

WORKING PAPER

Rethinking crop production: Gender relations along the maize value chain in Mozambique

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Abstract

Maize is a staple crop that plays an important role in securing household food security and livelihood for many smallholder farmers in Mozambique. Consequently, a thorough understanding of gender relations in the maize value chain in Mozambique is necessary if we are to know the areas that women, men and children are involved in and benefit from as a result of their involvement. To gain this understanding, we used the following methods to conduct the study: (i) a structured household survey; (ii) semi-structured key informant interviews with participants of the value chain; and (iii) sex-disaggregated focus-group discussions with smallholder farmers. The findings reveal that from production to processing, gendered social norms exist as regards to the roles performed by men and women. Female farmers are more prominent in the production side of the value chain than in post-production. Some women from matrilineal villages are shown to have more autonomy concerning the revenue from crop sales than women from patrilineal villages. Men's dominance in the maize value chain is seen throughout the various nodes of the chain, from input suppliers (agro-dealers) and maize producers, to buyers/traders and processors. As well as their involvement in the production of maize, women are seen in most cases to participate more as supporters of the chain than anchors of the chain (which is a men's position); for instance, by working as cashiers in agro-dealer shops or as seed sorters, and by generally performing less labor-intensive tasks in the processing part of the value chain.

Key words: Mozambique; gender relations; maize value chain; food security

1. Introduction

Literature from Mozambique shows that maize is considered as one of the most important crops cultivated and is a major consumption staple for many households (Zavale et al., 2005; Donovan and Tostao, 2010; Nhlengethwa et al., 2014; Marennya et al., 2005). According to the ICRISAT (2004) report, interviews held with sex-disaggregated focus group discussions in Chokwe District, Mozambique, revealed that the reasons why men and women participants ranked maize as the most important crop were based on their ascribed roles in maize farming. Hence, men and women farmers may have different priorities in terms of crops produced (Agri Experience, 2016). In Mozambique, men see the cultivation of maize as an opportunity to participate in markets, while women cultivate maize as a source of nutrition and food security for their households (ICRISAT, 2004; Agri Experience, 2016). Women's participation in marketing maize is low partly because of the notion that women have poor negotiation skills, hence this role is culturally ascribed to men (AGRA, 2014; Gallina and Chidiamassamba, 2010).

Gender roles in post-harvest management activities in Mozambique are well-defined to some extent, with women predominantly involved in processing maize, while more men are involved in handling and storage that are considered to be important activities within the value chain (AGRA, 2014). These nodes are important because handling and storage allows men to determine the amounts of maize grain needed for bulk sales and to manage the income earned from the bulk sales (Manda and Mvumi, 2008, FANRPAN, 2017). According to Farnworth and Mahama (2012) study in Ghana, shows that one clearly defined role of women is the management of dehusking and shelling, which are part of the first-level post-harvest processing of maize, while men are primarily responsible for storage management, stock taking and control over revenue from sales. Women's involvement in transporting harvested maize is a challenge, because of their limited access to financial resources, hence they may be unable to pay transport

costs. Moreover, women are disadvantaged because they incur additional costs in hiring laborers to bag, load and collect maize, while men have the physical strength to undertake these activities themselves (FANRPAN, 2017; Adetonah et al., 2016; Farnworth and Mahama, 2012).

While gender roles for the post-harvest management of maize, and some aspects of women's participation in the maize market have been documented, no study has been done to investigate the participation and engagement of men, women and children at every node of the value chain. Moreover, the existing gender inequality in agricultural production (and post-production processing) affects economic development and benefits, especially for women (KIT, Agri-ProFocus and IIRR, 2012). Furthermore, value chain development has recently been used as a key approach to increase the income of smallholder farmers and other economically-poor individuals. Thus, it is important to understand gender relations in maize-value chain development.

2. Methods

2.1 Conceptual Framework

To analyze gender issues along the maize value chain, we used Gender Dimensions Framework (GDF), developed by Rubin and Barret (2009) and Rubin et al., (2009). The framework was used by Me-Nsope and Larkins (2016) when carrying out their analysis of gender relations along the pigeon value chains in Malawi. The framework has also been reported in Njuki et al., (2011). GDF allows for the classification of gender issues at each node of the chain under four dimensions: (a) access to and control over key productive assets; (b) practices and participation; (c) beliefs and perceptions and (d) laws, legal rights, policies and institutions.

The first dimension describes the social relationships that shape the distribution of resources necessary to be a fully active and productive participant in society – socially, economically, and politically. Ownership of assets has huge implications for livelihood outcomes

such as food security, nutrition and education, as well as increasing the bargaining power and well-being of the whole household (Meinzen-Dick et al., 2011). The questions that we examine here include the following: What are the resources – types of labor, land size, etc. – needed to participate in the maize value chain?

The second dimension examines how gender structures people's behavior and actions. Here, we ask the following questions: Who is involved in what activities? What are the productive, reproductive and community roles and responsibilities of men and women? Why? What are the barriers that prevent men or women from playing a particular role?

The third dimension looks at how cultural beliefs, systems and perceptions shape gender identities and behavior, and how men, women, boys and girls conduct their daily lives (Rubin, 2011). The fourth dimension examines how gender affects the way people are regarded and treated by both customary law and the formal legal code and judicial system. Gender may affect rights to ownership and inheritance of, for example, land (Rubin and Barret, 2009). Lastly, power is a theme that runs through all four dimensions – power means having control over material, human, intellectual and financial resources (Rubin, 2011).

