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Beyond crop production: Gender relations along the pigeon pea value chain and implications for income and food security in Malawi

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Abstract

Legume-intensified maize systems have been identified as a potential “one stop” solution to the problems of food insecurity and declining soil fertility in Malawi. Previous research to understand legume adoption/cultivation in Malawi has failed to examine how gender relations may influence incentives to adopt and potential food security gains at the farm level, or how gender may impact participation, performance, and benefits at later value chain stages. Using a combination of key informant interviews, focus groups, and a value chain approach, we identify gender based constraints and opportunities along the pigeon pea value chain, their implications for legume adoption/expansion, for income gains, and for the food security status of legume producing/selling households. We find that due to their culturally prescribed role as heads of households, men are mostly responsible for legume cultivation decisions at the farm level and across all regions. Cultural restrictions on women’s mobility and gender disparities in transportation assets exclude women from participating in markets, thereby giving men more access to pigeon pea sales revenue. Men’s predominant role in pigeon pea marketing and their power to make major decisions on the allocation of crop revenue creates a disincentive among women to expand the legume at the farm level, especially since women make major labor contributions towards the cultivation and post-harvest handling of the legume. Our results indicate that income from pigeon pea sales may not always translate to improvements in household food security, especially when intra-household gender differences in market participation, consumption needs and preferences are considered. We find that post-farm level, women on the pigeon pea value chain still face mobility restrictions, unequal gender division of labor in reproductive and household chores, limited access to transportation assets, limited credit and non-farm employment opportunities which hinder the performance and benefits from participation at higher nodes of the pigeon pea value chain. Development efforts targeting increases in household food security through the promotion of pigeon pea must take our findings into consideration to improve intervention outcomes.

Keywords: Africa; Malawi; pigeon peas, gender relations; value chain analysis; poverty; food security

Introduction

Poverty and food insecurity are significant challenges in Malawi. These challenges are further exacerbated by changing climates, rising population densities, and increasing pressure on land. Smallholder agriculture is an important source of livelihoods for a majority of the rural population of Malawi (Chirwa and Matita, 2012). Snapp, *et al.*, (2002) observe that the small

size of most farms in Malawi (one – two hectare per household) place the majority of smallholder households at the margins of subsistence. As in most of southern Africa, maize is the dominant cropping system in Malawi. Maize accounts for 60-80% of the total area sown, and approximately 97% of farmers in the country produce this crop (Rubin and Barrett, 2009). The remainder of smallholder arable land is planted with tobacco, groundnuts, pigeon pea, and other crops (Snapp *et al.*, 2002).

Declining soil fertility as a result of continuous cropping with cereals (e.g. maize); minimal use of fertilizers (due to high cost); and the abandonment of the traditional fallow systems which allow the soil to recover from continuous planting (Mafongoya *et al.*, 2006; Snapp *et al.*, 2002) have sparked a great interest in legume intensified maize systems as an alternative technology that could enhance food security in Malawi. Studies on malnutrition (FAO, 2009) and poverty promote legumes as a potential solution for low income households. In comparison to the dominant maize crop, protein-rich grains of legumes have been argued to prevent malnutrition commonly associated with cereal based diets (Prasanna *et al.*, 2001). According to Mhango *et al.*, (2013) Legume diversification of maize-based systems is a core example of sustainable intensification, with the food security of millions of farm families at stake” (p.234). Further, legumes can provide market possibilities, thereby providing farmers the opportunity to improve their income and livelihoods (Giller *et al.*, 2011; Kamanga *et al.*, 2010), which alongside increases in total food production is needed to combat hunger (Bie, 2008; De Schutter, 2010). Taken together, these characteristics make it critical to consider the adoption and expansion of legume cropping as part of the solution to food security concerns in Malawi. Of specific interest, is the pigeon pea.

In this paper, we use a gendered approach to value chain analysis to examine pigeon pea as an example of a multipurpose legume in Malawi. If pigeon pea is to be promoted for sustainable intensification within maize dominated systems as a means for increased food security outcomes, the gender dynamics which influence adoption and expansion of the legume at farm level, and the performance of the post-farm nodes of the value chain need to be clearly understood and considered in the design of innovations. We recognize that: 1) it takes more than just growing more legumes to make people more food secure. The food has to be distributed.

Considering a value chain as a system with multiple and interrelated parts that are driven by the end markets, it is important to understand not only the constraints to legume adoption and expansion at the farm-level, but the challenges and incentives for actors at post-farm levels of the value chain— those who work to move the food from the farm to consumers, and how all these challenges work to limit the potential of the value chain to contribute to poverty reduction and overall economic growth; 2) value chains are embedded in a social context (Rubin *et al.*, 2009), and therefore there is need to understand how intra-household and broader gender dynamics influence adoption decisions at the farm level, participation at post-farm levels of the value chains, and the distribution of incentives to participate in the value chain. Specifically, we conduct a gender mapping of the pigeon pea value chain to understand the structure of the value chain, we later analyze gender relations and roles at the different nodes of the value chain to identify gender-based constraints (GBCs) or gender-based opportunities (GBOs); and lastly we determine the implications of these GBCs for pigeon pea adoption/expansion, as well as for the potential of the legume to contribute to food and income security for all actors along the value

chain. Overall, the study will provide critical input for the design of gender-sensitive innovations targeting food security and poverty reduction in low-income households through the scaling of pigeon pea legumes in Malawi.

Literature review

Pigeon pea is an important export crop in Malawi. The country ranks first in terms of pigeon pea production in Africa, and she is the third largest producer in the world, behind India and Burma (FAOSTAT, 2012). The southern region of Malawi is known for its high levels of pigeon pea production for the export market, and for local consumption (pigeon pea is part of the traditional diet in the South). Recently, production of pigeon peas has been growing in the central and northern regions of Malawi, and this growth can be attributed to donor interventions geared towards sustainable intensification of maize-legume systems for soil fertility improvements. This shrubby legume is particularly attractive to smallholders for its multipurpose characteristics—dried seed, pods and immature seeds used as green vegetables, leaves and stems used for fodder, and the dry stems as fuel (Simtowe *et al.*, 2009)—and its soil fertility benefits (Snapp *et al.*, 2002). Pigeon peas are highly drought tolerant (compared to maize, tobacco and cotton), and their long taproot is advantageous in accessing nutrients in deeper soil profiles (Snapp *et al.*, 2002). Pigeon pea grain has a high protein content ranging from 21% to 25% (Simtowe *et al.*, 2009), making it a valuable source of nutrition for many poor families who cannot afford dairy or meat.

