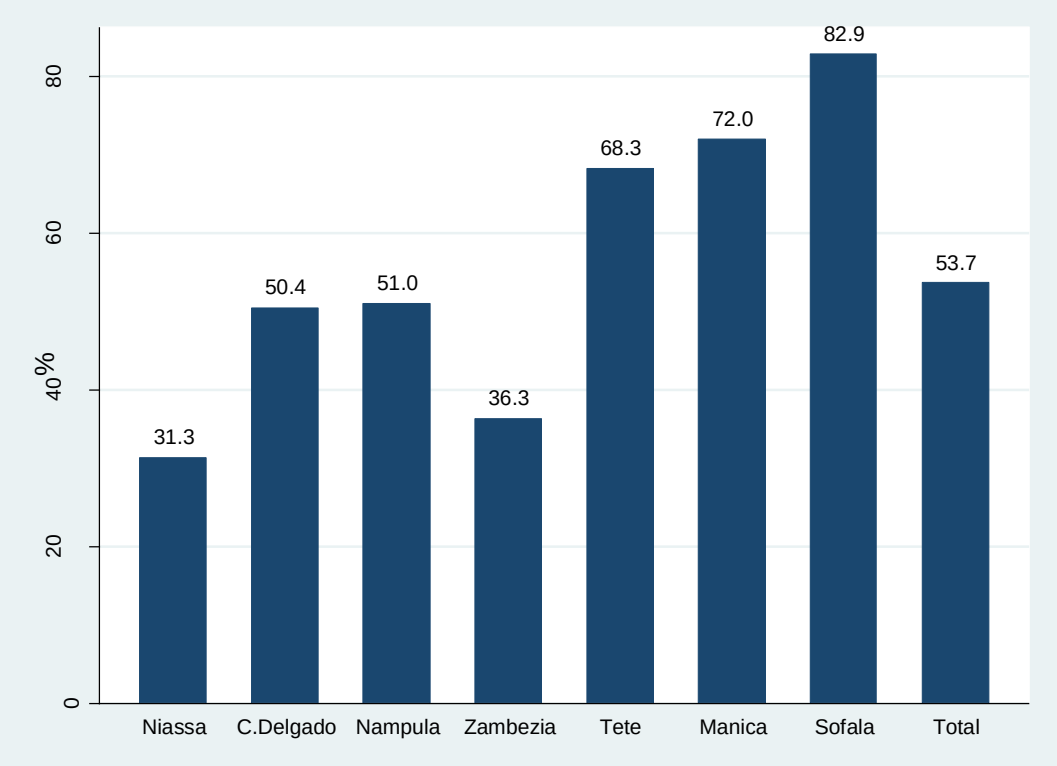
to the women in the other survey provinces. The WEAI score of Zambézia and Niassa provinces is driving the central and northern provinces average down.

Figure 12 Percentage score of the modified dimensions of empowerment



The estimates presented in Figure 12 above are the scores, and not necessarily the percentage of women who are (are not) empowered. In order to obtain this percentage, we compute a new variable for empowerment that takes a value of 1 if the score is equal or greater than 80%, and zero otherwise. As a result, about 54% of women in rural central and northern Mozambique are empowered (Figure 13 below). Empowerment is highest in Sofala, followed by Manica and Tete provinces.

Figure 13 Percentage of empowered women by province



This empowerment seems to be crop and site specific, according to data obtained from the focus group discussions and key informant interviews.

In Sofala, Manica and Tete women are involved with cash crops (rice in Buzi, Sofala, maize in Gondola, Manica and soya in Macanga, Tete). Probably because these crops involve money making, men tend to assume a more authoritarian role in decision making about the crop, its sale and income use: while the man makes decisions alone, women make decisions 'as a couple' or 'with a man', even if widowed[6]. Trying to balance men's decision making power for cash crops, women make a stronger effort to participate in the decision making.

However, in these cash crop contexts, women are also more aware of gender discrimination in decision making, access to land and production. Of all surveyed qualitative contexts, gender discrimination was more sharply expressed by women in Macanga, Tete for soya, in Gondola, Manica for maize and in Nicoadala, Zambézia for rice, who reported that in Nicoadala 'women are forbid to have farming plots' (whereas man can have as many as they can), in Gondola 'women always depend on the husband for decision making' even if they are successful farmers and in Macanga 'women are told to sit and only do house chores'.

Gender discrimination was also expressed by women farmers in Mogovolas, Nampula regarding cassava, a food crop: 'women are seen as having no ideas', 'even when the woman produces a lot there are men who want to control how much she earns, what she does with it and some use the yield and its benefits without consulting the woman's opinion' (women focus group discussion). However, in general cassava farmers - both men and women - who participated in

[6] If a woman is widowed, a man from her family may intervene in decision making, as stated in in Montepuez, Cabo Delgado for maize.

the focus group discussions in both qualitative survey contexts (Lugela, Zambézia and Mogovolas, Nampula) felt that food crops, and cassava in particular, was discriminated in what concerned access to inputs, extension services and financial support, as a "second grade" crop. Gender discrimination seems to be a further discrimination within this broader feeling of marginalisation in farming production, although cassava is a staple food in most surveyed qualitative contexts.

Of the surveyed qualitative contexts, women empowerment in agriculture stands out in Buzi, Sofala for rice and in Gondola, Manica and Montepuez, Cabo Delgado for maize. In these three contexts, focus group discussions revealed that women are involved in all stages of the productive process and in the sales of the production; while in all other survey contexts sales was said to be undisputedly a man's responsibility. In Buzi and Gondola women are heavily involved in rice and maize production because men are absent and women are heads of household: in Buzi men are away working as fishermen or migrant labourers, in Gondola women maize farmers are widowed. Thus, in the absence of men, women have the need and the opportunity to take the lead in decision making and action from farming production to sales, and they embrace it (according to Buzi SDAE, up to 80% of the district's rice farmers are women).

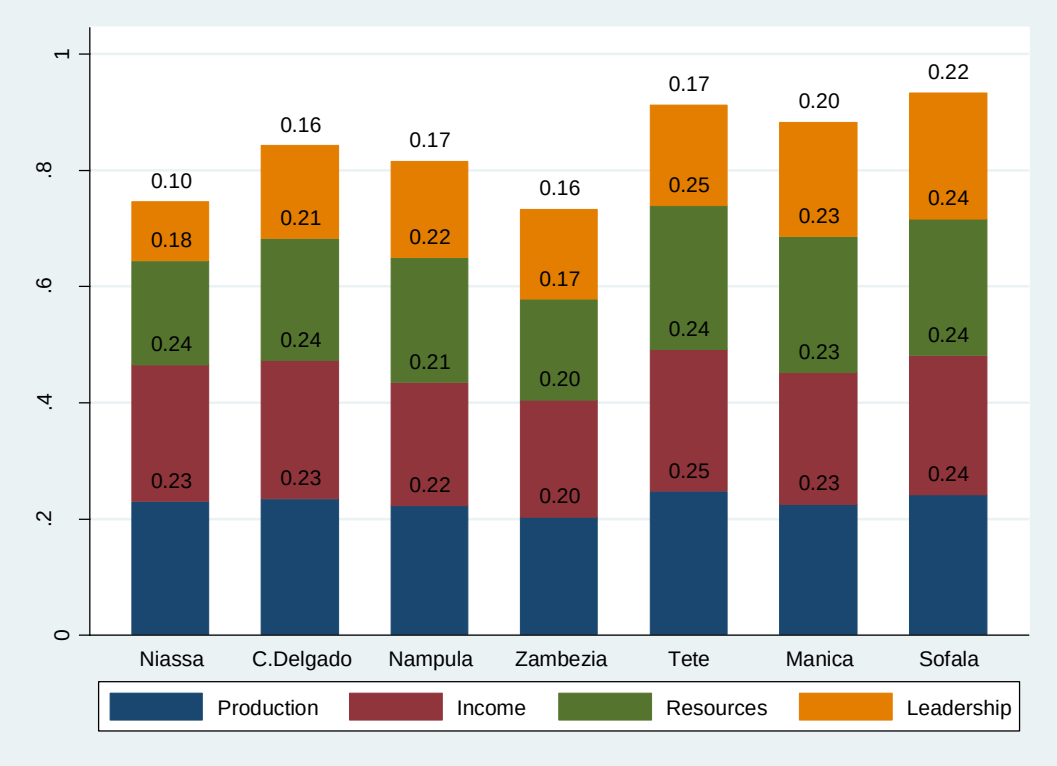
In Montepuez, women maize farmers are also reportedly involved in the production and sales of maize, but not in the absence of the men: they conduct sales, and decision making about production, with the husband or with the men of her family. Matrilineal kinship, which is a strong element of society in Montepuez, was highlighted by SDAE as contributing to women's participation in sales 'always accompanied by a man.

Buzi was the only survey context in which the woman was reported to personally own the land she cultivates in. In all other survey contexts, including other contexts with high levels of empowerment, the land was said to be owned by the husband, his family or the woman's family[7].

Since the survey did not collect data on the fifth domain of empowerment, i.e. time allocated to leisure and workload, each of the four domains included in the analysis has a total score of 0.25. The production domain had the largest score (Figure 14 below), meaning that of the four empowerment domains, women have a stronger role in production. This is not surprising considering that, according to the focus group discussions and key informant interviews, in all survey provinces women, both adult and children (as young as ten years old), work in the household's farming plots for both food and cash crops. However, despite the woman's omnipresent role in production, she seldom makes the key decisions about such production. As the SDAE in Nicoadala put it: the woman manages the farming plot, but it is the husband who gives her the money for that and makes the decisions about the plot.

[7] However, without any formal land title, which is also the case for male farmers. Formal land use titles are practically nonexistent amongst the farmers who participated in the qualitative data collection.

Figure 14 Average score for each of the four domains of empowerment



The leadership domain is weak, especially in Niassa and Zambézia provinces, comparatively to the other survey provinces. This is what contributed to lower overall scores in those two provinces.

The focus group discussions in all qualitative survey contexts identified 'successful' women farmers for all the target crops. These are women farmers with a common profile: comparatively to the other farmers of the target crop in their context, these women cultivate what is locally perceived to be a 'large' plot of land, own farming inputs (and in most cases rent them to other farmers), use modern farming techniques[8], have complementary income sources due to their 'wise' application of the target crop farming income, and are perceived to be better off.

As a result of this, these women stand out in their community. They are involved in social networks who help out others, most commonly a church or household support group and, less common, a farming association. However, despite standing out in their community, they do not assume leadership roles or rise to speak out in the community. The social recognition of their success expands their influence (the gendered role of caring for others) from their household to the broader community, but it does not necessarily give them leadership or voice.