2.2 Data collection

The study employed a mixed-methods approach, integrating both qualitative and quantitative methods, including (a) a structured household survey of smallholder farmers who grew maize; (b) semi-structured, key informant interviews (KIIs) with participants of the maize value chain – maize breeders, agro-dealers, retailers, processors, local buyers and traders; and (c) sex-disaggregated focus-group discussions (FGDs) with smallholder farmers of both sexes. The main reason for the mixed-method approach was the fact that only farmers were captured in the household survey, and other actors in the maize value chain were not considered. The sex-

disaggregated FGDs also allowed us to gain a deeper understanding of the gender relations along the chain.

The dataset of the 2013 International Maize and Wheat Improvement Center (CIMMYT) Adoption Pathways households survey provided quantitative data for 295 households. The survey targeted three maize/legume-based farming systems in Central Mozambique and was conducted in Angonia, Manica and Sussundenga districts. A combination of purposive and stratified sampling methods was used to select the districts. As the project focus was on maize-based farming systems, maize production was used as an important criterion to select districts and villages. A total of 216 villages were sampled. A multi-stage proportionate random sampling procedure was employed to randomly select villages from each district, and households from each village. The survey provided detailed information at household-, plot- and village level, and was used to investigate differences in socio-economic conditions, labor participation, and adoption of improved seed between male-headed households (MHHs) and female-headed households (FHHs). It was not possible to do a plot-level analysis of data in the regions under study, because in most cases a husband and a wife farmed together.

The KIIs and sex-disaggregated FGDs were carried out in only six villages in 2016/2017. The first three villages were in Macate district: Macate-sede, Matamira and Niza, and the last three villages were in Angonia district: Cabango, Chiphole and Guwa. The Instituto de Investigacao Agraria de Mozambique (IIAM) scientists helped to identify villages in each of the two districts that were diverse in terms of agro-ecological and socio-economic characteristics and proximity to markets, ensuring that the site selections represented contrasting conditions. The villages selected were those that had taken part in the CIMMYT 2013 Mozambique household survey, thus providing pockets of multi-layered information, (Geertz 1994), within the general intervention area; however, because of attrition and other factors, it was decided that for the FGDs it was not necessary to interview people from households that had already participated in

the household survey. In addition, a total of 29 KIIs were conducted with the following actors: maize and legume seed breeders from NARS (3); agro-dealers/input suppliers (4); buyers and traders (10); local processors (10); large-to-medium-scale processors (2); Purposive sampling was used to identify the interviewees.

[Table 1 here]

We conducted a total of 12 FGDs in six villages, and separate FGDs were held with men and women maize growers. On average, each FGD had 9 to 10 participants, bringing the total number of participants to 62 men and 65 women. The FGD respondents were selected by extension staff and local village leaders and had to be aged between 18 and 70. A balance was made to ensure that there were married, widowed and divorced people, and people of varied socio-economic status: a household was considered poor if (i) their house roof was made of grass and the walls of mud, and (ii) if the household did not own any cattle. A household was considered well off if (i) the house roof was made of iron sheets and the walls of bricks, and (ii) the farmer owned cattle. The FGDs included questions on seed sources, cultivation practices, decision making, gendered division of roles in production and marketing, access to and control over land, control over revenue from maize sales, and relationships along the value chains. Checking was systematically carried out to minimize potential bias resulting from time differences in data collection periods between the survey conducted in 2013 and the FGDs in 2016/2017.

2.3 Data Analysis

We first coded the household survey data in Excel and then transferred to a STATA package for statistical analysis. We also coded the KIIs and the sex-disaggregated FGD data using Nvivo software. Data from KIIs and FGDs were transcribed and coded for textual analysis following the procedures outlined by Creswell (2007). To protect the respondents' anonymity, all study participant names were replaced with pseudonyms.

3. Results

3.1 Household demographic characteristics

The majority of the households (86.4%) were male-headed (Table 2). The average age of heads of MHHs was 49 and that of FHHs was 55. The average level of formal education was 4 years; on average, heads of MHHs were more educated than heads of FHHs (4 years of education and 1 year of education, respectively).

The majority reported farming as their main occupation (86.4%), followed by salaried employment (5.1%), self-employed off-farm (4.1%), and other (4.4%). Almost 82% of household heads were married, 12.9% were widowed, 3.1% were divorced/separated, 1.4% married but spouse absent, 0.7% never married. As expected, MHHs had the highest percentage of married couples (92.5%) compared to FHHs (15%). The largest percentage of divorcees and widows came from FHHs (15% for FHHs and 1.2% for MHHs). The average size of the surveyed households was seven, but four when converted into adult equivalents. FHHs had fewer household members (adult equivalents) than MHHs (3.6 compared with 4.0). FHHs had on average a smaller land size (3.7 acres) than MHHs (5 acres).