In spite of these attractive attributes and characteristics of pigeon peas, attention to the legume in Malawi has mostly been in the context of expanding production for the export market, with little consideration of the potential of the legume to contribute to food and income security for poor households. Further research on pigeon pea has been heavily weighted towards expanding farm-level production. However, the cultural significance of maize has been argued to diminish the potential of adding legumes to crop rotations throughout Malawi (Alwang and Siegel, 1999; Simtowe *et al.*, 2009).

In Malawi, food security at the household level is commonly equated with the size of the maize harvest; poor farmers prefer to avoid purchasing part of their personal food requirements in the market (Snapp *et al.*, 2002). According to Kerr *et al.*, (2013) farmers defined the boundaries within which legumes can expand on their farm by food security and income—the majority of the farmers indicated that legumes can only be expanded when domestic maize production is sufficient to satisfy household demand. The choice between maize and legumes is further complicated by small farm sizes. As observed by Mhango *et al.*, (2013) small farm sizes and poor soil quality (degraded and arid soils) decrease production capacity, resulting in most farmers choosing to maximize their maize crop.

Snapp *et al.*, (2002) observe that notwithstanding the marginal decline in maize harvests that would accompany a legume intensification strategy, there is a potential for significant improvement in net farm profits. The findings of Simtowe, *et al.*, (2009) support this, demonstrating that pigeon pea intercropping with other staple food crops can be done without reducing other yields. The lack of reliable access to seed has also been argued to limit legume adoption and expansion. Snapp, *et al.* (2002) observed that legume seeds are expensive, do not store well, and are difficult to multiply for the next planting season (Snapp, *et al.*, 2002).

According to Simtowe *et al.*, (2009), Malawi's seed market is informal—the majority of smallholders farmers recycle their seed, or trade with other producers. There is almost no private sector involvement in access to seed, and the availability in the public sector fluctuates (Simtowe *et al.*, 2009). Seed access is further differentiated by actor group. For instance, Snapp *et al.*, (2002) found differences in the use of purchased seeds across male (approximately 30%) and female headed (approximately 15%) households. Female headed households (FHH) were also less likely to receive agricultural credit, thereby limiting their ability to purchase legume seeds and improved varieties when these are available.

A household's resource endowment may also constrain adoption. Kerr *et al.*, (2013) found that low resource endowed households are less likely to expand legume production because they have no recycled seeds to plant (the entire legume crop was consumed as food in the previous season), lack the funds to purchase seeds in the market, and/or cannot afford additional farm labor or inputs. Further, vulnerable farmers with smaller parcels will dedicate over 70% of land to maize, as their cash crop staple (Snapp *et al.*, 2002). Labor requirements associated with legume intensification influence cultivation decisions for all households. Like land, labor allocation to crops is very competitive- it depends on the returns per unit of input, and on the efficiency of markets for both seed and grain products. Insect and livestock damage are other common challenges to legume adoption. Specifically, for pigeon peas, plant damage caused by insects is a problem when the grain is on the field, and has been identified as an important cause of post-harvest losses (Kanyama-Phiri *et al.*, 1998; Snapp, *et al.* 2002; Snapp and Silim, 1999).

In addition to the production challenges discussed above, existing evidence also highlights farm-level challenges in the marketing of legumes, the main one being poor access to markets. According to Mhango *et al.*, (2013) the majority of farmers live in areas with outmoded infrastructure, fragmented and degraded farmlands, deficient institutions, organizations and policies, and often with limited support from agricultural research and development organizations. Kerr (2013) shows that the marketability of legumes (other than groundnuts) was often a major constraint for profit oriented farmers to expand their production. Coupled with poor market access is the degree of competitiveness of farm-gate prices. Farm-gate prices for grain legumes are markedly lower across the country in comparison to retail markets (Phiri *et al.*, 1999). Any significant expansion of legumes will remain limited until the relative profitability of these crops improves (Mhango, *et al.*, 2013). Farmers' lack of access to reliable price information also often results in them selling below market value during the harvest season (Makoka, 2009). Low profits from pigeon peas have also been attributed to farmers' lack of awareness of the quality of pigeon pea demanded by exporters, with few actually cultivating the type that earns a premium in international markets (Makoka, 2009).

Our review of the literature on legumes in Malawi highlights that the existing analysis of factors influencing legume adoption in Malawi has been void of consideration of the broader social context in which these adoption decisions are made, and more specifically, the gender dimensions of legume adoption decisions. Women dominate smallholder pigeon pea production in Malawi, and they play an important role in informal food distribution and processing (Makoka, 2009). This notwithstanding, Malawian women's agency and access to agricultural resources is limited (Kerr *et al.*, 2013). Not only do rural Malawian women have less access to education, land, credit, seeds and other agricultural resources compared to men, they are also

constrained by highly unequal workloads, including agricultural labor, household tasks, and child care responsibilities (ibid).

The attention to gender issues in agricultural value chains, and the differential distribution of benefits to men and women began in earnest in the last decade (see Laven *et al.*, 2009, IFPRI 2013). Significant in this literature is a focus on increasing women's participation in cash crop sales, as a method to improve household food security (Vargas Hill and Vigneri, 2009). Critically, there is recognition that while women's success as farmers and market sellers is equal to men's, this productivity will only be equal when they begin with the same asset profile (ibid). In any crop or livestock value chain, it is unlikely that women will have the same access to assets as men, even more so in female-headed households. Blackden and Wodon (2006) demonstrate this in relation to the asset of labor. Cultural expectations of women's domestic responsibilities reduce the amount of time (labor) they may freely give to cash crop agriculture. However, this effect is felt not only in the efficiency of production, but in the marketplace, where less productivity in the field, means there are less goods to sell (Blackden and Wodon, 2006).

Furthermore, we know that the success of many agricultural interventions for the entire household depend on improving the bargaining power of women (Doss, 2013). Value chain development programs that seek to achieve the outcomes of improved food, nutrition, and income security of the rural poor must understand the implications of intra-household gender dynamics for these outcomes and design interventions that address existing gender disparities and improve women's participation and bargaining power in important household decisions. Thus, if pigeon pea cultivation is to improve food security and reduce poverty in Malawi, we must also examine the social factors that determine incentives and gains for all actors along the value chain. Research that systematically investigates gender and intra-household dynamics, how these dynamics influence farm-level adoption decisions, and the participation, challenges and benefits at post-farm nodes of the value chain is almost non-existent. Furthermore, there must be an analysis of the interaction between women's asset endowments and their ability to participate in markets. We seek to fill this gap, by focusing on how intra-household dynamics may operate as a barrier to women to participate as well as benefit from their participation in the pigeon pea value chain at all nodes, using the descriptive case study model advocated by Coles and Mitchell (2011).