The only qualitative surveyed context in which women farmers are reported to assume some sort of leadership role is Macanga, Tete for soya. In Macanga 'successful' women soya farmers are called upon to solve conflicts at the community level and are invited to meetings with the local government, as well as to represent the community in festivities. This may be specific to soya, a cash crop that can generate visible signs of success (income from sales, increased

[8] Despite this, interviewed SDAE recognize that the use of inputs and modern farming techniques is still low even among successful farmers, both men and women.

cultivated land, improved assets and living standards) in little time comparatively to other crops; thus also opening space for successful women farmers to gain social respect and, with that, leadership roles progressively. Leadership scores are also higher amongst Sofala and Manica provinces, where, as already explained women also assume a stronger role in decision making of rice and maize cash crops.

6.3 Women's Dietary Diversity

Chronic malnutrition levels among Mozambican children are quite high, estimated at 41% for the country and 46% in rural areas. Stunting rates are actually higher in Nampula and Zambézia provinces, which has raised a heated discussion in Mozambique because these two provinces have high production levels. It would be logical to think that more food produced is correlated to lower stunting levels. Nampula and Zambézia together represent almost half of the country's population, and this is why more emphasis is currently being given to these provinces. For example, a recent agricultural development project with a total budget of $40 million was launched this year in 10 districts, five in each of the two provinces (Malema, Ribaue, Mecuburi, Rapale and Murrupula districts in Nampula; and Gilé, Gurué, Alto Molocue, Mocuba and Ile districts in Zambezia province). The development program is called SUSTENTA and is financed by the World Bank. In 2018 the European Union envisages launching a similar program, again focusing in those two provinces.

The results from the baseline survey also support this view that malnutrition is higher in Nampula province. With a women food diversity score of 3.1 (Table 29) Nampula has the lowest score. The foods that were consumed by the households are grouped into 12 food categories, and the score is based on the sum of these 12 groups. A household who has not eating anything in the last 24 hours receives a score of zero. The higher the score the more diversified is the diet. A score of 3.1 in Nampula would be equivalent to eating maize meal and green leaves prepared with water and salt only. As the income or wealth level rises, households tend to diversify their meals by adding cooking oil, meat, fruits, etc.

Table 29 Food diversity score

Province	Mean	Median
Niassa	3.5	4.0
C.Delgado	3.4	3.0
Nampula	3.1	3.0
Zambezia	3.9	4.0
Tete	4.4	5.0
Manica	5.1	6.0
Sofala	3.6	4.0
Total	3.8	4.0

Based on the number of food groups consumed, we classify the diets as bad (if the women only consumed up to four food groups; median (if the women consumed either five or six food groups); and good (if the women consumed seven or more food groups[9]. Table 30 below shows

[9] This diet classification has previously been used in other nutrition studies in Mozambique, conducted by ANSA, the Food security and Nutrition Association.

that in Manica there is a significantly higher proportion of women that are classified as having a good diet than in any other province.

Table 30 Quality of the diet

Province	Bad	Median	Good	Total
Niassa	60.2	31.5	8.3	100.0
C.Delgado	70.4	19.9	9.7	100.0
Nampula	69.8	22.2	8.0	100.0
Zambezia	57.5	25.2	17.3	100.0
Tete	44.6	39.9	15.5	100.0
Manica	31.8	27.9	40.4	100.0
Sofala	59.2	19.8	21.0	100.0
Total	57.8	26.5	15.7	100.0

7 Agriculture Production and Input Access

This chapter presents an assessment of agriculture productions and factors that contribute to the production process.

7.1 Plot Characteristics and Soil Quality

Maize is the main crop cultivated in the central and northern provinces, grown by 68.3% of the population (Table 31). But there is a considerable geographical variation, with cassava being more important in Nampula. There are at least two reasons we find a higher proportion of cassava growers in Nampula: they consume a lot of cassava and they also sell it to the cassava beer factory that is located in Nampula. The beer factory buys the cassava from DADTCO, a Dutch Company that does the initial processing of cassava. DADTCO has a mobile processing unit, and they move from Ribaue to Murrupula, Rapale and other districts within Nampula province.

Table 31 Main crops grown in the plots (%)

Main crops	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Maize	94.0	87.9	54.6	30.9	96.6	98.5	54.9	68.2
Cassava	14.4	24.8	60.2	59.2	5.2	11.2	11.3	33.9
Rice	6.2	4.7	9.4	20.0	0.2	1.1	41.8	11.1
Soybeans	1.8	0.0	0.4	1.0	11.2	1.7	0.0	2.6

Rice is usually grown in sole-cropping. This is why in Niassa, for example, when it is grown it occupies 100% of the plot (Table 32). Late intercropping of rice with other crops when the water in the plot starts to dry is also possible, and this is common in Sofala – a lower proportion of the crop in the field suggests that the crop is intercropped.

Table 32 Proportion of land occupied by the main crops

Main crop	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Maize	78.1	81.7	71.1	87.3	69.6	79.0	64.3	75.0
Cassava	54.7	82.8	78.5	87.0	86.7	42.5	68.7	82.1
Rice	100.0	85.8	77.4	84.4	5.0	75.0	66.6	76.8
Soybeans	65.0		75.0	70.0	52.1	2.7		48.6

The initial plan was to measure about 1,000 plots. Plot measurement is used to determine the accuracy of landholding size self-reporting, but it can also be used to adjust the declared areas. The adjusted landholding size can then be used to estimate crop yields. A total of 985 plots were measured (Table 33), and this corresponds to about 98.5% of what was planned.

Table 33 Total number of plots that were measured

Province	Was this plot measured?				Total number of plots, both measured and unmeasured
	Yes		No		
	N	%	N	%	
Niassa	88	36.7	152	63.3	240
C.Delgado	172	46.7	196	53.3	368

Province	Was this plot measured?				Total number of plots, both measured and unmeasured
	Yes		No		
	N	%	N	%	
Nampula	181	38.9	284	61.1	465
Zambezia	233	45.9	275	54.1	508
Tete	151	32.5	313	67.5	464
Manica	128	32.7	264	67.3	392
Sofala	32	9.7	298	90.3	330
Total	985	35.6	1,782	64.4	2,767

Land is usually inherited or received as a gift (Table 34). This was confirmed by the focus group discussions with both men and women farmers. Sharecropping is still uncommon, and this is usually an indication of land scarcity. In the Gurué area in the upper Zambézia households have expanded their fields and some are now cropping the Liupo river to find more agricultural land in Niassa province. In places like Gurué and maybe in parts of Manica province it would be less uncommon to find sharecropping in comparison to other places.

Table 34 Land acquisition method (%)

How did you obtain this plot?	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Purchased	4.2	14.3	13.0	19.3	2.1	14.9	26.2	13.3
Received as gift or inheritance	33.6	57.5	61.5	54.3	86.2	65.2	42.8	61.4
Rented-in-for fixed payments	0.0	0.1	0.9	0.1	0.5	2.3	11.0	1.6
Sharecropped-in	0.0	0.2	0.2	0.5	0.0	0.4	0.0	0.2
Borrowed-in	1.3	7.4	9.8	4.7	0.3	1.0	0.7	4.5
Just walked in	58.2	20.4	13.6	20.6	9.5	16.1	19.0	18.3
Other specify	2.7	0.0	1.1	0.4	1.4	0.2	0.3	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Land ownership with title is only common in urban areas. In rural areas most people own the land without title (Table 35), a fact that was also confirmed by the focus group discussions with both men and women farmers, as explained in Section 6.1. However, there have been recent efforts to provide farmers with land titles. The recent boom in the exploitation of natural gas in Cabo Delgado has motivated the government and development partners to promote and facilitate land titling among smallholder farmers to ensure that farmers are not displaced of their land. Both Zambézia and Nampula provinces have benefited from projects that promoted land use titles recently, namely the Millennium Challenge Account in Zambézia and more recently the SUSTENTA project (financed by the World Bank and housed at the Ministry of Land, Environment, and Rural Development) in 10 districts of Nampula and Zambézia.

Table 35 Land tenure status of the plot (%)

Land tenure status	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Titled	2.0	14.1	9.3	19.3	3.0	2.6	6.9	9.2
Owned but not titled	96.8	77.7	75.1	70.8	96.3	92.5	77.9	81.9
Leasehold	0.0	0.1	0.9	0.2	0.0	1.0	3.8	0.7
Government land/ forest/road reserves	0.0	0.8	0.4	0.3	0.0	0.0	0.5	0.3
Rented-in	0.2	0.1	0.7	0.0	0.5	1.3	5.3	0.9
Borrowed-in (no cost)	0.8	6.9	9.4	3.5	0.0	1.0	1.2	4.1
Just walked in	0.0	0.0	0.2	1.9	0.0	1.4	0.0	0.6
Other specify	0.2	0.4	4.1	4.0	0.3	0.3	4.5	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Of the few that own a land title, about 41.6% were granted right of occupancy, about 16% have inherited a letter, and 13.8% received a certificate of customary right of occupancy (Table 36).

Table 36 Type of land title for the plot (%)

Type of title	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Granted right of occupancy	45.8	7.8	39.6	55.6	69.7	41.6	29.2	41.6
Certificate of customary right of occupancy	54.2	0.0	28.0	9.2	7.6	41.6	7.3	13.8
Residential license	0.0	0.0	4.5	2.7	0.0	0.0	39.5	4.8
Village/Govt/witness purchased agreement	0.0	2.8	9.3	5.1	0.0	10.4	0.0	5.2
Local court purchase agreement	0.0	23.6	9.3	3.0	7.6	6.3	17.5	9.6
Inheritance letter	0.0	54.8	4.7	12.7	0.0	0.0	0.0	16.0
Village government allocation letter	0.0	11.1	2.3	11.8	0.0	0.0	6.6	7.7
Official correspondence	0.0	0.0	0.0	0.0	15.1	0.0	0.0	0.9
Just walked in	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The farming plots are usually located in the vicinity of the household. Households usually have to travel about 3 km to the plot (median), but this varies by province. The distance to the plot is exceptionally larger in Sofala, relative to the other provinces, both the mean and the median values (Table 37). The market is usually located 7 km from the plot (median value for the central and northern provinces).