[Table 2 here]

3.1.2 Cultural norms, land ownership, crop production and management decisions

Land is acquired through inheritance, purchase or rent. In all the villages under study, with the exception of one village, Chiphole (which follows the matrilineal system) the land belongs to the man unless the husband has died, in which case the land belongs to the woman. The reason that was given by both men and women FGD respondents, was that the man was the household head, and the decision maker within the household. Few of the land owners have title deeds, and in the majority of cases they have customary rights to their land. For those who have title deeds, the

land is in the name of the man. However, in all the villages under study the women have user rights. For Chiphole residents, in a marriage, both husband and wife are given a piece of land, and each is responsible for his/her own plot. The wife and the husband have both customary rights and user rights to the land; in addition, the land assigned to the husband has a title deed in his name, and the land assigned to the wife has a title deed in her name. Mixed answers were given as to who made the decision with regard to how much land was allocated to growing maize. In Macate, Cabango and Niza the women FGD respondents reported that men made the decisions on how much land should be allocated, but the men reported that decisions were made jointly. Only in Matamira, Chiphole and Guwa did men and women FGD respondents agree that decisions as to how much land was allocated to maize were made together.

3.2. Gendered participation and gender roles along the maize value chain in Mozambique

Figure 1 presents a sketch map of the maize value chain in Mozambique that details the points of access and nodes of activity for men and women. The results of the study show that the maize value chain involves many participants: input suppliers, producers/farmers, traders and buyers, processors, and consumers. In this study, the term input suppliers includes all actors involved in supplying inputs to farmers, including seed, fertilizers, herbicides and pesticides, among others. Farmers cultivate and harvest maize and sell dry grains to buyers/traders and large-scale processors at the farm gate, at local and distant markets, and at other specified places. Local farmers and households take their maize to local processors to obtain maize flour for home consumption. Buyers/traders buy dried maize directly from farmers, and then sell to consumers or other buyers/traders.

3.3 Agro-dealers/Input suppliers

The research team interviewed four male agro-dealers in the two study districts. The majority of their employees were men, who were assigned activities that required strength, such as lifting

bags, while women were assigned light activities such as acting as cashier and handling product registration. Julius, one of the respondents pointed out that *“Women are better suited for the sales sector, they are better than men at convincing customers to pay the stated price.”* According to the respondents, women are better at activities that need care and accounting.

Samson from Niza village pointed out that his shop serves a lot of women customers. He gave the following reasons for this: *“Women prefer to go to buy seed because this way they make sure that seed is bought. Women believe that men will change their minds and use the money to buy alcohol”*. In contrast, the input supplier in Chimoio city said that men were the major customers of maize seed and explained that men were more likely to travel to town to buy inputs than women, who have to stay at home. The findings presented by the agro-dealer from Chimoio illustrate the low mobility of women from villages when travel to distant places is necessary, and reinforce women’s traditional role of staying at home to take care of the house and children. In Angonia however, findings show that both men and women buy seed from agro-dealers, since both grow maize and choose to use good quality seed. The agro-dealers mentioned that men buy more seed than women and suggested that this was because men cultivated larger areas than women, so required more seed. Samuel, one of the respondents, also said, *“Women usually complained more about the price/cost of seed compared to men.”*

All respondents said that they provided additional services to their customers, for example offering credit, providing technical assistance and training, demonstration plots, and discounts for customers buying a large amount of inputs and equipment at the same time. Respondents stated a preference for providing credit to women, as women paid back the credit given more readily than men. John said that producers could also pay back credit in kind (in grain after the harvest). The findings indicate that the major challenges faced by agro-dealers in their business include lack of capital to buy inputs; insufficient stock to satisfy customers during times of high

demand; low access to credit and difficulty paying back the credit due to bad harvests and low income; and bad quality of seed obtained from some seed companies.

3.4 Production of maize by farmers

3.4.1 Maize seed acquisition and access

The 2013 household survey showed that about 99% of the households had grown maize during the survey reference period. Both hybrids and open-pollinated varieties (OPVs) of maize are grown in Mozambique. Overall, 32.6% of the sampled households had adopted the use of improved maize varieties (hybrid/OPV), with MHHs adopting more improved varieties (34.4%) than FHHs (22%), although the results are not statistically significant. About 10% of sampled households had adopted improved OPVs, while almost 24% had adopted improved hybrid maize varieties (Table 3). A difference in the adoption of improved hybrid maize varieties was observed between MHHs, (24.7%) and FHHs, (19.5%), although the results were not significant. Moreover, more MHHs adopted OPVs (11.3%) compared to FHHs (2.4%), although again the difference was not significant.

[Table 3 here]

According to the FGD respondents, the high cost of improved varieties of maize seed often compelled farmers to recycle their own local seed saved from the harvest. The data from the household survey show that both MHHs and FHHs tended to use more of their own saved seed than of bought seed: overall, MHHs purchased more maize seed than FHHs (10.7 kg/household compared to 7.6 kg/household), while FHHs tended to use more non-purchased seed than MHHs (17.5kg/household compared to 12.7kg/household).

Gender disparities in seed access and acquisition: The FGDs revealed that in most cases, both men and women used their own recycled seed, saved from the previous season.

Respondents in Angonia mentioned that recycled maize seed was commonly obtained from other farmers in exchange for labor. Other sources of maize seed included gifts and purchased seed. Improved seed was bought from agro-dealers, retail shops, seed companies and other farmers. Other sources of seed included extension services and agricultural projects operating in the districts. Seeds were paid for in cash by both men and women. In Niza, according to women FGD respondents, women were the ones who went to buy maize seed, because men might spend the money drinking. However, sometimes wife and husband bought seed together.