To date, most research on the potential for pigeon peas has focused on production of the legume, assumed a unified household where incentives, benefits, gains and constraints are equally experienced by all members of the household; and failed to demonstrate the interconnectedness of various nodes of the value chains, how gender issues are experienced across the different nodes of the value chain, and what these issues imply for the anticipated food security, poverty and nutrition outcomes. Downstream stages of the value chain rely on farm output for their own processes and activities. The incentives to expand production at the farm level come from downstream actors, and the profitability of downstream activities depend in part on the performance at the farm level. Research must acknowledge that the performance of the entire value chain can be influenced by cultural norms operating in the social context in which the value chains are embedded.

In particular, cultural norms prescribe: i) gendered patterns of resource allocation within the household; ii) the division of roles and responsibilities by gender within the household and on the farm; iii) gender-power relations in intra-household decision-making with respect to crop cultivation at the farm level, and market participation at post-farm levels of value chains; iv) gender differences in control over production assets and incomes derived from value chain participation; and overall, affect men's and women's incentives and benefits for participating in legume value chains. Value chains are embedded in a social context (Rubin *et al.*, 2009). Access to resources (physical, financial, human resources, time, information, and skills) is critical to value chain participation. Gendered patterns of resource allocation often imply differences in participation and in the sharing of benefits from participation for men and women. Sebtad and Manfre (2011), observe that gender-defined roles in value chains and within households affect access to financial services, control over income, access to and use of new technologies, inputs, and social services. Further, gender relations affect and are affected by the ways in which value chains function (Matua *et al.*, 2014). While value chains offer tremendous opportunities to men and women through better market linkages and employment opportunities, at the same time, the way these value chains operate can affect some groups negatively (Matua *et al.*, 2014).

Methodology

The Gender Dimensions Framework (GDF) developed by Rubin and Barret, (2009) is used as the analytical schematic for understanding gender issues along the pigeon pea value chain. Although originally intended for use by value chain development practitioners, the framework is a useful research tool as it allows for a rapid assessment of agricultural value chains, identifying gender issues along these chains, and how these issues could impact the design of innovations to improve food and income security through value chain development. The framework is simple and practical. Specifically, it allows for a clean classification of the gender issues at each node of the value chain under dimensions (or thematic areas) that have been widely recognized as major areas of gender inequalities in agriculture (for example assets, control over productive resources and income, division of roles). Such a classification of inequalities facilitates the practice of designing innovative solutions to address the identified gender issues. The GDF contemplates four dimensions of inequality: i) access to and control over key productive assets (tangible and intangible); ii) practices and participation; iii) beliefs and perceptions; and iv) legal frameworks. Power is a cross-cutting component in each of these four dimensions (Rubin *et al.*, 2009). Each dimension of the GDF was used to inform the design of questions in our interview guide; they are explored in greater detail below, as is our respondent frame.

The first dimension, access to assets, describes the social relationships that shape the allocation of resources that are necessary to be a fully active and productive (socially, economically, and politically) participant in society. These include access to land, labor, capital, natural resources, education, employment, and information (Rubin *et al.*, 2009). Empirical evidence supports that assets are not always pooled within the household –they may be held individually by men, women, and children (Haddad *et al.*, 1997). Men and women own different types of assets, accumulate these assets in variable ways, have disparate access to the same set of resources, and distribution between men and women is often unequal (Meinzen-Dick *et al.*, 2011; Rubin and Barrett, 2009). Who within a household has access to which resources and for what purposes is conditioned by the broader sociocultural context and by intra-household allocation rules (Meinzen-Dick *et al.*, 2011). The distribution of assets within the household is critical to

household and individual well-being, as measured by outcomes such as food security, nutrition, and education. Different types of assets enable varied livelihoods and may have diverse implications for bargaining power or well-being within the household (Meinzen-Dick *et al.*, 2011). Thus, the gendered nature of asset distribution could influence participation at the various nodes of the value chain, as well as control over the benefits derived from participation. Under this dimension, we examine questions such as: What are the resources needed to participate in the pigeon pea value chain? Do men and women differ in their ability to mobilize those resources? How? Why?

The second dimension of the GDF, practices and participation, examines how gender influences what people do and the way they engage in development activities (Rubin and Barret, 2009). It seeks to understand the productive, reproductive, and community development roles and responsibilities of men and women, and to determine the implications and rewards for value chain participation (Rubin and Barret, 2009). The third dimension, beliefs and perception, details who knows what and how, describing how these domains of knowledge may differ by gender. Cultural belief systems prescribe gender identities and behavior, define roles for men and women, boys and girls, and how they go about their daily lives (Rubin and Barret, 2009). The fourth dimension, legal frameworks, investigates how gender can influence the way people are regarded by and treated within the judicial system—including customary law and the formal legal code. Gender relationships may affect rights to legal documents, ownership and inheritance, reproductive choice and personal safety, representation, and due process (Rubin and Barret, 2009). Again, power cuts across all four dimensions of the GDF.

Data collection methods and study sites

Fieldwork was conducted in the north, central, and south regions of Malawi. Agricultural production statistics from the 2010/2011 harvest season indicate the following yields by region: southern: 361,885,741kg; central: 7,802,141kg and northern: 392,044 kg (Tschirley *et al.*, 2014). Within each region, sites were selected based on district level total annual production and stakeholders' input. A map showing the five districts selected for our research may be found at Figure 1.

The Gender Dimensions Framework (GDF) (Rubin *et al.*, 2009) provided the tool-kit for collecting, organizing, and analyzing data from actors at different stages of the value chain. Specifically, using the framework, data was collected to: i) map gender relations and roles along the pigeon pea value chain; ii) identify gender-based constraints (GBC's) at different nodes of the value chain; iii) assess the consequences of the GBCs for value chain participation and benefits derived from value chain participation. In the context of this research, the benefits include improved incomes and food security for all value chain actors.

Quantitative data was collected to map men's and women's participation at various levels of the pigeon pea value chain; and is based off respondent estimation of participation in the marketplace. The overall participation rates are listed in the value chain map below, with upper and lower limits represented. Semi-structured interview guides were designed to collect qualitative data from actors at each node of the pigeon pea value chain: seed actors, farmers, farmers' cooperatives, retailers, local processors, independent trader, and large-scale export buyers, and processors. Qualitative data was collected to help understand existing inequalities

and their causes, power dynamics at play along the value chain, and points of convergence and divergence of interests among actors. Focus groups were the primary method of data collection at the farm level. This method can increase comfort among respondent populations who are unfamiliar with interviews, and because of the interest in generalizing patterns of household dynamics, the dialogue between respondents regarding their experiences was critical.