Table 37 Distance (Km) from the plot to the HH and market

Province	Distance from the plot to the HH (Km)		Distance from the plot to the market (Km)	
	Mean	Median	Mean	Median
Niassa	7.2	5.0	12.2	10.0
C.Delgado	4.2	2.0	7.6	5.0
Nampula	6.3	2.0	8.8	6.0
Zambezia	6.8	2.0	7.7	3.0
Tete	4.0	3.0	9.5	8.0
Manica	8.4	5.0	13.7	12.0
Sofala	17.3	15.0	14.6	15.0
Total	7.0	3.0	9.8	7.0

The survey also included a self-assessment of soil quality. About 60.3% of households consider their soil to be of good quality, based on their own experience (Table 38). Soil testing is still quite uncommon. Nampula province has a soil lab, and this is supposed to serve all northern provinces.

Table 38 HH Soil quality assessment (%)

		Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Soil type	Sandy	74.2	45.5	50.9	43.9	29.7	36.6	44.0	44.2
	Loamy	7.5	16.0	19.1	25.6	2.1	16.7	11.8	15.3
	Clay	18.3	37.1	29.2	30.0	68.0	46.5	41.5	39.8
	Other	0.0	1.4	0.9	0.5	0.2	0.2	2.7	0.8
Soil quality	Very good	50.4	40.7	23.0	34.8	5.5	31.0	27.7	26.9
	Good	44.9	54.0	57.4	57.8	74.7	60.5	61.9	60.3
	Average	3.4	4.2	17.0	6.2	19.6	8.3	9.7	11.6
	Poor	1.2	1.2	2.2	0.8	0.2	0.3	0.6	1.0
	Very poor	0.2	0.0	0.4	0.4	0.0	0.0	0.0	0.2
How did you know about soil quality	Soil test	2.0	20.3	12.0	5.2	1.1	4.9	4.9	7.7
	Own experience	97.9	79.6	87.2	92.6	98.2	95.1	91.3	91.2
	Other	0.2	0.1	0.9	2.3	0.7	0.0	3.9	1.1
Slope	Flat	71.0	64.5	64.2	44.1	42.4	31.3	85.1	55.0
	Slight slope	23.3	23.5	24.7	38.0	43.6	47.2	12.7	31.9

		Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
	Moderate slope	3.7	10.5	10.9	11.6	13.3	18.9	1.6	11.1
	Steep/hilly	1.1	1.6	0.2	5.1	0.7	2.6	0.0	1.7
	Steep terraced	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	Other	0.9	0.0	0.0	1.2	0.0	0.0	0.6	0.3

Only 1.4% of the plots of the surveyed households were rented (35 plots out of nearly 2,800 plots).

7.2 Farm Labour

On average, a household uses two or three members to grow their crops. This includes youth and children of both genders. Ploughing and planting are the most labour intensive activities. Clearing is also labour intensive but this activity does not take place in every year due to their prevailing agricultural system of slash and burn. Exchange labour is uncommon.

Table 39 Mean of family and non-family agricultural labor by activity

Type of labor	Activity	Chemical application	Harvesting	Clearing	Ploughing	Weeding	Planting	Total
Family labor	# of female members	0.7	1.4	1.1	1.7	1.4	1.6	1.3
	# of male members	0.6	1.4	1.0	1.7	1.3	1.5	1.3
	# of female days	5.1	11.3	12.0	20.8	18.6	10.4	13.0
	# of male days	4.6	9.6	10.8	17.9	16.2	9.0	11.4
Exchange/ communal labor	# of female members	0.3	0.2	0.6	0.4	0.3	0.4	0.4
	# of male members	0.1	0.1	0.2	0.2	0.2	0.2	0.2
	# of female days	0.1	0.6	0.4	0.8	0.7	0.4	0.5
	# of male days	0.2	0.5	0.5	0.9	0.8	0.4	0.5
Hired labor	# of female members	0.0	0.1	0.1	0.2	0.2	0.1	0.1
	# of male members	0.1	0.2	0.2	0.3	0.2	0.2	0.2
	# of female days	0.1	0.4	0.3	0.8	0.8	0.3	0.5
	# of male days	0.1	0.6	0.8	1.3	1.4	0.4	0.8

7.3 Chemical Use

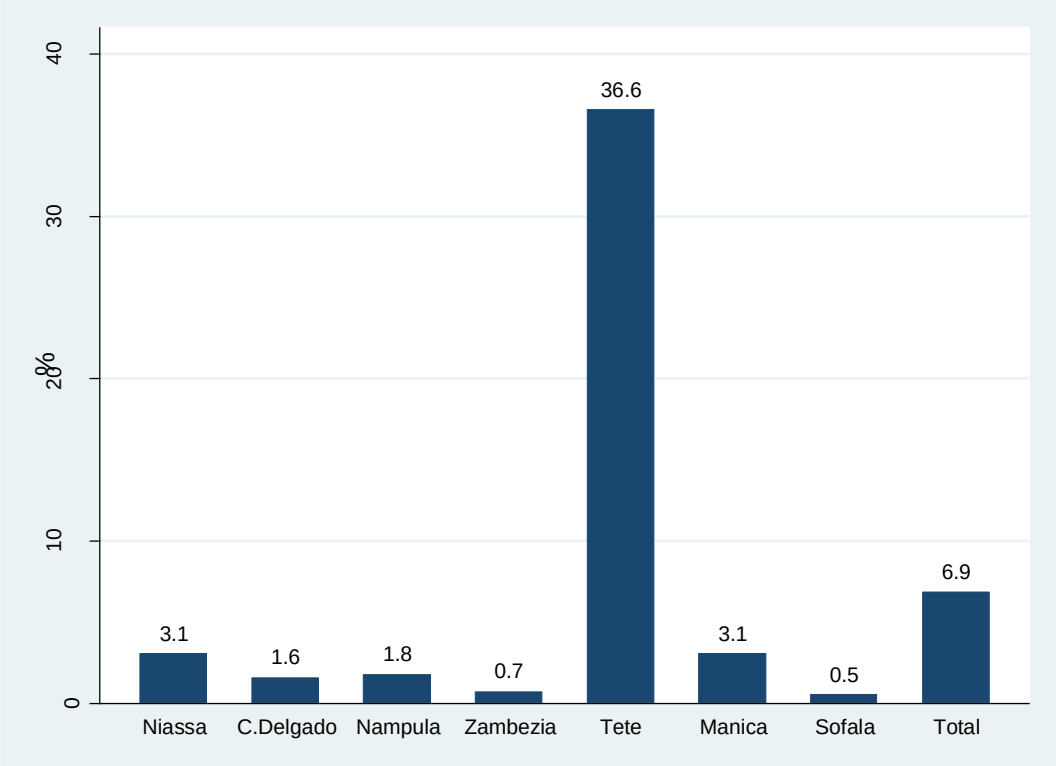
About 90% of the fertilizer used in Mozambique is applied to tobacco and sugarcane (Benson et al., 2012). Other than sugarcane and tobacco, farmers usually apply fertilizers to horticultural crops. Overall, the Ministry of Agriculture estimates that less than 5% of smallholder farmers in the country use inorganic fertilizers. The current baseline survey found that about 6.9% of smallholder farmers in central and northern provinces used fertilizers. Tete is a major tobacco producer in the country, and since most the fertilizer is used in tobacco production, it is no surprise that Tete province stands out in Figure 12. Both Manica and Niassa are also tobacco growing provinces, but since the sample was not designed to specifically capture tobacco production, the use of fertilizers in these two provinces may be underestimated, especially in Manica due to both tobacco production and its proximity and cultural ties to Zimbabwe, a country with a long tradition of fertilizer use. The Tete story can also be linked to relatively cheaper fertilizer prices in the bordering Malawi, and there has been many reports of cross border trade between the two countries.

The low levels of use of chemicals (more commonly fertilizers, less commonly pesticides and herbicides) was confirmed by the SDAE and extension services in selected districts, through key informant interviews. These low levels of use of chemicals in agriculture are related, on the one hand, to the limited accessibility to inputs in general (distant agro-dealers[10], limited supply from extension services, limited diversity of products and high costs for transportation and purchase) and, on the other hand, the resistance to change from traditional farming practices to more modern practices of difficult access. Soya producers in Tete also resort to Malawi for inputs, given that none are available at the district.

Accessibility to inputs in general, and chemicals in particular, was reported to be better in Mogovolas and Lugela districts (Nampula and Zambézia provinces) for cassava, in Gurué (Zambézia province) for soya and in Dondo (Sofala province) and Nicoadala (Zambezia province) for rice. For cassava, this is due to the fact that the production of this particular crop is less demanding in chemicals (more demand of planting material than chemicals) and therefore farmers are better served with the chemicals available. For soya, this is due to the presence of non-governmental organizations and a local cooperative in Gurué, focused on soya, who help the farmers to access chemicals (as well as seeds and mechanization) and other inputs at affordable prices.

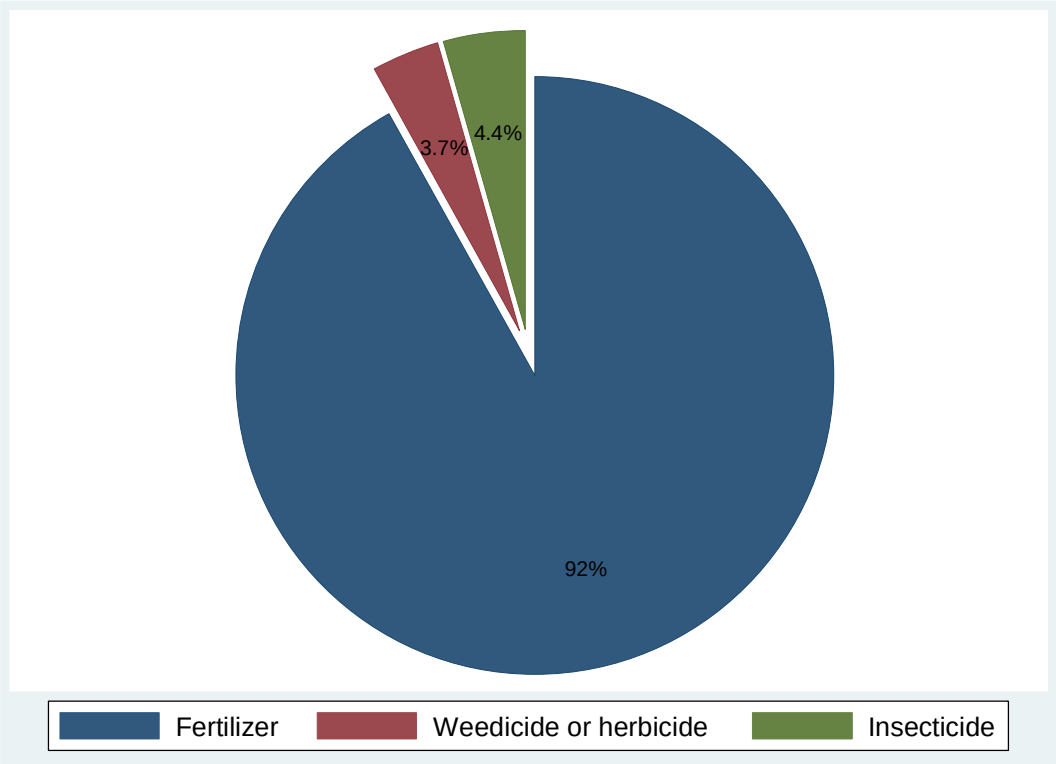
[10] Agro-dealers providing inputs are located far from the farming areas of the survey crops, from as close as 15 km for rice areas to as far as 60-70km for maize and cassava areas. This includes neighboring districts.