Seed availability, breeding and quality: The male FGD respondents at Matamira reported that most of the time, seed is not available at the local markets and they are forced to travel to town to get seed, which involves transportation costs. The Matamira farmers' sentiments were echoed by male respondents in Macate, who also mentioned late delivery of seed that sometimes arrived after planting time, resulting in a poor season for the farmers, and who also said that if farmers wanted to acquire improved seeds they had to travel far. Both women and men farmers complained of lack of credit to facilitate access to inputs and farm tractors that would facilitate the expansion of their agricultural activities.

Maize breeders indicated that in the past ten years, the IIAM breeding team in collaboration with other research institutions had released nine maize varieties. According to them, the process of releasing new varieties took two to three years. Before releasing a new variety, researchers conduct three to four on-station trials, followed by two on-farm trials.

Breeders reported that maize was bred for different traits, including high yield under farm conditions and good storage. The different maize varieties are made available at the market through seed companies, and farmers can choose according to their preferences and economic condition. Breeders reported that there were gender preferences in choosing specific variety traits: women preferred easily-pounded flint varieties and early-maturing varieties for household consumption, while men preferred maize with big cobs and grain that were good for selling at

market and generating income. In order to meet the different gender-related preferences, respondents reported that they were working on breeding varieties with characteristics that were liked by both men and women. However, one of the maize breeders claimed that both men and women liked maize varieties with higher yields under their farm conditions and that were good for storage, so breeding was more focused on varieties with these characteristics.

3.4.2 Gender division of labor in maize production

Maize production involves the following activities: seed storage, land preparation and planting, disease and pest control, weeding, harvesting, threshing, maize storage, transportation, marketing and cooking.

Seed storage: Participants in all 12 FGDs (both male and female) were agreed that adult women dominated this activity, however, three FGDs – two female (Matamira and Macate-sede) and one male (Guwa) – acknowledged that adult men also took part.

Land preparation and planting: Table 4 shows that regardless of the gender of the household head, most land preparation and planting activities are done by the family (84.2% in MHHs and 79.1% in FHHs) and by hired labor (15.8% in MHHs and 20.9% in FHHs). In MHHs, these activities are primarily done by adult males (45.1%), followed by adult females (31.1%), and children (7.8%). In FHHs, adult females carry out 44.4% of these activities, adult males 29.3%, and children 5.5%. Overall, there is no statistically-significant difference between MHHs and FHHs in this activity.

[Table 4 here]

Disease and pest control: Participants from all 12 FGDs were agreed that this activity is mainly performed by men. Women were excluded because respondents believed that chemicals

were dangerous, and if women were involved in spraying, this might damage their reproductive potential. Only women FGD participants from Guwa reported that this activity was also carried out by adult females.

Weeding: Table 4 shows that regardless of the gender of the household head, most weeding activities are done by the family (82.2% in MHHs and 76.1% in FHHs) and by hired labor (17.8% in MHHs and 23.9% in FHHs). In MHHs, 34.6 % of these activities are carried out by adult males, 35.8% by adult females, and 11.7% by children. In FHHs, 45.5% of weeding activities are done by adult females, 24.3% by adult males and 6.4% by children. Overall, the results show that there are no statistically-significant differences between MHHs and FHHs.

Harvesting: Table 4 shows that regardless of the gender of the household head, most harvesting activities are done by the family (83.2% in MHHs and 78.1% in FHHs) and by hired labor (16.8% in MHHs and 21.9% in FHHs). In MHHs, 30.6% of these activities are carried out by adult males, 39.4% by adult females and 13.3% by children. In FHHs, 49.5 % of harvesting is done by adult females, 21.6% by males and 7.0% by children. Overall, the results show that there are no statistically-significant differences between MHHs and FHHs.

Threshing: Regardless of the gender of the household head, most threshing activities are done by the family (87.1% in MHHs and 81.8% in FHHs) and by hired labor (12.9% in MHHs and 18.2% in FHHs (Table 4). In MHHs, 32.4% of these activities are done by adult males, 40.1% by adult females and 14.7% by children. In FHHs, 50.5% of threshing is done by adult females, 26.6% by adult males and 4.7% by children. Overall, the results show that there are no statistically-significant differences between MHHs and FHHs in threshing activities.

Maize storage: In all FGDs, participants acknowledged the involvement of both adult men and women in storage activities. Adult men are mostly involved in building storage

facilities, while women assist in managing and controlling the stored product. All FGDs reported that children were involved in storage, and that hired laborers were not involved at all.

Transportation: According to the FGD respondents, all adult males and females were involved in transporting maize, and children also helped, but no hired laborers were involved.

Marketing: Respondents from the twelve FGDs agreed that marketing was sometimes done by both men and women, and sometimes by a man or woman alone. Children were also reported to be sparingly involved, but hired laborers were not involved at all.

Cooking: All the study participants agreed that cooking was traditionally done by women, and that women knew better how to prepare meals.

3.5 Gender disparities in access to and participation in markets

The results of the study show that both men and women are involved in maize marketing across the two districts. Most respondents reported that they sold maize at the farm gate, local markets, the nearest sale point of the larger-scale maize processors, and distant markets in Chimoio and Ulongue cities. The main buyers were intermediaries, village and urban retailers, consumers, and larger-scale processors who bought directly from farmers.