Interviews were conducted with men and women pigeon pea farmers in the selected extension planning areas (EPAs). The pigeon pea farmers were identified with the help of the extension work for each EPA. In most cases separate focus groups were held with men or women farmers. A focus group was also held with representative members of a farmer owned pigeon pea marketing cooperative in the District of Chiradzulu (South region).

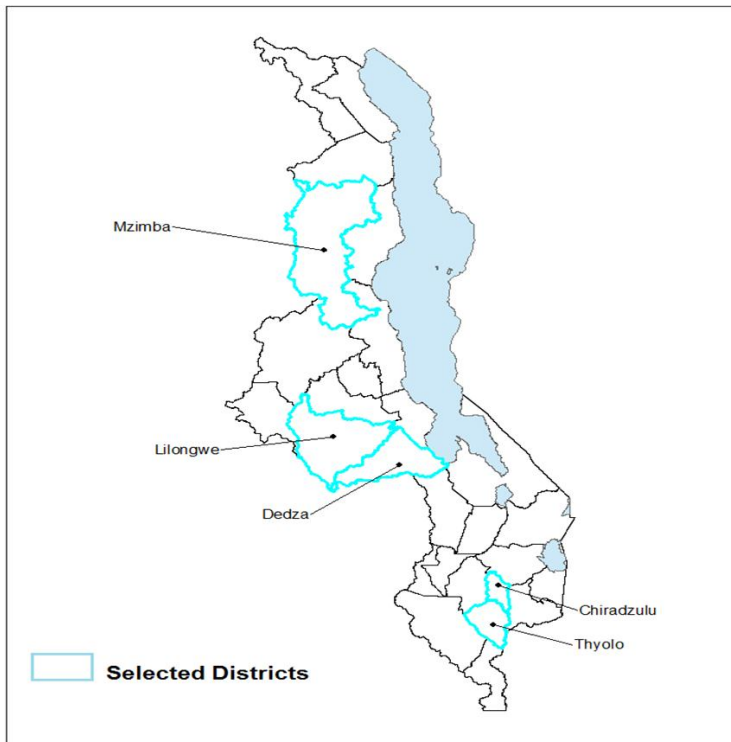


Figure 1: Selected research areas in north, central and southern Malawi

Individual interviews were conducted with retailers and local processors of pigeon peas; independent pigeon pea traders; representatives of large scale pigeon pea processing and export companies; and representatives of the legume seed system in Malawi. Purposive sampling was used to identify the interviewees. All respondents were reminded of their rights as voluntary participants, and consent was collected verbally. A description of our data collection methods and the number of respondents for each node of the value chain may be found in Table 1.

Table 1: Qualitative data collection

Value Chain Node	Data Collection Method	Female	Male	Total Respondents
Seed Actors	Key Informant Interviews (6)	1	5	6
Producers	Group Interview (23)	152	108	260
Producer Cooperative	Group Interview (1)	21	9	30
Retailers and Local Processors	Key Informant Interviews (19)	14	5	19
Local Buyers and Traders	Key Informant Interviews (10)	2	8	10
Export Market Buyers and Traders	Key Informant Interviews (4)	0	4	4

Results and discussion

Gendered participation and gender roles along the pigeon pea value chain in Malawi

A simple sketch of the pigeon pea value chain details the points of access and nodes of activity for men and women in Malawi (Figure 2).

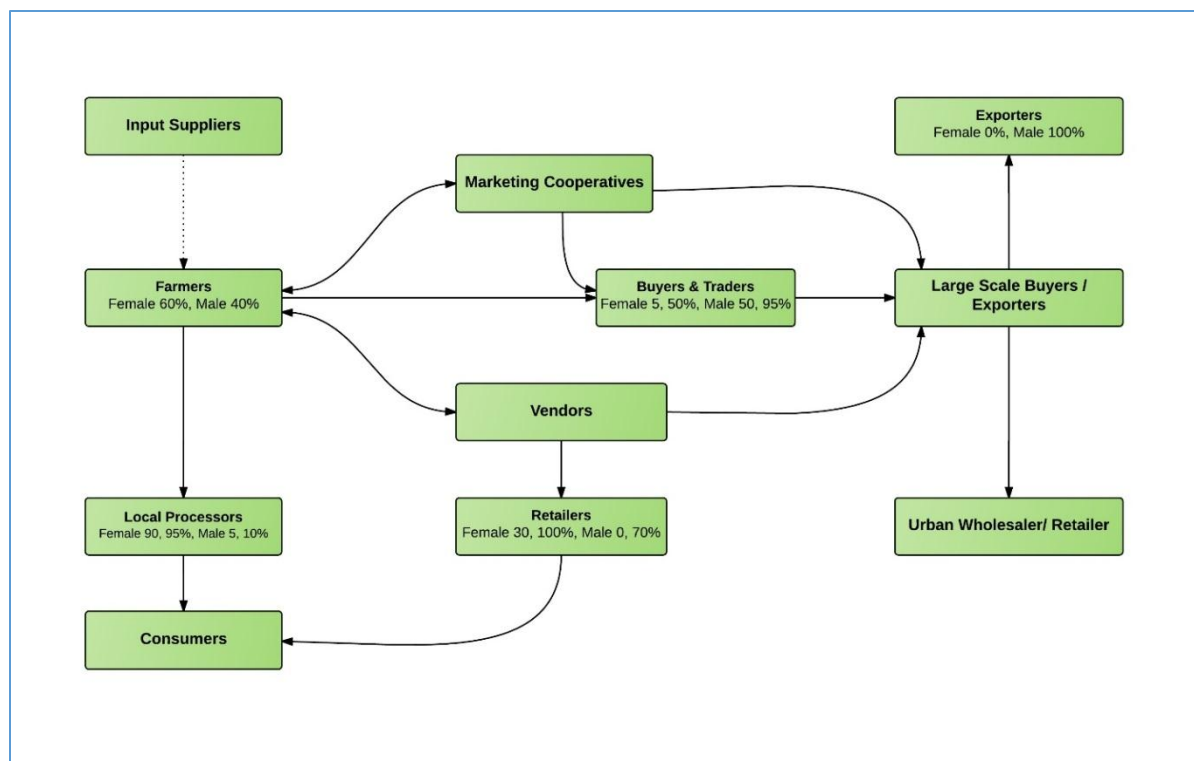


Figure 2: Men and women's estimated rate of participation in the pigeon pea value chain

Seed actors, farmers, farmers' cooperatives, retailers or local processors, independent traders, and large-scale export buyers /processors were identified as the actors along the pigeon pea value chain. Given the regional variation of production and marketing activities (i.e. more activity in the south than north or central), the upper and lower limits of value chain involvement for men and women as reported by respondents are included. Along with regional differences, the qualitative data suggests that participation rates vary by season (e.g. greater involvement by men during the harvest season when maize is also mature, whereas women dominate at the farm level the rest of the year).