Figure 15 Percentage of households that used chemicals



Application of chemical inputs other than fertilizers is even more seldom (Figure 13). The use of herbicides and insecticides is yet to pick up, and this result is in agreement with the Ministry of Agriculture's Statistical Yearbook.

Figure 16 Type of chemical that was used (%)



About 61.7% of households obtain the chemical through purchase from the market, but this varies considerably by province. In Niassa most of the chemical comes from organizations that come to the community while in Sofala a private aggregator was the only source. In Zambézia gifts of chemicals together with agro-input dealers each comprises 36% of the source.

Table 40 How did the HH obtain the chemical (%)

	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Agro-input dealer	0.0	8.8	0.0	36.0	2.3	83.3	0.0	6.2
Purchased from market	0.0	50.0	50.6	28.1	67.3	16.8	0.0	61.7
Exchanged	0.0	0.0	16.9	0.0	0.7	0.0	0.0	1.4
Borrowed (loan)	0.0	0.0	0.0	0.0	18.2	0.0	0.0	15.4
Gift	0.0	8.8	0.0	36.0	0.0	0.0	0.0	0.6
Organization came to community	64.1	32.3	0.0	0.0	9.4	0.0	0.0	10.1
Private aggregator	35.9	0.0	16.9	0.0	1.4	0.0	100.0	3.3
Other	0.0	0.0	15.6	0.0	0.7	0.0	0.0	1.4

Tete and Manica provinces are tobacco producers, and farmers usually receive inputs in outgrowing schemes. In both provinces about 42.3% and 41.6% sold crops or other stored agricultural produce to pay for the chemical, respectively.

Table 41 How did the household pay for the chemical?

	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Funded from regular HH income	17.2	50.0	50.6	0.0	15.7	10.4	0.0	17.7
Sold crops or other stored agric. produce (credit)	0.0	41.2	16.9	36.0	42.3	41.6	0.0	39.8
Used savings	6.4	0.0	0.0	28.1	16.5	48.0	100.0	16.9
Sold livestock	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.6
Sold other property	17.2	0.0	0.0	0.0	0.7	0.0	0.0	1.0
Borrowed from friends	59.2	0.0	16.9	0.0	0.0	0.0	0.0	2.2
Borrowed from a private	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.6
Borrowed from an NGO	0.0	0.0	0.0	0.0	13.1	0.0	0.0	11.1
Gift from an institution	0.0	0.0	0.0	0.0	8.0	0.0	0.0	6.8
Gift from friends or family	0.0	8.8	0.0	36.0	0.0	0.0	0.0	0.6
Other	0.0	0.0	15.6	0.0	2.3	0.0	0.0	2.8

7.4 Awareness of Hybrid/Improved Seed Varieties and Usage

About 80% of farmers retain part of their harvest to use as seeds in the following agricultural season (Table 42). There are proportionally more household purchasing seeds for soybeans than for maize or rice.

Table 42 Source of seeds or planting material during the main agricultural season (%)

Source of seeds/planting material	Maize	Cassava	Rice	Soya bean	Total
Own harvest	80.7	80.0	75.5	63.2	79.7
Agro-input dealer	2.0	2.5	3.9	4.3	2.3
Purchased from market	12.2	5.7	12.2	18.1	10.5
Exchanged	0.5	0.8	0.1	0.0	0.5
Private aggregator	0.7	1.4	1.0	4.2	1.0
Farmer Organization (Cooperative)	0.1	0.0	0.0	1.7	0.1
Ministry of Agriculture	0.2	0.0	0.0	0.0	0.1
Organization that comes to the community	0.1	0.0	0.3	3.3	0.2
Gift	3.3	8.6	5.7	5.3	5.1
Other(specify)	0.3	1.0	1.3	0.0	0.6
Total	100.0	100.0	100.0	100.0	100.0

The predominant use of seed and (cassava) planting material from own harvest was also confirmed by the key-informant interviews and focus group discussions in all survey crops.

The use of hybrid seeds is also low, and the most common seed type is the local variety (Table 43). In Mozambique improved seeds are in short supply because the National Agricultural Research Institute (IIAM) does not have enough basic and pre-basic seeds to provide to the commercial seed companies. Once they receive the basic and pre-basic seeds, IIAM and MASA in general do not have stuff in sufficient numbers to check and certify the quality of the seed. For example, Nampula province has 23 districts, and there are only two people with IIAM/MASA that can certify the quality of the seeds. It is surprising that in Table 41 there is a higher percentage of households using hybrid seeds that OPV. Table 42 reinforces previous results showing that the main source of the crop is owned/ recycled.

Table 43 Source of each type or seed variety by crop (%)

seed type	Maize	Cassava	Rice	Soya bean	Total
purchase new hybrid	9.1	0.0	10.1	13.7	7.2
retained hybrid	24.1	0.0	25.2	37.8	18.9
open pollinated variety	0.0	0.5	0.3	0.0	0.1
local variety	54.3	78.9	57.4	20.1	59.5
local seedlings/cuttings/splits	11.1	18.5	5.1	23.1	12.5
improved seedlings /cuttings /splits	1.2	2.2	0.5	5.3	1.4
hybrid and local variety	0.2	0.0	1.3	0.0	0.3
hybrid purchased + retained	0.1	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0

Table 44 Source of the crop (%)

Source of the crop	Maize	Cassava	Rice	Soya bean	Total
Own/Recycled	77.6	77.3	71.7	69.2	76.8
Other Farmers	7.9	16.0	12.2	10.5	10.6
Stocklist/Agro-dealer	0.8	1.0	1.3	0.0	0.9
Local market/shop	11.3	3.6	12.4	13.9	9.3
NGO	0.4	0.2	0.0	3.5	0.4
Cooperatives	0.0	0.0	0.0	0.0	0.0
CBO	0.1	0.0	0.0	0.0	0.0
Research institute/Un	0.0	0.0	0.0	0.0	0.0
Imported seed	0.0	0.3	0.0	0.0	0.1
Other (specify)	1.9	1.7	2.4	2.9	1.9
Total	100.0	100.0	100.0	100.0	100.0

About 86% of households use local seed varieties, while 8% use improved seeds (Table 45). These results appear to comport well with those reported in MASA's Statistical Yearbook where only 10% of the population use improved maize seeds.

The key-informant interviews and focus group discussions confirm the low levels of use of improved seeds and, even lower, certified seeds (more expensive and less accessible than improved varieties), in all survey crops. Although seed/ planting material is one of the inputs more commonly available at the district level for farmers, seed produced from own harvest is more readily available than improved and certified varieties.

The only contexts in which improved seed was said to be easily accessible and broadly used by farmers were Gondola, Manica province for maize and Buzi, Sofala province as well as Nicoadala, Zambézia province for rice. The use of improved seeds for maize in Gondola is probably linked to the district's proximity to Zimbabwe, a country with a long tradition of use of inputs as already said. In the case of Nicoadala, there is a lot of activities going on in that district: i) there are rice demonstration plots owned by IRRI (International Rice Research Institute), and IIAM (the National Agricultural Research Institute) in partnership with Vietnamese colleagues who are promoting the adoption of improved certified varieties; ii) there is also a Rice Research Centre less than 10km from Nicoadala, and this Centre is also run by IIAM in collaboration with the Vietnamese rice experts; iii) there is a seed multiplication farm with about 60ha of seed rice; iv) there is a rice processing plant, the EOZ (Empresa Orizícola da Zambézia); v) the district recently received tractors from FDA, the Agricultural Development Fund; vi) close to Nicoadala in Namacurra district there is a seed lab focusing on rice seeds, and another rice processing plant.

Table 45 Type or seed variety that was used (%)

Type or seed variety	Maize	Cassava	Rice	Soya bean	Total
Local	87.1	84.1	82.8	85.3	85.8
Improved	9.0	5.1	7.7	13.6	7.9
Other(specify)	0.6	3.1	3.1	0.0	1.6
Doesn't know	3.2	7.7	6.4	1.0	4.7
Total	100.0	100.0	100.0	100.0	100.0

Earlier we showed that less than 3% of smallholder farmers in central and northern Mozambique did not have access to credit. Only 1.4% of farmers obtained their seeds through credit while the majority got them from own production (Table 46). According to key informant interviews, seeds through credit are more common in cash crops such as rice (particularly in Dondo, Sofala) and soya (particularly in Gurué, Zambézia). Although farmers have low purchase power, through credit they are able to pay back with their harvest.

Table 46 How did the household obtain this seed type

How did the HH obtain this seed type	Maize	Cassava	Rice	Soya bean	Total
Own Cash purchase	17.1	11.7	21.2	24.6	16.1
Credit	0.7	2.3	3.2	3.8	1.4
Exchange	0.8	0.3	1.3	0.0	0.7
Free/gift	8.4	24.1	12.0	5.9	13.2
Retained seed	71.6	58.2	59.7	55.8	66.4
Voucher	0.2	0.2	0.0	0.0	0.2
Casual labour	0.2	0.5	0.8	0.0	0.3
Other (specify)	1.0	2.7	1.9	10.0	1.8
Total	100.0	100.0	100.0	100.0	100.0

Looking at the access to seed by crop and province, the results show that in Nampula all soybean growers purchased their seeds (Table 47). This compares to just 16% in Manica. Rice is predominantly grown in Zambézia province, and the results show that 22.2% of farmers purchased rice seeds.

Table 47 Percentage of households who purchased seeds or planting material

Purchase seeds last major season	Maize	Cassava	Rice	Soya bean	Total
Niassa	8.5	0.0	7.4	25.0	7.8
C.Delgado	9.0	1.9	15.7		7.7
Nampula	18.6	12.0	29.2	100.0	16.0
Zambezia	17.6	10.2	22.2	66.7	14.8
Tete	17.1	0.0	0.0	23.1	17.0
Manica	26.8	5.0	0.0	16.0	24.3
Sofala	24.8	21.1	19.6		22.5
Total	17.6	9.9	21.4	26.9	15.9

The main reason for using the seed sources is seed affordability (Table 48). This is followed by free availability and reliance/trustworthiness.