In all the study villages, the decision to sell maize and the quantity to be sold is done jointly by a husband and a wife, except for Niza and Chiphole villages. As illustrated by Anastazia from Niza women's FGD, "*In most cases, men decide to sell maize, because they are the head of the households, however if a woman is the head of the household, she is free to make the decision to sell maize alone.*" In Chiphole, the male FGD respondents reported that the final decision about the quantity of maize to sell was made by the husband as the head of the household. The person who negotiated the price of maize at the point of sale depended on the household and the relationship between the husband and wife, but in most households it was

usually the husband who negotiated the price. Samson, a participant from Chiphole, said that *“Men negotiate the price because they have the skills to discuss and understand well accounting matters compared to women.”*

The findings reveal that even though men, women and sometimes even children can participate in distant markets to sell maize, men tend to participate more than women, because cultural norms restrict women’s mobility and limit their access to distant and more profitable markets. As illustrated by Joanita from Macate-sede (Macate district), *“I sell my maize at the farm gate or local markets in small amounts, whenever I need money, because I have to stay at home and take care of my children and take care of other household chores.”* However, in some parts of Angonia, for instance in Guwa, women take maize to the market, and in Cabango, men or women can take maize to market depending on the size of the load. In other parts of Angonia, specifically in Chiphole, it was revealed that men did the marketing because they had more skill in negotiating the price than women. However, there are some reasons for women’s restricted access to market participation that go beyond cultural reasons. As one man in Macate reported, *“some men are jealous of their wives, do not want them to go the markets so that they can be seen by other people or because of the behavior of the wife, thus tend to control their wives frequency of going to the market place.”* Other men in Macate FGDs reported that, *“women have problems reading the scales, hence we men have to make sure that we are in that market place, when the transaction takes place.”* In addition, men can sell larger loads because they use bicycles or ox carts to transport their maize to market, compared to women who carry loads on the head or have to pay for transportation. In Macate district, maize loads are transported to local markets by women on the head, and to distant markets by private transportation (chapa).

3.6 Control over income/revenue

In all three villages in Macate district, husbands control the income from maize sales. A good example is provided by Maria from Niza FGD: *“the income from maize is under the control of the husband, because he is in charge of all the affairs of the household welfare.”* Similarly, John from Macate-sede FGD said: *“a husband is responsible for all that is needed in the household, hence he has to be in charge of the income from maize sell.”* On the other hand, in two of the three villages in Angonia, Guwa and Chiphole, women are in charge of the proceeds from maize sales. As noted by Plaxeda from Guwa, *“Wife control income from maize, because it is to meet her household needs.”* Some women in Guwa said that men did not allow them to control the income from maize sales because they wanted the money to spend on their addictions. Men FGD respondents also concurred with women in the Guwa FGD as reported by Elias, *“Women control the income from sales, because women know household needs.”* In Chiphole, the women FGD participants reported that they were in charge of the proceeds from maize, as men were not good managers and tended to spend their money unwisely and unnecessarily. However, in Cabango, the third village in Angonia, men control the income from sales, because they are the head of the household and buy what is needed in the household. As well noted by Casia from the women’s FGD, *“Men take care of the main household issues, such as buying iron sheets for the house, school fees, hence they are in charge of the income from maize sells.”*

3.7 Buyers/traders

Traders can be classified into two groups: small-scale maize traders and buyers, who buy a small amount of maize at the village level, transport it in “chapas”, and then sell to other traders or consumers; and large-scale traders and buyers, who buy a large amount at the village level that is then transported by truck to the processing factory. A total of ten KIIs were conducted with maize buyers and traders in villages in Macate and Angonia districts, and in markets in Chimoio and Ulongue cities. The sample included seven men and three women. Respondents stated that

they bought maize directly from farmers in the villages and in the market, and from other buyers and traders. Buyers and traders can buy from houses, at farm gates, local markets, and identified places in the villages, and they buy maize from both men and women. In the towns however, respondents revealed that the majority of buyers and traders bringing products to market were men.

Family and hired labor were important sources of labor for maize buyers and traders. Three of the respondents (one man and two women) used only family labor in the business, because of the small size of the business and lack of resources to hire labor. The other seven respondents (six men and one woman) said that they used seasonal and permanent male employees. Respondents stated that they preferred to hire men, because the activities involved in the business required the physical strength to lift, load and unload bags of maize, and necessitated travelling to other villages and staying overnight there; lack of physical strength and cultural expectations made it hard for women to participate in the business as buyers and traders. Joseph the trader, noted the following “*Women’s availability for work is very low and women cannot stay overnight outside for a long time like men*”.

Men and women traders face several challenges in their work. The main challenges are constraints relating to capital and finance, storage, transportation and mobility. As regards access to capital and finance, most of the individual buyers and traders (six men and three women) revealed that they had not taken credit from banks but had used their personal savings to start up their businesses. Only one male trader mentioned that he had been able to acquire loans for additional capital for his business. The difficulties in accessing credit from banks or other sources were mainly caused by the size of their businesses, and lack of collateral. Due to the small size of the businesses, the majority of traders and buyers interviewed did not have storage facilities and stored their products at their houses or shops. Owning a vehicle was also a challenge: the majority of buyers/traders used private transportation (called *chapa cem*) to

transport their grain from the villages to the markets and were charged per bag, with the exception of one male buyer/trader who owned his own bicycle and used it to transport grain to the market in Chimoio.