As expected for most crops, seeds are a major input in pigeon pea production. Two main seed systems are distinguished in the literature on seed systems: the formal seed system and the local or informal seed system. Louwaars (1994) defines a formal seed system as one which involves a chain of activities leading to clear products: certified seed of verified varieties. A local seed system (also referred to as the informal system) embraces most of the other ways in which farmers themselves produce, disseminate, and access seed: directly from their own harvest; through exchange and barter among friends, neighbors, and relatives; and through local grain markets¹. Unlike in the formal seed system where there is a clear distinction between "seed" and "grain", this is less clear in the local/informal seed system. We find that the formal seed system for pigeon pea in Malawi is not well developed. Key informant interviews conducted with actors in the formal seed sector in Malawi (Chitedze Research Station, Ministry of Field Crops, AGRA, etc.) revealed that several pigeon pea varieties have been released by the Chitedze Research Station. However, it was impossible to trace the flow of seeds from the formal sector because no agro dealers or other avenues selling certified pigeon pea seeds to farmers were found during the fieldwork. The few farmers who mentioned using certified seeds obtained the seeds (often free of charge) from research organizations or projects such as Africa Rising and ICRAF.

The informal sector plays an important role in the provisioning of pigeon pea planting materials to farmers. Farmers relied heavily on grains from their previous harvest (recycled seed)—the un-commercialized informal seed sector; or on the local market for pigeon pea planting materials—the commercialized informal seed channel. Pigeon pea traders play an important role in the provisioning of planting materials to farmers—they select the highest quality grains from their grain stocks, which they later sell to farmers as "seed" during planting. Within the household, women are more heavily involved in the selection and storage of pigeon pea grains recycled for use as seed. Intra-household gender differences in seed related activities are explored in greater detail below.

Pigeon pea production and marketing activities occur to varying extents across the three regions. Not surprisingly, the south continues to dominate given the long tradition of pigeon pea cultivation and consumption in the region. Recent expansion in the processing capacities of most multinational grain exporting companies in the South has created a high demand for pigeon pea, thereby increasing the importance of the legume, not only as a staple food source but as a source of income to many farm households. The increasing importance of the legume as a cash crop has led farmers to adopt a mix of cropping methods, and there have been increases in the field space allocated to pigeon peas over other traditional crops. Compared to the south, the legume is

¹ <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/compendium/tools-guidelines/what-are-seed-systems/en/>

relatively new in the central and north regions. For example, in the Nsipe EPA, District of Ntcheu, Central region, farmers in the group interviews reported that they had only grown pigeon pea for two seasons, and had lost almost all first harvests to pest and disease.

Women are heavily involved in pigeon pea cultivation across all three regions, and the crop is often considered a women's crop (even in the south region where the legume has a better cash generating potential). It is perceived as such, not because women have control over its sale in the market, or the revenue from it, but because women perform the majority of the agricultural labor needed for the crop and also because of the significance of the crop in helping women fulfill their responsibility of providing food (relish) for their families. Further, despite the increased demand in the export marketplace, in Malawi, pigeon pea is still linked to the most marginal households. Men's involvement does not signal that the crop is valued, rather, that because cash/benefit is being accrued, men participate given their role as household heads, and their presence in later nodes of the value chain.

Data collected during our interviews with farmers revealed a participation rate of approximately 60% for women in pigeon pea farming, i.e. about 60% of those who grow pigeon peas are women. It should be noted that the majority of focus group discussion participants at this stage came from the southern region where there is greater pigeon pea activity, and men are increasingly becoming involved with this crop as its cash value increases. Therefore, it is likely that men's visibility is greater in the south compared to the central and north regions. The gender division of labor in pigeon pea production reveals patterns such that women are responsible for most of the pigeon pea production tasks. Women were more likely to be in charge of seed selection, seed storage, harvesting, transport, and cooking. In addition to performing production activities on the family farm where pigeon pea and other cash crops such as maize are cultivated, women are, as prescribed by the culture, responsible for household chores and childcare.

Smallholder farmers sell dried pigeon peas to either vendors (middlemen), independent traders in the villages (or rural assemblers) or to agents buying for large scale buyers/processors. The few smallholder farmers who are members of cooperatives sell their legumes through the marketing cooperative. Some smallholder farmers are also local processors. They harvest and cook fresh pigeon peas from their own production and sell for consumption as a snack in the market during harvest season. It is estimated that women comprise between 90-95% of local processors in Malawi. The heavy involvement of women as local processors in the pigeon pea value chain is attributed to the fact that local processing essentially involves cooking of the legume, a task perceived to be suitable for women, and one that they can easily perform with the assets available to them.

Retailers purchase processed grains (dried, hulled and split) from urban wholesalers/retailers or large processors which they sell to consumers in villages or peri-urban areas. Retailers and local processors of pigeon peas were identified in the central (Dedza Central market) and southern (Namitambo, Yasini, and Kanje markets) regions of Malawi. Except for one local processor who sold biscuits/flitters commonly known as *Cheula*, made from processed pigeon pea flour, the majority of local processors cooked fresh pigeon pea pods obtained from their own fields to sell to consumers on market days.

Unlike local processing, men were more likely to participate in the value chain as retailers. Our data reveals up to 70% participation for men in the retail segment of the pigeon pea value chain, somewhat varied across districts, and with men in the absolute majority off-season. The five men interviewed described pigeon pea retailing as a profitable business due to the increased demand for the legume in the region, and the high availability of the legume during harvest season. Access to finance/cash is an important requirement to participate as a retailer. Unfortunately, unlike their male counterparts, women retailers had less income/cash generating opportunities – men retailers were more likely to be involved in other income generating activities (mostly as hired farm labor or other non-farm income opportunities); funds generated from these other activities were often invested into pigeon pea during harvest season because they were quite certain to obtain good prices off-season.