Table 48 Reason for using selected seed sources (%)

Why did the HH use this source?	Maize	Cassava	Rice	Soya bean	Total
Affordable	41.7	47.3	52.3	47.4	44.4
Reliable/trustworthy	15.9	18.6	19.0	4.2	16.7
Convenient	8.0	8.7	6.0	5.6	8.0
Easy to access the seed	2.2	4.4	4.2	0.0	3.0

Why did the HH use this source?	Maize	Cassava	Rice	Soya bean	Total
High quality seed	7.5	3.8	7.9	4.8	6.4
Available for free	23.6	13.9	8.1	38.0	19.8
Assortment of differences	0.0	0.0	0.0	0.0	0.0
Guaranteed output buy	0.4	1.1	0.0	0.0	0.6
Other	0.7	2.1	2.5	0.0	1.2
Total	100.0	100.0	100.0	100.0	100.0

7.5 Agricultural Mechanisation

Only 3.8% of farmers in Mozambique use a tractor in the central and northern provinces (Table 49). Of all households that use tractors in Mozambique in a recent past, about half of them were located in Maputo province, and 75% in the southern provinces (Cunguara et al., 2013). In the last two years the government of Mozambique has been implementing tractor hire services throughout the whole country, and this might have shifted the balance of tractor use between the south and the rest of the country. Nevertheless, the baseline survey was conducted in late 2016, and it should pick up households that are benefiting from the tractor hire services.

Table 49 The use of tractors and animal traction by province (%)

Province	% used tractor	% used animal traction
Niassa	1.8	0.0
C.Delgado	1.3	0.0
Nampula	2.4	1.0
Zambezia	7.2	1.4
Tete	1.4	39.4
Manica	2.6	41.0
Sofala	21.1	7.6
Total	3.8	13.8

This is in line with the key informant interviews, who stress that mechanization requires strong financial resources (to purchase and maintain the machines) and a locally available market. Due to this, the agricultural work tools more commonly available at the district level - hoe, sickle and machete - do not involve any mechanization. This is why in Gondola the levels of mechanization are low, despite the high levels of use of improved seeds for maize production[11].

However, a few qualitative surveyed contexts mentioned the use of water pumps and tractor in the production of selected crops. Water pumps are used for rice (Dondo and Nicoadala) and soya (Macanga) production; the pumps are owned by farmer associations but are often non-operational due to the need for repair. Tractor is used for rice (Dondo and Nicoadala), maize (Montepuez) and soya (Macanga) production, in rental schemes from both individual and associated farmers.

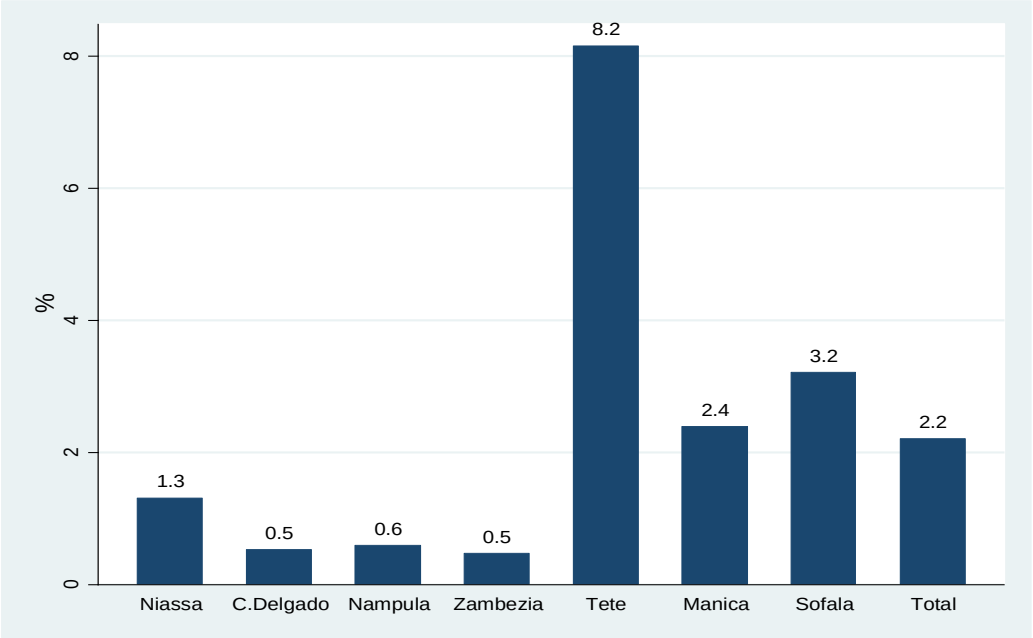
[11] Gondola's topography (steep slopes and mountainous area) could also add difficulties in using machinery.

There is hardly any use of animal traction north of the Zambezi River, and conventional wisdom holds it that lack of animal traction is due to the prevalence of tsetse flies. A study conducted in 2016 does not entirely support the tsetse fly story. Cultural habits and climatic factors such as the availability of pasture of good quality (sweet veld) are major factors contributing to lack of large livestock in the smallholder sector (Cunguara et al., 2016). Of the surveyed qualitative contexts, animal traction was only mentioned in Macanga (Tete province) for the ploughing of soya production.

7.6 Farmer Based Organizations' (FBOs) Membership

The MASA Statistical Yearbook reports that in 2015 only 2.8% of farmers had membership in a farmers' association. The baseline survey shows that 2.2% of farmers in the central and northern provinces belong to an association (Figure 17). Membership to farmers' association has been declining in Mozambique since its peak in 2007, according to data from the Ministry of Agriculture.

Figure 17 Membership to a farmers' association (%)



7.7 Awareness and Use of Extension Services

The MASA's Statistical Yearbook reports that in 2015 about 4.3% of households received extension services nationwide. In Nampula 4.4% received extension in the same period. The results from the baseline survey are in line with those reported by the Ministry of Agriculture, and Table 50 shows that only 5.5% received extension.

Table 50 Percentage of HH who received extension services by province

Province	% received extension
Niassa	2.0
C.Delgado	0.2

Province	% received extension
Nampula	0.0
Zambezia	0.6
Tete	29.3
Manica	4.0
Sofala	1.1
Total	5.5

The low number of farmers served by extension services is common to all surveyed crops, and is recognized by district authorities, extension officers and farmer associations alike. According to the key informant interviews and focus group discussions, among the farmers of the surveyed contexts there is a general awareness of the existence and role of the extension officers. However, the use of the existing extension services is low, due to a number of reasons that pertain to both the farmer and the extension officers.

On the one hand, there is a general lack of places where the farmer can obtain farming inputs, without which he/she cannot apply the knowledge and techniques learned from the extension officer. There is also a refusal in adopting new varieties and techniques over older ones, particularly when the 'new' requires a longer production cycle and/or is not profitable (production is demanding and income earned does not pay off). Lastly, farmer associations are poorly structured and have little coordination among themselves.

On the other hand, the success of extension services depends greatly on the extension officer's capacity to show farmers that the knowledge and techniques being introduced do lead to better and higher production. This is hampered by the reduced number of extension officers available (up to a ratio of 1 extension officer per every 500 farmers, in Nicoadala) and the limited extension and farming inputs (as basic as seeds for demonstration fields). These two factors are severed by limitations in transportation to cover all farming areas and the linguistic barrier between the extension officer and the local farmers, one of the inter-personal barriers to be overcome in order to gain the farmers' trust.

Due to these limitations, extension services target farmer associations and large farmers (i.e. cultivating more than 10 hectares), in order to maximize the resources available and reach as many farmers as possible.

7.8 Awareness and Application of Agronomic Practices

Gabions, use of inoculum and lime, and terracing are less known agronomic practices. Among the 5% of households who are aware of terracing, about 18.3% have practiced terracing. Among the 0.8% of households who are aware of gabions, only 4% practiced them. The inoculum is usually applied on soybeans. Lack of awareness of inoculum is related to a few households growing soybeans in the country and unavailability of inoculum and other modern inputs in rural Mozambique. Use of lime is related to knowledge of the soil nutrient content, but soil testing is extremely rare.

Table 51 Percentage of households who are aware and have practiced selected agronomic practices

Agronomic practice	% aware	% practiced
terracing	5.0	18.3
mulching/cover cropping	31.6	89.7
minimum tillage	56.3	79.4
wind breaks	15.1	10.9
contour farming	14.8	40.0
crop rotation	50.1	49.4
water pans/planting basins	14.9	8.6
grass strips	22.3	13.6
Afforestation	13.9	5.0
agro forestry (legume trees)	10.4	5.7
agro forestry (other trees)	8.0	0.4
gabions/storm bands	0.8	4.1
cut-off drains/soil bounding	20.3	33.5
fallow	49.2	18.3
Composting	9.6	18.2
use of inorganic fertilizers	33.9	20.1
use of green manure fertilizers	32.1	34.9
use of farm yard manure	37.6	8.8
slash and burn	12.1	27.3
growing legume crops	18.4	23.4
use of inoculum	1.3	5.7
use of lime	4.5	2.5

According to the key informant interviews and focus group discussions, farmers of the surveyed contexts are generally aware of different agronomic practices but apply them in different degrees. In general, the cash crops - rice, maize and soya – use a bigger quantity of agronomic practices, which also tend be more complex, comparatively to the practices mentioned for cassava, a food crop. The most common agronomic practices mentioned are consociation (ex. maize with beans and peanut), cultivation in line and spacing. Other less common agronomic practices, both site and crop specific, are monoculture, conservation agriculture, contour line and vegetation cover used for maize (Gondola, Manica Province), plant density used for soya (Macanga, Tete Province) and rice (Dondo, Sofala Province) and transplant from improved seeds used for rice (again Dondo, Sofala Province).

The reasons for using specific agronomic practices are indicated in the table below.