The findings showed that men were more likely than women to buy directly from producers in the villages. Only one female trader purchased maize from producers in the villages. The other two women traders purchased maize from other traders and producers in town markets. The women traders faced two major obstacles: (i) the inability to buy large quantities of maize compared to men, and (ii) the difficulty of balancing family responsibilities and household chores with being a trader. The first obstacle was well noted by Ziporah, “ *I am not able to buy large quantities of maize, as I have to hire men to help me in the packaging, loading and unloading the bags, which is a cost to me, some male traders do not have to incur this cost, as they handle the bagging and loading themselves.*” Moreover, household and family matters hinder women traders from expanding their business as they would like. As reported by Cecilia, “*Even though I would like to buy maize from more distance villages where the price is lower compared to the nearby market areas, I am not able to do so, because I have to return home early to look after my children, husband and house.*” Cecilia added that the business required her to travel to villages and spend time there in order to find more grain supplies; however, because she is a woman with many responsibilities at home, she is not able to handle the business as she desires. The other women trader, Salome, who mainly purchases her maize in markets in town, had the following to say, “*In the villages one is sure that she will be able to find products, instead of waiting in town markets where many people are waiting to buy and there is not always enough product for sale. But travelling to villages is not easy for women, because of the distance, and this leads me to have a small business*”.

3.8 Large-Scale Buyers and Processors

The research team conducted KIIs with two large-scale maize processors in Chimoio and Ulongue (Angonia district). In Chimoio, the team conducted the interview at the Development and Agricultural Commercialization Company (DECA), which is a large-scale processor of maize, and in Ulongue, the interview took place at Empresa a escolha do Povo ('people's choice company'), which is also a large maize-processing company. Large-scale processors are companies or maize-processing factories that are involved in milling large amounts of maize and in packaging and marketing flour and subsidiary products. DECA is a privately-owned company with foreign investments, while the Empresa Escolha do Povo is a company with private and government investments. These companies are also maize buyers.

The large-scale buyers said that they obtained maize grain directly from producers and from other traders/buyers or intermediaries, mainly during the commercial season. According to the respondents, the price of maize was defined by the government and announced on radio programs. However, the prices are not fixed and change over time. Farmers also get information about maize prices via radio, other farmers, and the market. In terms of maize varieties bought and quality, the findings showed that the buyers buy all types of maize.

The companies reported hiring both men and women. However, in both companies the number of men employed was higher than the number of women, with Ulongue employing 36 people (31 men and 5 women) and DECA employing 150 people (137 men and 13 women). The companies hired and trained employees who were then placed at the buying points in the villages. The main activities in the buying process include unloading, measuring the grain, receiving the money, storing, and loading the grain into the trucks. Most of the employees are men due to the nature of the work. The workers stay in the village until they obtain a sufficient quantity that is then transported to the factory using the company's trucks. According to the respondents, most of the activities in the factory were done by machines, and employees needed

the necessary skills to use the scales, mill, package, maintain and repair the machines, store, and account. Other activities included cleaning, and lifting, loading and unloading maize or flour bags. Most of these activities are physically demanding and require strength, so are difficult for women to perform. Men can perform most of the activities while women work only in reception, in accounting and in the storage sectors.

3.9 Small-Scale Processors

The research team conducted a total of ten KIIs with local maize processors, nine men and one woman (a mature, 56-year-old widow). Local processors use milling machines to mill maize from local households and producers. All the respondents reported that they only processed maize that local households and producers brought to be milled whenever it suited them, to obtain maize flour for home consumption.

Respondents stated that the major challenges faced by men and women local processors were related to the following factors: machine failure; lack of product to process because of a reduced number of customers following an increase in the price of fuel and consequently a rise in the price of milling; difficulty paying monthly taxes due to few customers in times of hunger when activity is low; and an increase in the number of milling machines causing a reduced number of customers.

Local processors mentioned the existence of laws and policies that made the business difficult to operate, for example both men and women said that they had had difficulties obtaining operating licenses. As one respondent explained “the tax system is not appropriate for our type of business and conditions. The monthly taxes sometimes have to be paid at a time when we do not have customers and there is no money. Monthly fees must always be paid, and the system does not take into account how much we earn per month”. Another respondent added that “sometimes we are forced to stop work, because if we do not pay, they remove and take away parts of our machines so that we cannot operate until we pay”.

All local processors are family-run small businesses and family members assist in the business. Nine out of the ten processors had only one male employee to help, and one processor said that only family members provided labor in the business: himself and three sons. One hired employee was enough given the small size of the business, and respondents expressed a preference for men because of the nature of the tasks involved: cleaning the machines, repairing machine parts, lifting loads, operating the milling machine, and running the till. Operating a machine and lifting loads require skill and strength and are activities that would be difficult for a woman to perform; thus male employees who can perform all the activities are preferred. Some respondents revealed that few women in the villages looked for jobs, and that women generally stayed at home taking care of the house and children. One respondent said that *“If women were to work, it would be to fetch water and cook for the man employee because women are not able to perform any of the activities in the processing and women’s place is in the kitchen”*.