Independent traders buy dry pigeon pea grains from farmers, farmers' groups, vendors and middlemen which they eventually sell to the large exporters and processors located in Blantyre or Limbe. All independent traders interviewed were located in the south (Thyolo and Chiradzulu districts) due to high levels of pigeon pea activity in this region. The relationship between independent traders and the vendors and middlemen who aggregate pigeon peas from farmers to sell to them is largely informal. In some areas women are estimated to comprise 50% of local traders. Surveyed respondents thought it much more likely for men to be engaged at this node (50-95%). The main activities of this node include: buying of pigeon pea from sellers, lifting of grain bags, storage, weighing, sacking of grain, treatment, and sorting. Key informant interviews revealed that most of these tasks are performed by paid laborers, and there is a preference for male laborers who are perceived to be physically stronger and able to carry out all or most of these business related tasks.

Large-scale and privately owned grain exporting and processing companies interviewed in Limbe and Blantyre include: AGORA, Export Trading Group Rab Processors and Transglobe, INC. These companies buy and export pigeon peas and other commodities (cowpeas, grams, beans, groundnuts, soybeans, sunflower, and maize); and are spread throughout the country in major pigeon pea producing areas. Farmers take their grain to sell at the branches. There are no women who act as large-scale exporters, and very few of the employees in these branches were women (estimated at less than 30% across the country). The main activities associated with buying of the grain at this level include lifting, weighing, bagging, and transporting of the grain from the branches to the warehouse. These activities were believed to be difficult for women to undertake, since women were perceived to be physically weaker than men by employers of the exporting companies (themselves men). While the perceptions of women's physical abilities (in terms of lifting and protecting themselves from theft) impact their participation in large scale market activities, cultural restrictions on their time and mobility are a factor in market participation at a local level.

Buying agents working for large-scale export and processing companies observed differences in the quality and quantity of grain purchased based on gender, where women were perceived to sell higher quality than men. However, they do not receive any price premiums for selling grain of better quality. This difference in the quality of grain sold by men and women was attributed to the common practice of men stealing grain from their wives before they had winnowed or sorted the grains (winnowing and sorting were perceived women's work). As vendors or farmers, men

brought in larger quantities for sale than women. If women's cooperatives were able to scale up their supply, it could be possible for them to capitalize on the market preference for their grain.

Respondents from these companies jointly agreed that current pigeon pea production level in Malawi is insufficient to meet the demand for local consumption as well as for the export market; thus there is huge growth potential for this legume. Notwithstanding the opportunities, they observed the lack of certified /branded seeds remains a major challenge to the pigeon pea value chain in Malawi. Other challenges identified include; variable access to irrigation; the lack of storage facilities among traders (affects the quality of grain brought to sell as well as the price they receive); increased transport costs due to the landlocked nature of the country; differing cultivation strategies amongst farmers (farmers have a subsistence mentality and do not see agriculture as a business); and high competition amongst export market buyers.

Cultural norms, land ownership and crop production and management decisions

Analysis reveals that across all regions, the cultural definition of men as heads of households make them solely responsible for crop production and marketing decisions. Contrary to theories that have attributed the subordinate position that rural women in Africa occupy to their inability to own land—a major asset in food production (Whitehead and Tsikata, 2003)—we find in Malawi that the matrilineal system of land inheritance in the south and central regions may improve women's bargaining power with respect to land utilization. However, as heads of households, men still had the final say on what to cultivate. Thus, access to, or ownership of assets is a necessary but not a sufficient condition for women's empowerment. While older women may have greater decision making power over land in the central and south regions, the findings reveal that across all regions (north, central and south), and irrespective of land inheritance patterns, decision making and control over land was deeply rooted in a culture of patriarchy. Thus, despite the potential for some women to gain access to land, we find that across all four dimensions of the GDF, their participation and ultimately their power to gain food and income security is circumscribed by their gender.

First, within the household, men and women differ in their priorities for growing legumes and hence in preference for different varieties. While women's primary interest in pigeon pea is first as a source of "relish" for household consumption, and second as a source of income, for men, the adoption and expansion of pigeon pea was influenced by the cash generating potential of the legume, which depended in part on the availability of buyers in the location. This gender difference in priorities for growing the legumes in turn influenced the allocation of production resources—decisions made by men—to the legume. As observed by women in the north and central regions, improving access to markets will increase men's interest in pigeon pea, and therefore the risk of men appropriating the crop. This reasoning is congruent to what is observed in the south, where the high demand for the legume (for local consumption and export markets) and the potential of the legume to generate cash has led to greater interest in the legume amongst men. This finding supports existing evidence documenting the appropriation of traditional women's crops by men when the crops become highly commercialized. Men often move into crop activities that were previously "women's", when those activities become commercially viable/cash crop ventures, given their traditional control over financial resources, roles in

commercial and agriculture organizations, and established place in markets. (World Bank *et al.*, 2008)

Members of a household cultivate a common plot. Unlike in other countries in Sub-Saharan Africa, it was uncommon to find multiple plots per household in Malawi. Group interviews with farmers across all regions revealed that men are responsible for making major decisions with respect to land utilization and marketing of agricultural products because of their position as household heads. The cultural ‘perception’ of men as household heads, supports the ‘practice’ of men’s control over land utilization and selling of crops.

Secondly, sex-disaggregated focus group discussions with men and women farmers revealed that not only do men decide what to grow on the farm land, it was also the responsibility of the man to decide on how much of each cash crop (maize, bananas, and pigeon peas) to cultivate based on yearly income needs, and on farming practices (intercropping versus crop rotation).

Third, across all regions (especially in the north and central), constraints on women’s time due to their multiple roles (productive and reproductive), and the secondary position of the crop in terms of its cash generating potential often resulted in late planting and/or insufficient amounts of resources allocated to its production (cash crops are taken care of first). The findings highlight that efforts to expand legume production are likely to have negative implications for women if the current gender division of labor wherein women perform most of the work is maintained. This is demonstrative of the disparate power of men in this value chain, and how the support for cultural customs that reinforce the secondary position of Malawian women, impact the potential for agricultural development.

Gender disparities in access to and participation in markets

Unlike men, our data revealed that women are less likely to own or have access to transportation assets (such as carts and bicycles). Throughout Malawi, women frequently transport by head load, whereas men have access to bicycles or carts. Data collected also revealed cultural restrictions on women’s mobility (the expectation that women belong to the domestic space/sphere), which simultaneously with gender disparities in access to, or ownership of transportation assets limit the participation of women farmers in the markets where pigeon peas are sold. Women’s limited access to transportation and cultural restrictions on their mobility also manifest downstream in the value chain. As retailers and traders of pigeon peas, women can’t travel to high volume points where lower bulk prices would result in higher profits back in their villages and/or are unable to delay sales or negotiate for better prices when selling at a profitable price requires staying one more day away from home or paying more transportation. Access to markets is particularly important for the north and central regions with fewer opportunities to sell at the farm-gate. Generally, limited access to markets has implications for prices received and hence the profitability of the crop to producers. For women in particular, their limited participation in markets due to gender disparities in transportation assets and cultural restrictions on their mobility forcefully solicits the involvement of men in legume marketing. Across all regions, data collected from the group interviews revealed that men’s participation in markets increases their access to crop income, and together with their role as heads of household, increases the control that they have over income derived from the sales of pigeon pea. In five out of 13 group interviews conducted in the north and central regions where access to pigeon pea markets/buyers is significantly limited, women indicated that including husbands in the

transportation and marketing of the pigeon peas quite often results in their husbands using the revenue generated from sales for their own personal needs (e.g. alcohol and/or to hire prostitutes).