Table 52 Reasons for using selected agronomic practices (row %)

Agronomic practice	Prevent soil erosion	Improves soil fertility	Reduces filtration	Improves aeration	Recovers soil fertility	Introduces nutrients	Labor saving	Maintain soil moisture	Facilitates soil preparation	Pest and disease control	Other
terracing	5.7	35.0	14.0	10.0	0.0	4.3	0.0	14.0	6.5	1.9	8.7
mulching/cover cropping	1.2	66.2	0.6	0.7	4.8	20.4	0.4	1.1	2.3	0.0	2.4
minimum tillage	3.5	46.2	1.0	4.4	9.1	1.5	7.5	2.1	16.4	0.5	7.8
wind breaks	35.7	19.5	7.6	6.2	5.9	0.0	0.0	5.9	1.5	6.6	11.3
contour farming	17.5	10.4	7.8	2.6	6.6	1.7	6.5	7.1	6.5	1.8	31.4
crop rotation	9.8	23.2	2.1	1.9	23.2	6.5	2.5	12.0	7.7	0.7	10.4
water pans/planting basins	6.8	31.4	1.3	0.0	13.4	4.0	2.2	30.3	1.3	1.2	8.0
grass strips	17.8	39.0	2.3	1.1	8.9	4.1	0.0	18.8	0.0	0.0	8.0
Afforestation	33.1	23.5	0.0	18.0	7.4	4.1	0.0	0.0	6.7	2.5	4.9
agro forestry (legume trees)	43.8	13.2	9.0	9.0	5.7	13.2	0.0	2.1	0.0	0.0	4.0
agro forestry (other trees)	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
gabions/storm bands	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0
cut-off drains/soil bounding	19.4	28.2	8.7	4.5	2.5	0.2	3.6	22.7	3.9	0.9	5.4
fallow	1.7	38.1	1.6	3.4	33.5	2.9	0.7	2.2	7.8	0.5	7.6
Composting	0.0	43.5	4.1	0.0	25.3	0.0	0.0	24.2	0.0	0.0	2.9
use of inorganic fertilizers	1.1	81.9	1.4	0.5	3.1	2.2	0.0	2.1	0.6	2.6	4.6
use of green manure fertilizers	0.9	68.5	0.0	0.4	6.5	12.4	0.0	1.9	6.6	0.3	2.7
use of farm yard manure	0.0	60.1	0.0	2.8	7.0	22.5	0.7	1.2	5.8	0.0	0.0
slash and burn	1.1	6.2	0.0	1.2	17.9	5.0	1.9	0.0	30.9	0.0	35.9
growing legume crops	17.0	28.8	2.5	6.9	6.1	12.9	0.9	5.4	3.7	4.1	11.8
use of inoculum	0.0	0.0	0.0	0.0	46.2	0.0	0.0	53.8	0.0	0.0	0.0
use of lime	0.0	0.0	0.0	0.0	35.5	64.5	0.0	0.0	0.0	0.0	0.0
Total	6.0	44.8	1.9	2.7	11.3	7.5	3.1	5.4	8.6	0.7	8.0

The adoption of agronomic practices is by farmers is evidence-based, i.e. dictated by the success of the demonstration fields in which they were applied (yield). However, other than the will of farmers, the adoption of agronomic practices also depends on the availability of the needed inputs and follow-up technical support from the extensionist.

Although the introduction of agronomic practices falls mostly under the responsibility of the extensionist, non-governmental associations assume a relevant role to help the government overcome the lack of farming inputs and provide technical training/ refreshment to the extensionists.

7.9 Crop Yields

On average a household produces about 510 kg of maize (Table 53), and this is similar to what is reported by the Ministry of Agriculture. Rice is rarely produced in Tete province, and a high average indicates the influence of a few observations. In order to calculate yields, production data were matched with the data on cropped area.

Table 53 Mean HH production of selected crops by province in Kilograms (KG)

Province	Maize	Rice	Cassava	Soybeans
Niassa	562	299	178	145
C.Delgado	305	177	151	
Nampula	258	181	250	
Zambezia	316	123	256	53
Tete	774	606	43	256
Manica	675	111	60	118
Sofala	403	224	83	
Total	510	181	224	229

Since intercropping is very common and we did not measure the area of the crop, the yields reported in Table 54 only refer to sole cropping where the area of the plot is actually the area of the crop. This is why soybean is missing from Table 54, because there were only a few observations of soybean in sole cropping that we could use for the yield calculation. We also capped the yields at 8 ton/ha because this is potential yield for many maize and rice varieties that are available in the country. The results comport well with what is reported in the national agricultural statistics, except for cassava. Yields of cassava are much lower for the baseline. This may have to do with the way data on cassava production was collected, with a single question. Cassava data in the national agricultural survey is collected using multiple questions (quantity produced during low harvest and high harvest, and the frequency of harvest during each of these period) to account for multiple harvests during the cropping season.

Yields are obtained in two ways. First, we calculate yields for those whose plots were measured, without using the information from households whose plots were not measured. We call this unadjusted yields. Second, we divide the reported plot size by the measured plot size, and the median of such ratio is 2.8. Since households were found to overestimate their plot size, the actual yield will increase by a factor of 2.8, which is reported in the column “adjusted” below for each of the crops considered. Unadjusted yields are more similar to what is reported in the national statistics. The Ministry of Agriculture also adjusts its yield figures but uses a different approach to what was used in this reports, and in those from the other three countries that

conducted similar baselines. The Ministry of Agriculture adjusts the reported plot sizes based on regression analysis that accounts for education of the household head and location. The adjusted figures presented in Table 54 are closer to what was reported by Ghana, Mali, and Benin.

Table 54 Mean yields of selected crops by province in Metric Tons (MT)

Province	Maize		Rice		Cassava	
	unadjusted	adjusted	unadjusted	adjusted	unadjusted	adjusted
Niassa	1.261	3.5308		0	2.136	5.9808
C.Delgado	1.752	4.9056	0.150	0.42	0.129	0.3612
Nampula	0.930	2.604	1.262	3.5336	0.609	1.7052
Zambezia	0.954	2.6712	0.566	1.5848	0.817	2.2876
Tete	1.428	3.9984		0		0
Manica	0.756	2.1168		0		0
Sofala	1.459	4.0852	0.359	1.0052	0.055	0.154
Total	1.247	3.4916	0.669	1.8732	0.676	1.8928

7.10 Pre-Harvest Crop Losses

The occurrence of droughts and floods are usually the main reasons for pre-harvest crop losses. In the baseline study we found that drought accounted for 60.1% of crop losses. Since farmers were coming from a drought year, floods didn't play a role in crop losses. Depending on the variety, cassava rotting can be common and this results in major yield losses. On a positive side of growing cassava, only 39% of households mentioned drought because cassava is actually drought tolerant. Cattle could damage the crop, but there is hardly any cattle among smallholder farmers in the surveyed provinces, expect in Tete, Manica, and parts of Sofala.

Table 55 Reasons for losing the crop in the field (%)

Reasons	Maize	Cassava	Rice	Soya bean	Total
Rotting	4.8	24.1	3.0	0.0	7.7
Disease	2.8	2.9	4.5	0.0	2.9
Flood	1.2	1.4	1.0	0.0	1.2
Drought	64.1	39.0	58.5	86.3	60.1
Birds	1.5	5.1	9.4	3.4	2.8
Grasshoppers	1.5	0.0	4.1	0.0	1.4
Locust	0.0	3.2	0.0	0.0	0.5
Termites	3.0	1.6	0.0	4.9	2.5
Caterpillars	0.2	1.4	1.0	0.0	0.5
Other insect	1.0	1.1	2.2	0.0	1.1
Rodents	4.0	11.0	8.0	0.0	5.4
Monkeys	3.8	0.6	0.0	0.0	2.9
Sheep	0.2	0.0	0.0	0.0	0.2
Goats	0.4	1.8	0.0	0.0	0.6
Cattle	2.2	0.0	2.4	0.0	1.8
Other	9.2	6.8	5.9	5.4	8.4
Total	100.0	100.0	100.0	100.0	100.0

Crop loss in the plot is quite significant (29.9% for maize, 23.4% for cassava, 38.9% for soybean, and 32.5% for rice). There is some geographical variation, with Tete and Sofala being the two provinces with the highest percentage of pre-harvest crop losses.

Table 56 Percentage of crop loss in the plot

Province	Maize	Cassava	Rice	Soya bean	Total
Niassa	21.9	7.3	24.8	20.0	20.2
C.Delgado	21.0	14.2	20.1		19.8
Nampula	23.4	12.2	4.3		17.0
Zambezia	25.4	36.5	34.6		32.4
Tete	31.9	32.2	30.0	43.4	32.7
Manica	32.4	28.1	45.0	2.2	31.7
Sofala	33.1	40.9	35.3		35.0
Total	29.9	23.4	32.5	38.9	29.3

7.11 Post-Harvest Storage, Crop Sales, Processing and Market Price Information

Once the crop is harvested, about 92.5% store it while the remaining do not, especially if it is cassava where the percentage of households who store it drops to 84.3. Cassava is usually harvested in small quantities based on the immediate needs of the households.

Almost 95% of households store their crops at home/farm, whether in bags or small silos/ granaries (Figure 18). The use of a private aggregator or a warehouse receipt is practically non-existent. The use of chemicals for storing their harvest is also practically non-existent (Figure 19).

Figure 18 How the harvested and dried crop is stored (%)