Most of the local processors are open every day from Monday to Saturday and closed on Sundays. The operating hours start from 7:00 am and end around 5:00 pm to 6:00 pm. Some processors said that they could remain open until as late as 9:00 pm, depending on the number of customers. As one processor said *“We are usually open from 7:00 am to 6:00 pm, but can continue until late, around 9:00 pm, for the benefit of people who work during the day and are paid in maize that is brought to the milling machine when they finish work”*. Processors stated that there was a difference in the quality of maize brought by men and women. Women brought clean maize, while men brought maize with impurities including stones, that needed to be carefully cleaned. Women brought clean maize that was ready for milling, and in large quantities compared to men.

4. Discussion and Conclusion

The results show that both men and women smallholder farmers and non-farmers are involved in different stages and nodes of the maize value chain. However, women are more evident in the

production side of the value chain than in the post-production side (marketing, trading and processing), which is dominated by men. Women have less access to land ownership, market mobility, decision making power and control over resources and income. If employed in other areas of the value chain, such as processing, women perform activities that are not physically demanding, while in trading, men avoid employing women. A striking finding is that women in matrilineal villages have more power over their husbands than women from patrilineal villages, in that they have control over the revenue from maize sales. Further studies need to be done in this area, in order to really understand what the factors are that allow the women in these two villages, Guwa and Chiphole to have autonomy in this area. The need for further investigation is shown by the fact that there have been a number of studies that have looked at deeply-rooted socio-cultural obstacles to women's access to land and water resources in Africa, although these have not been related to revenue control, and most agree that matrilineal societies are in fact not necessarily empowering to women (Debevek, 2015).

This study is in accordance with what Jeckoniah et al., (2012) has documented, namely that women's rights, the benefits they derive from participation in agricultural activities, and their contribution, are not always recognized. Moreover, it has developed and expanded on the studies written by Agarwal (1997); Doss (2001); and Lastarria-Cornhiel (2008), which document women's low level of participation in the marketing of crops in some patriarchal societies in the developing world. In addition, the study has shown that there is a need for development partners, the private sector and the government to capitalize on some of the areas where women are strong, and to seek to remedy areas where women are weak. For instance, in terms of agro-dealers, the study shows that women are better suited in the sales sector, i.e. they are better than men at convincing customers to pay the stated price, better cashiers and trustworthy. In addition, there are opportunities for women to be employed in large processing companies, for example working in light tasks in sectors such as reception, accounting and storage. The study also shows

that even when women try to break into men's territory by working as buyers/traders, social norms and cultural prescriptions that must be fulfilled by a woman, for example taking care of the household chores and children, are barriers that prevent a woman from moving forward in her business, and that these barriers do not exist for a man. What can be done to ensure that there is gender equity in terms of sharing the benefits derived from agricultural production between men and women, in societies that have deeply-engrained social norms, and which favor men's dominance in several areas that include access to land, labor, capital, natural resources, education, employment, and information?

The achievements made by some Agricultural Innovation Platforms (AIPs) in Rwanda on gender and equitable benefit-sharing mechanisms (Adam et al., 2018) provide a good example of how women and men can farm together, access improved varieties of seeds and other agricultural inputs, access information on better agricultural practices, produce good harvests and be effective in linking smallholders to markets, as well as allowing women as well as men to benefit at the end of the value chain. Moreover, studies done by Barham and Chitemi (2009) and Majurin (2012) have shown that cooperatives can raise members' productivity and increase their social inclusion through the provision of additional services, such as access to credit, technical assistance, and agricultural inputs. Even though the above studies show the relevance of farmers' organization/groups in enhancing gender equality, providing room for women to have more autonomy at the end of the value chain, further studies still need to be done to determine whether partnerships of this kind (farmers, research extensions, traders, agro-dealers, among others) would be beneficial to other actors in the value chain, as well as to women and men farmers, and whether they could bring about positive gender transformational changes and be sustainable at the same time.

The study also revealed that lack of availability of improved seeds during the planting season is a challenge to all farmers irrespective of gender. Development partners and the private

sector in Mozambique should aim to improve the accessibility of improved seed to women and men farmers. The use of improved varieties of maize seeds, in combination with other sustainable intensification technologies has the potential to lead to the expansion of maize production and utilization, and ultimately to improve the food security of the country.

Women play an important role in selecting and storing seeds and often have more knowledge than men about traditional farmer varieties of maize in Mozambique (ICRISAT, 2004; Bakker and Martínez, 2011). However, constraints such as their low literacy levels and lack of access to cash income place women in a precarious position compared to men as regards access to information about new or recently-introduced varieties of maize (ICRISAT, 2004; Manjichi and Dias, no date). The literacy gap between men and women in Mozambique remains a challenge: women's literacy rate is 36%, compared to 67% for men (UNESCO, 2014). Zavale et al., (2005) argue that both education level and access to finance have a positive impact on a farmer's decision to use improved maize seed. Marenya et al., (2015) also emphasize the positive association between education and fertilizer use by farmers. Similarly, providing information to both men and women farmers on improved maize seed can improve adoption rates. However, there is often a misconception that husbands will transfer information to their wives, but this tends to be ineffective, and the lack of women's inclusion prevents interactive learning between men and women farmers (Farnworth and Mahama, 2012). Thus, as well as encouraging the development of AIPs and/or farmer organizations in Mozambique, it is pertinent that development partners and the government of Mozambique work to bridge the gap in education levels that exists between men and women in the country, in order to address some of the gender equity matters that are related to agricultural production, marketing, and sales.