Control over crop income was cited as a major source of household conflict in the central region of Malawi. Group interviews with women only revealed that men's use of crop revenue for their own personal gains would often result in a family going without food or being forced to find alternative food provisioning resources. Even in the southern region with greater opportunities to market pigeon peas, women in the group interview reported that it is customary for women who sold pigeon peas to return all generated revenue to men/husbands, who have greater decision making authority on the allocation of crop revenue to different household expenditure categories. Women had access to only a small part of the crop revenue, and they were expected to use their part for the provisioning of food for the household. Their limited control over crop income was cited as a major source of disincentive to contributing labor for the expansion of pigeon peas beyond immediate household consumption needs. In this case, access to assets (GDF dimension 1) is intricately tied to how the practice of/participation in marketing is performed (GDF dimension 2). Combined, they construct significant barriers for women's profitable participation in the pigeon pea value chain beyond their role as farmers and women's ability to scale pigeon pea cultivation at the farm level is diminished by gendered household labor roles. The findings highlight the need for innovative ways of improving women's direct access and participation in markets. Doing so could increase their control over pigeon pea sales income. Women's direct access to pigeon pea income is likely to improve their participation in decision making on the allocation of crop revenue to different household expenditure categories. Evidence from other studies supports a positive relationship between women's control over income and household food security status (Kerr *et al.*, 2013).

Gender disparities in access to business capital/credit

Analysis reveals access to financial capital as a critical resource requirement for participation at the post-farm levels of the pigeon pea value chain. Capital is an 'asset' (GDF dimension 1), however, the limitations to women's access to it must be understood within customary and legal frameworks (GDF dimension 4) that privilege male business networks, allow men to participate in the cash economy, and use other business ventures as collateral.

Key informant interviews with pigeon pea retailers and traders reveal that high interest rates discourage individual/personal borrowing. Group loans are also not popular in Malawi. Only one of the retailers interviewed mentioned that she was a member of a group of 10 other retailers (not necessarily dealing in pigeon peas) who have benefited from a group loan from the Foundation for International Community Assistance. In addition to the general challenges associated with obtaining credit/loans for business expenses, discussions with both men and women key informants at the retail and trader nodes of the value chain revealed that women had fewer opportunities to access business credit than men.

The unequal gender division of productive and reproductive labor at home and the cultural definition of the home as the appropriate space for women forcefully restrict women's participation in cash earning or generating opportunities for business purposes. Men and women key informants also observed that most cash-earning opportunities require significant amount of

physical strength or energy, thereby excluding women who are perceived to be less energetic than men. Gender differentials with respect to access to capital were identified as a major reason for the difference in men and women's participation at this level. A male trader explained that: *"Men usually have more business capital which is essential in this business."* Both men and women key informants at the retail and trader levels of the value chain reported that men have greater access to cash resources, either through specialized networks or opportunities to earn cash income away from home. A few of the women retailers interviewed observed that they are more likely to buy on credit, and quite often do not break even. Their inability to break even leaves them in a cycle of revolving debt to their creditors. Women retailers attributed the difficulty to repay debt in spite of the profitability of the business to their sometimes inability to separate business income from household income needs—it is common practice to find women diverting profits to other businesses and household needs.

Limited access to capital hinders business expansion even when there are opportunities – it limits the size of inventory, and the ability to buy in bulk for discounts. Good storage is important to maintain the quality of the grain, and fetch higher prices. Cash is needed to build or rent storage facilities, and to acquire vehicles used in transporting the grains to export buyers and processors. Men traders owned warehouses separate from their homes; whereas the single woman trader interviewed used the house her family lived in for legume storage.

The findings indicate a need to expand opportunities for business capital, and to make access to such opportunities gender equitable. Improving access to business capital for men and women operating at these nodes of the chain is likely to stimulate investments in business-related infrastructures, such as storage and transportation, which in turn will have implications for the profitability of the business. Retailers and traders especially noted that pigeon pea marketing was a very risky business because of frequent price fluctuations. Excellent negotiation skills were required to be successful in such an environment. Men described potential women colleagues as unlikely to negotiate better prices, easily taken advantage of by other actors in the market, and less able to withstand the pressure that the business exerts. Women discussed fears of being cheated by the exporters/processors, therefore often relying on their husband or other male relatives for the selling of grains to large-scale export buyers. These latter comments are reflective of how gendered beliefs and perceptions of women's ability to do 'business' reinforce their participation in the pigeon pea value chain at less profitable nodes, and/or earn lower profits compared to men operating in the same node.

These findings imply that supporting women's participation at the retailer and trader nodes of the value chain will require, in addition to improved access to credit, other business related resources (for example training on business management skills and negotiation skills), necessary for enhanced profitability, which will in turn increase the potential for pigeon pea to contribute to food security. It will also require training and education for men and women challenging the cultural stereotypes which depict women as poor entrepreneurs. Options for group loans that could be administered through women's cooperatives should be explored, along with other microcredit schemes that can help to foster economic empowerment and business acumen.

Access to and control over revenue

Who has access to and/or who controls farm or business income has implications not only for the participation and performance of the various nodes of the value chain, but also for the benefits derived from the value chain participation and how these are distributed. Data collected from the farm-level in the central region of Malawi revealed that even when pigeon peas are sold in the market, gendered preferences for different crops and intra-household gender power relations intersect to determine how crop income is spent. Group interviews with women in the Nsipe EPA revealed that as heads of households, men are responsible for the decision to invest crop income on farm inputs. Women reported that men are more concerned with maize yields/harvest and the greater potential for maize to generate more income (compared to other crops). As a result, there is a tendency among husbands to invest income from the sales of pigeon pea in the purchase of fertilizers for maize plots or other maize inputs (e.g. maize seed), while women were responsible for saving seeds for the production of the legume in the next planting season.