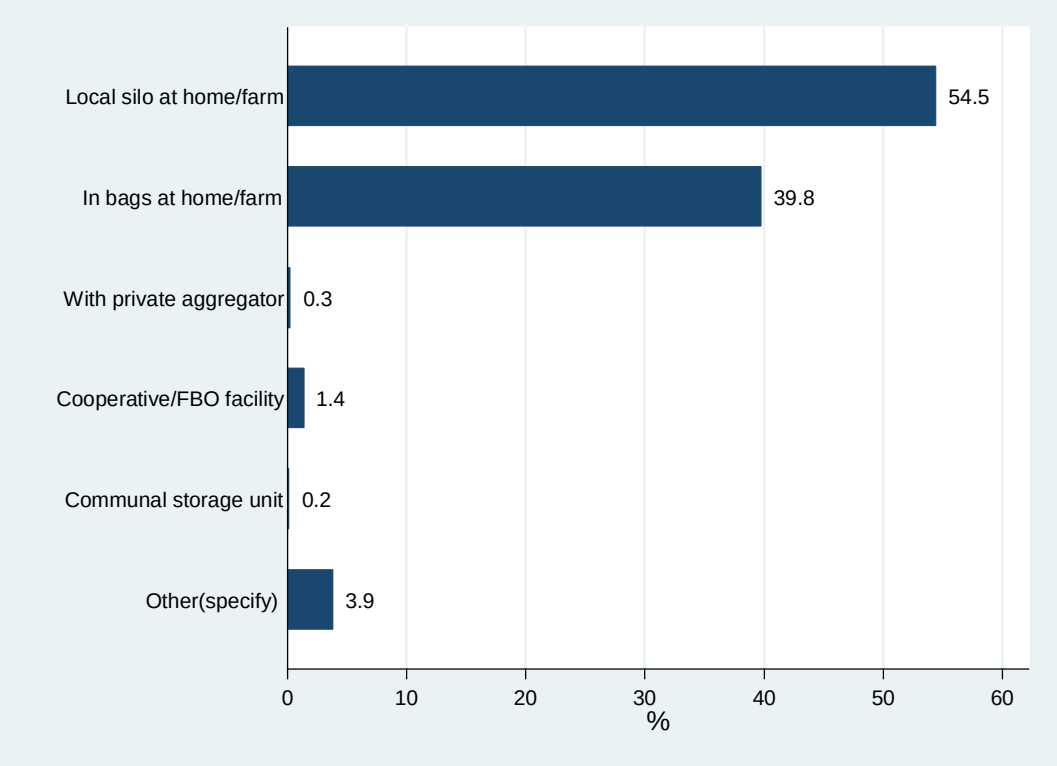
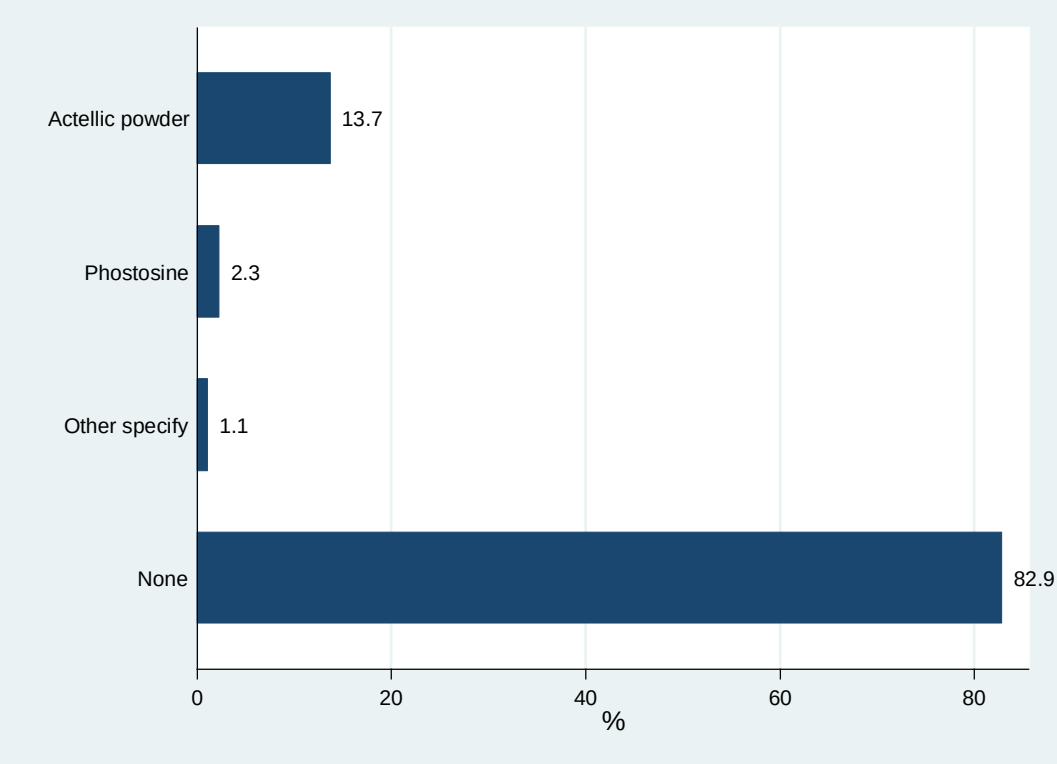


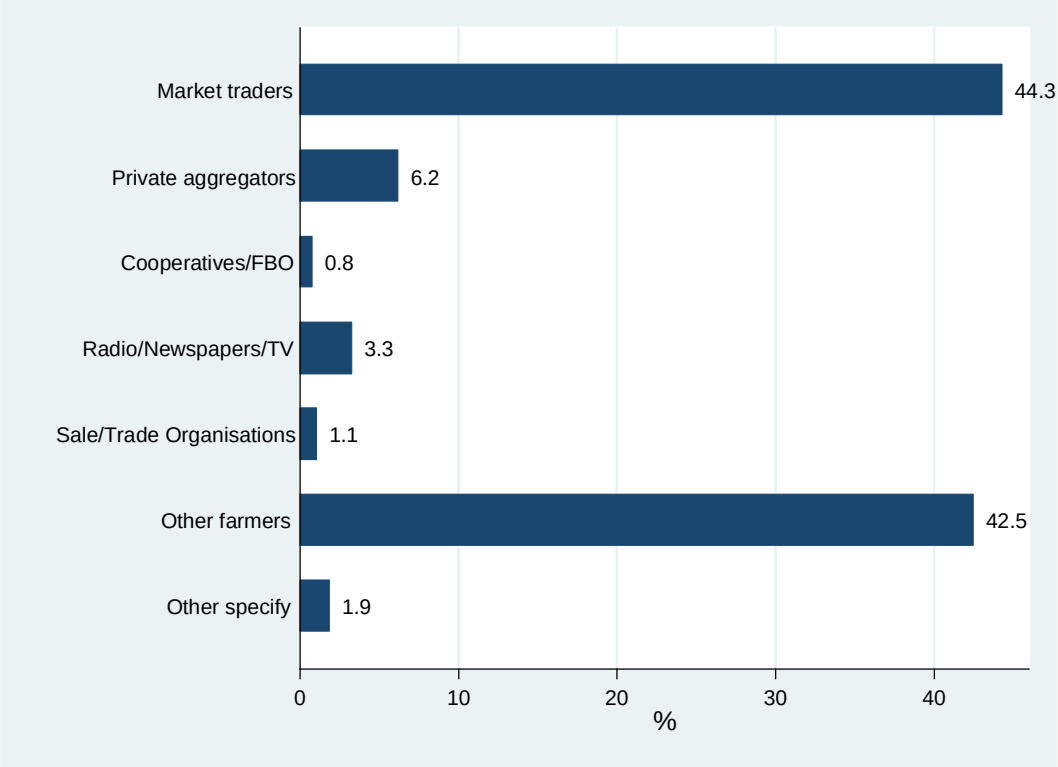
Figure 19 The use of chemicals for treating crops in storage (%)



Market traders and other farmers are the two main source of market price information (Figure 20). Private aggregators such as ETG and Gani Comercial are beginning to have an impact in spreading agricultural market information. They have storage rooms in rural central and

northern Mozambique where they usually assembly pigeon peas, sesame, maize, among other crops.

Figure 20 Source of market (price) information (%)



About 7.1% of households said they experienced post-harvest losses (Table 57). For maize, 7.3% of households experienced post-harvest losses, but this figure seems to be underestimated. The agricultural literature in Mozambique suggests maize post-harvest losses are between 20% and 25%. We think that the households underestimated their post-harvest losses because they had already estimated pre-harvest losses as being quite high, so they had to compensate in the estimation of post-harvest losses. The combination of both post-harvest and pre-harvest losses results in losses in the magnitude of 30%-37% which is in line with the agricultural literature in Mozambique.

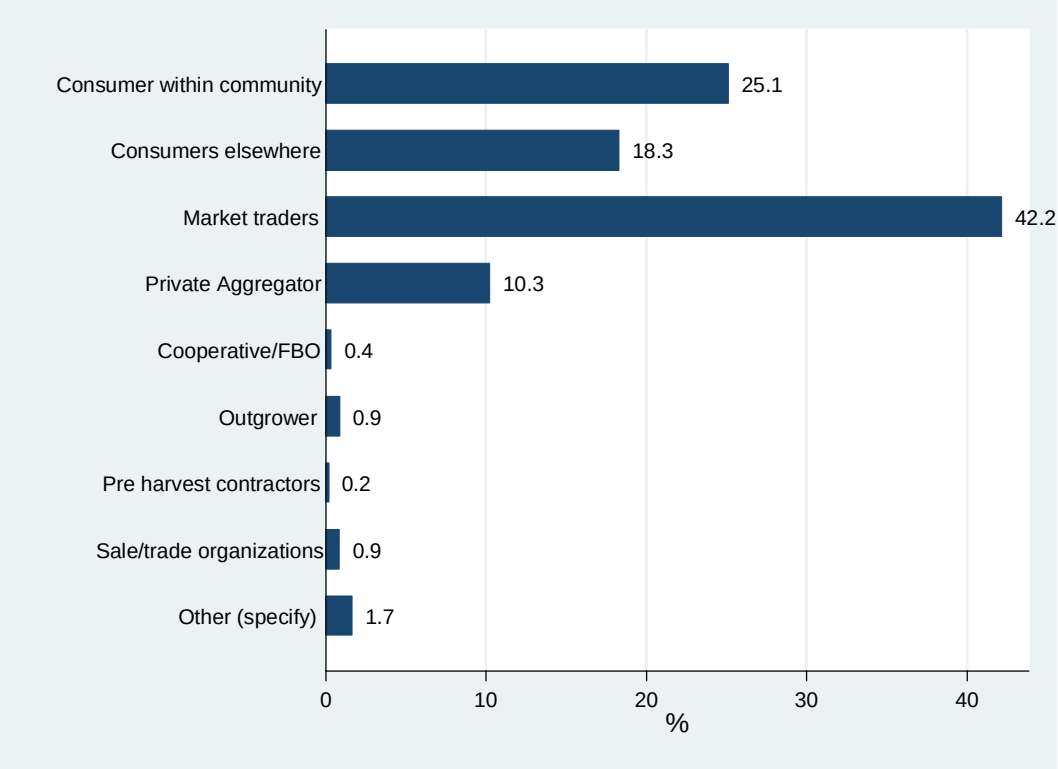
Table 57 HH experienced post-harvest crop loss (%)

Province	Maize	Cassava	Rice	soya bean	Total
Niassa	6.1	0.0	0.0	0.0	5.1
C.Delgado	7.4	17.9	0.0		8.7
Nampula	5.1	10.2	5.3	0.0	7.3
Zambezia	7.3	2.0	7.3		4.5
Tete	2.3	0.0		3.6	2.4
Manica	15.8	0.0		27.5	14.7
Sofala	14.0	0.0	12.5		11.9
Total	7.3	6.7	8.2	4.2	7.1

As discussed in the previous section, yields are very low even by Sub-Saharan Africa standards, in addition to cropping smaller plots. As a result, not much is left for trading. Smallholder

farmers are usually engaged in spot markets with little or no vertical integration (Figure 21). Contracts are still rare.

Figure 21 Who buys the crop from the HH (%)



8 Conclusion

The objective of this baseline report was to collect and analyse data on a set of outcome indicators in breadbasket areas of AGRA's intervention in Mozambique.