In conclusion, this paper has attempted to show some of the power relations between husbands and wives in the communities we have studied, and the differences in power relations that exist between married couples in matrilineal villages and those in patriarchal villages, and it

has shown the involvement of children, women and men in MHHs and FHHs in the production of maize. However, there is still room to explore other intersecting dimensions of social identities, for example, income, ethnicity, age and disability, and to consider how these roles as they relate to power affect who participates and at what level in the maize value chain.

Disclosure statement

Conflict of interest: All authors declared that they have no conflict of interest.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article.

Acknowledgement

This study is supported by the Australian Centre for International Agricultural Research (ACIAR) through the International Maize and Wheat Improvement Center (CIMMYT)-led Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) and Adoption Pathways projects. The views expressed here are those of the authors and do not necessarily reflect the views of the donor or the authors' institutions. The usual disclaimer applies.

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Table 1. Data collection

Value chain node	Data collection mode	Male	Female	Total respondents
Producers	FGDs (12)	62	65	127
Input suppliers	KIIs	4	0	4
Local processors	KIIs	9	1	10
Large-to-medium-scale processors	KIIs	2	0	2
Buyers/Traders	KIIs	7	3	10
Breeders	KIIs	2	1	3
Total	N/A	86	70	156

Table 2. Household level characteristics by gender

Variable	MHHs (N=255)	FHHs (N=40)	Total (N=295)
<i>Age of HH head (average years)</i>	49.4	54.7	50.1
Age: 18-40 (%)	30.2	30.0	30.1
Age: 41-60 (%)	47.2	35.0	45.5
Age: 61+ (%)	22.6	35.0	24.3
<i>Education level of HH head (average years)</i>	3.9	1.3	3.6
Education: none (%)	17.1	50.0	21.5
Education: primary education (1-7 yrs) (%)	70.5	50.0	67.8
Education: secondary + (%)	12.4	0.0	10.7
<i>Main occupation of HH head (% households)</i>			
Agriculture, self-employed, farming	84.7	97.5	86.4
Salaried employment	5.9	0.0	5.1

Self-employed off farm	4.3	2.5	4.1
Others	5.1	0.0	4.4
<i>Marital status of the HH head (% of households)</i>			
Married living with spouse	92.5	15.0	82.0
Married but spouse away	1.2	2.5	1.4
Never married	0.4	2.5	0.7
Divorced/separated	1.2	15.0	3.1
Widow/widower	4.7	65.0	12.9
Household size (absolute numbers)	7.3	6.8	7.2
Household size (adult equivalent)	4.0	3.6	4.0
Female members (in numbers)	3.4	3.3	3.4
Male members (in numbers)	3.5	2.8	3.4
Members aged 0-17 (in numbers)	3.5	2.7	3.4
Members aged 18-60 (in numbers)	3.2	2.6	3.1
Members aged 61+ (in numbers)	0.3	0.5	0.4
Land size holding (acres)	5.0	3.7	4.8

Table 3. Adoption of improved maize varieties by gender of the household head (% households)

Maize variety	Male (N=)	Female (N=)	Total (N=)	X ² -value	p-value
Grew maize	98.8	100	99	0.497	0.481
Improved hybrid	24.7	19.5	24	0.519	0.471
Improved OPV	11.3	2.4	10.1	3.074	0.08
All improved (hybrid/OPV)	34.4	22	32.6	2.484	0.115

Table 4. Farm labor participation by gender of the household head (percent gender contribution)

Farm activity	MHHs (N=255)	FHHs (N=40)	Total (N=295)	t-value	p-value
Land preparation & planting by children	7.8	5.5	7.5	0.514	0.608
Land preparation & planting by males	45.1	29.3	42.7	1.877	0.062
Land preparation & planting by females	31.3	44.4	33.1	1.637	0.103
Land preparation & planting by family	84.2	79.1	83.3	0.808	0.420
Land preparation & planting: hired labor	15.8	20.9	16.7	0.808	0.420
Weeding by children	11.7	6.4	11.0	0.997	0.320

Weeding by males	34.6	24.3	33.2	1.286	0.200
Weeding by females	35.8	45.5	37.2	1.181	0.239
Weeding by family	82.2	76.1	81.3	0.921	0.358
Weeding by hired labor	17.8	23.9	18.7	0.921	0.358
Harvesting by children	13.3	7.0	12.6	1.122	0.263
Harvesting by males	30.6	21.6	29.6	1.162	0.246
Harvesting by females	39.4	49.5	40.5	1.209	0.228
Harvesting by family	83.2	78.1	82.6	0.789	0.431
Harvesting by hired labor	16.8	21.9	17.4	0.789	0.431
Threshing by children	14.7	4.7	13.6	1.729	0.085
Threshing by males	32.4	26.6	31.4	0.733	0.464
Threshing by females	40.1	50.5	41.3	1.241	0.216
Threshing by family	87.1	81.8	86.4	0.909	0.364
Threshing by hired labor	12.9	18.2	13.6	0.909	0.364

Figure 1: Maize value chain map for Mozambique