According to the women in the group interviews, revenue from pigeon pea sales is rarely reinvested in the purchase of pesticides for pigeon pea, in spite of their knowledge that the legume requires specific chemicals. There were no reports of using pigeon pea revenue explicitly for the benefit of the following year's yield. Men's control over crop income has implications for crop yields, especially given the high risk of pest damage. Moreover, women's limited control over crop income has implications for household food security. Cultural norms dictate that women provision household food needs; in most cases women are given a small amount of cash from their husbands or male relatives after all other expenditures have been satisfied. The amount allotted to women is not always sufficient to meet the household's needs. Promoting pigeon pea adoption across all regions as an innovation for food security would require increasing the role of women in intra-household decision making and control over crop income. Here again, the greater power afforded to men through the maintenance of cultural beliefs and perceptions, impacts how and when women have access to assets.

Post-farm level, married women (50%) who participated in the value chain as retailers and/or local processors described themselves as business owners, and reported joint decision making with their husbands when it came to the allocation of revenue generated from pigeon pea sales. In most cases men's control over income from their wives' businesses was maintained, given the role men play in providing capital for these ventures—which is a constraint similar in nature to that faced by married women farmers. It would appear then that female heads of households (20%) have more control over business income. However, the sizes of their businesses were observed to be smaller than that of married women (likely due to resource differentials). At the local-processor stage of the value chain, while women key informants identified themselves as business owners, they also observed that within the household, men were mostly responsible for cultivation decisions—the husband decides which crop to grow. This is important because the fresh pigeon pea pods which are cooked for sale are obtained from the family farm (cultivated jointly by husband and wife). According to women in this group, limited access to seeds reduced production affects the volume of the legume available to cook for sale. Further, men saw their participation in pigeon pea retailing as an opportunity for capital accumulation, whereas women's decision to participate as retailers/local processors was driven by the necessity to generate income. One retailer stated that she participates in pigeon pea retailing because she needs to earn income to pay school fees for her daughters as her husband found it inappropriate

to educate girls (they were meant for marriage). Two other women interviewed were heads of their household, one through separation and the other because her husband was in jail. This made their businesses a major source of income for household and childcare expenses.

Overall, whether as business owners or not, the profitability of women's businesses is further reduced by the unequal gender division of labor within the household. The cultural expectation that women take care of children and household chores reduces the time and labor women may commit to business. Women retailers reported having to close their businesses early in the day to carry out culturally prescribed domestic responsibilities. In contrast, men pigeon pea retailers reported that the business was their primary focus; they could rely on their wives to handle domestic chores, and did not have to limit store hours because of household responsibilities. The gender division of labor and the cultural restrictions on women's mobility limits travel to regional markets where supplies are cheaper—thus limiting the scope, size, and profitability of their businesses (their power). The perception that women are weaker than men places the women operating at the independent trader node of the value chain at a greater risk of theft and vandalism even when they are able to travel to heavy production zones to procure supplies,. This limits their ability to buy larger volumes of grain at lower cost, affecting the performance and profitability of their business.

Conclusion

The findings support existing evidence that the gendered nature of asset distribution influence participation in livelihood generating opportunities and have diverse implications for bargaining power or well-being within the household (Meinzen-Dick *et al.*, 2011). As shown by our gender mapping of the pigeon pea value chain, women are concentrated at points along the chain with minimal resource requirements, and that are flexible enough to allow them to perform their culturally defined role as homemakers. Constraints on women's time, their mobility, and the expectations for domestic labor, severely restrict women's ability to participate in the pigeon pea value chain at any node. We illustrate that while ownership of assets is an important determinant of bargaining power within the household, patriarchal customs governing both matrilineal and patrilineal communities in Malawi play a much more significant role in determining decision making authority and control over other productive assets and income (Coles and Mitchell, 2011). Thus, promoting gender equitable opportunities to access or own land is a necessary but not a sufficient condition for empowering women in agriculture. Even when women are the 'custodians' of land as in matrilineal communities in Central Malawi, patriarchal customs dictate that women relinquish control and final decision making authority to their husbands, or risk abandonment.

Innovations seeking to increase food, nutrition, and income security through the scaling of pigeon pea must identify ways of enhancing women's access to the resources required for their businesses to be profitable (e.g. finance, business training); and importantly improve their role in decision making and control over financial resources. At each node, men's control over income and household spending impacted women's ability to direct funds to pigeon pea cultivation or food provision even when women reported some joint decision-making with their husbands. Any effort to increase pigeon pea production without considering the social context of value chain, is unlikely to achieve positive gains for food security. As household heads, men control income

from pigeon pea sales, limiting women's incentives to expand production beyond household consumption needs, and decreasing the potential for this legume to contribute to improved food security and poverty reduction. In this value chain, the intersectionality of the GDF is demonstrated, where women's access to productive assets, is limited by beliefs and perceptions, cultural practices, customary frameworks, and the ability of men to refract power throughout.

The link between legume adoption/expansion, food security, and poverty reduction is mediated by intra-household dynamics and gender relations. The finding that gender differences exist in preferences for legume type within the household, (women prioritize food consumption benefits of the legume, while men prioritize cash benefits) is of concern. While strengthening women's role in cultivation decision making could increase the chances of growing the legume, women's access to, and participation in markets must be improved to enhance overall household food security (Doss, 2013). This is primarily a function of the potential for increased earnings that would be used to purchase food; however, given the relative protein content of legumes compared to maize, greater consumption rates can also improve nutrition outcomes. However, in order for women to meaningfully participate in markets, their access to, or ownership of, transportation resources must be improved; or opportunities to market the legume must be brought closer to where these women are. Women producers are unable to take their harvest to markets where higher prices may be fetched, and women retailers could not travel to market sites where bulk purchasing was possible. Moreover, market participation for women beyond the producer node is limited by a lack of business capital, and training.

Innovations to promote market access must consider the implications of the gender based disparities demonstrated throughout this paper, and identify gender sensitive approaches of enhancing market participation. Importantly, programs or interventions that seek to address the gender-based constraints faced by women must specifically target men as important agents of change. While group ownership or cooperative schemes are often a popular recommendation to increase entrepreneurial opportunities for women, to succeed in this context, it would be necessary to address the general patriarchal culture that limits women's social and physical mobility, in addition to including financial literacy training, access to credit, and market transport. Interventions to promote entrepreneurship for women must take into account intra-household dynamics or gender relations that have implications for the success of their businesses. Improving women's direct access to business capital could contribute to enhancing their role in decision making and control over revenue, assuming that these accounts would not be accessible to their husbands or male relatives, which may be unlikely in some of the more patriarchal regions of the country. However, given our findings that support the link between women's greater control over business income and greater food security and nutrition gains for their families, it is critical that measures be taken to increase women's financial literacy and revenue control.

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