Data were collected from seven provinces: Niassa, Cabo Delgado, Nampula, Zambézia, Tete, Manica, and Sofala. The results presented are organized into four main sections: i) demographics; ii) household welfare; iii) women empowerment in agriculture index; and iv) agricultural production and input use. In general, the results presented are in line with those from other surveys and studies conducted in Mozambique

Starting with demographics, about 77% of households in the central and northern provinces are male-headed. The current baseline did not include the southern provinces, where migration of male members to Maputo city and South Africa results in increased percentage of female-headed households in that region. As a result, the overall percentage of male-headed households reported by the Ministry of Agriculture for the whole country is slightly lower, at 71%. The demographic data also show a correlation between the frequency of widowed households and HIV/AIDS prevalence rates. Data from the National HIV/AIDS prevalence survey conducted in 2009 showed that Sofala was the worst province, with 15.5% of the population infected by HIV, followed by Manica with 15.3%. These two provinces are the ones with the highest proportion of widowed household heads. The two provinces with the least infection of HIV were Niassa and Nampula, and this too is where we found the lowest proportion of widowed household heads. Polygamy appears to be quite high in Manica, relatively low in Nampula.

Adult literacy in Mozambique remains quite low, and this has historical roots. By 1975 when Mozambique got its independence from Portugal adult illiteracy rates were as high as 97%, which suggests unfavourable education policies for the locals during the colonial era. Illiteracy rates dropped quickly to 72% in just seven years after the independency but the war took its toll and not much progress was achieved until the peace agreement that was signed in 1992. Gender disparity in the access to education is clear from the data: about 54% of male household heads can read and write, compared to just 20% among female household heads. In Cabo Delgado province, only 7.7% of female household heads can read and write, compared to 52.5% among male-headed households in the same province. The proportion of household heads without education in twice as high among female than male household heads, and while having a college degree in rural Mozambique is a mirage, the smaller proportion is still four times greater among males.

The second major results section pertains to household welfare. Households in rural Mozambique seldom employ salaried workers. They usually pay for casual labour if they have to in order to compensate for smaller household sizes or larger cropped area. Participation in self-employment activities is often used as a mechanism to increase household incomes, and sometimes such increase can be reinvested in agriculture, but the poor who is often the less educated usually engages in activities of low return. Except for agricultural trading, gross incomes are not the highest among households located in Cabo Delgado, compared to the other provinces. Differences in education attainment exacerbates inequality: gross incomes in the upper quartile of self-employment incomes are about 59 times greater than the incomes in the lower quartile. In addition to self-employment activities, we also looked at incomes from salaried activities. Incomes usually tend to be skewed, and data from the baseline survey show that the median wage income is zero. The mean annual wage income is about 12,000 Meticais (Figure 2), with a maximum value of 1,320,000 Meticais.

In terms of food security, maize, cassava, and rice are the three most important staples. About 40% of households had suffered from insufficient food resources from own production during the last 12 months, and one of the coping strategies used by smallholder farmers when they face food shortage is to rely on food aid when it is available. On average, smallholder farmers who faced food shortage relied on food aid for less than five weeks during the last 12 months. Niassa and Manica provinces were less dependent on food aid. The baseline survey also collected data on household hunger scale. Nampula and Zambezia stand out, with a higher proportion of households who often had to go for a whole day and night completely without food due to lack of resources to get food.

The results from the baseline survey show that only 2.8% of households have tried to get credit in the last 12 months –this compares well with 3% of households reported by the Ministry of Agriculture. Attempts to obtain credit were relatively more frequent in Tete, where agricultural production is usually characterized by cultivation of cash crops such as tobacco and soybeans. Niassa and Manica also grow tobacco, but the tradition of use of improved seeds and chemical fertilizers is longer in Tete.

Household access to electricity in Mozambique is still limited. On average, about 27% of rural households had access to it. Electricity in rural areas tends to be of low quality, with frequent power cuts. This limits the development of the agro-processing industry, which would otherwise enable productivity growth in agriculture. Tete is located in a high altitude area with relatively good rainfall, and is a major producer of maize and soybeans. The animal feed industry would prosper in Tete, but only 12% of rural household had access to electricity, less than half of the average for the central and northern provinces. As we move in the direction north-south, the percentage of households with thatched roofs declines: about 86%-87% in Niassa and Cabo Delgado, 82% in Nampula, 75% in Tete, and 45% in Sofala. A similar pattern is observed with the floor material: the percentage of cement floors increases from the north moving towards the south.

The third main results section comprise the women empowerment in agriculture index, which included decision making in agriculture and women's dietary diversity. The results show that women in Zambézia and Niassa are less empowered. In total, about 54% of women in rural central and northern Mozambique are empowered, and empowerment is highest in Sofala, followed by Manica and Tete. The leadership domain of empowerment is still weak, especially in Niassa and Zambézia provinces, and this is what contributed to lower overall scores in those two provinces. In terms of women's dietary diversity, the results from the baseline survey are in line with national statistics where Nampula is the province with the highest malnutrition rates.

The fourth major results section pertains to agricultural production and input use. The results appear to comport well with what is reported by the Ministry of Agriculture: extremely low use of inputs, low productivity levels, and low participation in the market.

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Appendix A : Data collection instruments

Appendix B Qualitative interviews conducted

Table 58: Detailed number of qualitative interviews conducted per context

No of contexts	Target crop	Province	District	Qualitative excercises
1	Milho	Cabo Delgado	Montepuez	Interview with DPA (1) Interview with SDAE (1) Interview with Agricultural Extensionist (1) Focus Group Discussion (2) Case Study (2) Interview with Farmer's Association (2)
2		Manica	Gondola	Interview with DPA (1) Interview with SDAE (1) Interview with Agricultural Extensionist (1) Focus Group Discussion (2) Case Study (2) Interview with Farmer's Association (2)
3		Niassa	Cuamba	Interview with DPA (1) Interview with SDAE (1)
4		Zambézia	Gurue	Interview with SDAE (1)
5	Soja	Tete	Macanga	Interview with DPA (1) Interview with SDAE (1) Interview with Agricultural Extensionist (1) Focus Group Discussion (2) Case Study (2) Interview with Farmer's Association (2)
6	Mandioca	Nampula	Mogovolas	Interview with DPA (1) Interview with SDAE (1) Interview with Agricultural Extensionist (1) Focus Group Discussion (2) Case Study (2) Interview with Farmer's Association (2)
7		Zambézia	Lugela	Interview with DPA (1) Interview with SDAE (1) Interview with Agricultural Extensionist (1) Focus Group Discussion (2) Case Study (2) Interview with Farmer's Association (2)
8	Arroz	Zambézia	Nicoadala	Interview with DPA (1) Interview with SDAE (1) Interview with Agricultural Extensionist (1) Focus Group Discussion (2) Case Study (2) Interview with Farmer's Association (2)
9		Sofala	Dondo	Interview with DPA (1) Interview with SDAE (1) Interview with Agricultural Extensionist (1) Focus Group Discussion (2) Case Study (2) Interview with Farmer's Association (2)
			Total	**66 qualitative exercises conducted**

Appendix C Income and Employment

Table 59 Gross income in Meticais from each self-employment activity

Activity code	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala
Accounting Clerk	324.4		19.7	17.9	462.5	189.8	
Agricultural Trading	339.0	2,097.5	109.1	85.9	1,278.8	305.5	0.1
Bar Operator	125.2	81.0		172.3		1,054.0	0.1
Battery Charging				-			0.8
Bicycle (repair/transporter)	21.1			15.8	519.1		
Brick making				172.1	37.5	409.3	72.1
Brokerage						-	
Building	263.5	-	35.6	2.6		454.8	78.4
Butcher						278.3	
Carpentry	144.9	225.8	262.9	1,941.9		599.5	315.8
Casual worker			7.9				210.8
Charcoal burning			136.2	15.4		609.9	216.7
Clothes/Shoe business	412.2			527.0	991.4	677.8	562.0
Curio trader	160.6			128.4		288.7	0.2
Driver					2,371.5	419.1	
Earning dividends	474.3						122.5
Electrician			-				
Farm kibarua	48.7		36.4	73.0	38.7	187.7	-
Fish trading	126.8		62.2	31.5		28.1	89.5
Hairdresser/barber					434.8		
Harrowing					-		
Harvesting				152.6			-
Hawker	365.6		214.2	91.6	164.0		6.8
hiring out a bull			-	-			
income from other farm		47.4		80.3			

Activity code	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala
Jaggery (Sukaringuuru)				118.6			-
Livestock trading	-	180.5	-	-	210.5		
Local brewing	153.7				254.9	285.4	59.1
Lumbering/Wodd cutting			299.1	33.6			-
making pots							-
Mercenary	121.9	592.9	58.4			3,849.8	90.9
matatu business						592.9	
Mining		-				1,043.3	-
Nurse	1,040.8						
Pet breeder			-			882.7	
Planting			-	-			
Ploughing			37.5	-	26.4		
Plumber							-
Posho milling	514.5				308.3	573.1	408.4
Renting out properties				189.7			63.2
Retail shop/kiosk		1,457.5			1,660.1	757.6	
Selling mandasi	55.3	94.7		17.3	33.2	219.2	103.0
Selling water			14.5				
Surveyor		144.3					
Tailor	189.7		25.9	346.7		648.2	219.4
Teacher, part time		1,027.7		3,531.0			
Tout/turnboy							-
Trading timber						305.7	
Traditional doctor		47.4	45.2	108.7	540.2	263.5	1,027.7
Transporter (goods)			118.6	-	474.3	172.6	
Tree seller, commercial		210.8	289.0	358.4		474.3	
Vehicle mechanic				296.4			
Village elder				-			

Activity code	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala
Welding/Painting/ Black smithing					79.1	612.6	
Other(specify)	394.6	858.3	35.3	1,420.0	802.3	297.1	305.4

Table 60 Mean of total gross HH income in USD from self-employment activities by quartile and province

Quartile of gross income	Niassa	C.Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Total
Low	8.4	35.1	-	-	29.9	99.6	-	20.7
Low to middle	89.5	148.5	8.5	3.9	71.3	271.4	0.9	116.6
Middle to High	216.7	629.5	74.3	126.5	213.3	468.8	103.1	221.0
High	821.3	2,465.4	407.0	2,401.2	1,393.4	1,318.6	615.1	1,220.5
Total	270.5	768.4	119.8	571.6	411.6	532.8	175.1	374.3

[i] WEAI DOMAINS: 1) Production- Input in productive decisions, and autonomy in production, 2) Resources- Ownership of assets, purchase, sale, or transfer of assets, and access to and decisions on credit, 3) Income- Control over use of income, 4) Leadership- Group member, and speaking in public, and 5) Time- workload and leisure.