



Gender, vegetable value chains, income distribution and access to resources: insights from surveys in Tanzania

G. Fischer¹, A. Gramzow² and A. Laizer²

¹ International Institute of Tropical Agriculture (IITA), Duluti, Arusha, Tanzania

² World Vegetable Center, Eastern and Southern Africa, Duluti, Arusha, Tanzania

Summary

In sub-Saharan countries, male farmers are frequently seen as producers of cash crops and marketable vegetables, while female farmers are perceived as producers of food crops for home consumption. Few authors have tried to validate this perception of gender in the production of traditional vegetables, and gender differences in access to resources and markets remain underexplored. The same holds true for traders of traditional vegetables who share the same value chain. The few studies available have tended to focus either on the household (as the unit of production) or on the market (for trade), neglecting interrelationships between the two. This knowledge gap must be addressed if men and women are to benefit equally from interventions to counteract poverty. A survey of 360 smallholder farmers and 82 vegetable traders in Tanzania was conducted under the “Africa Research in Sustainable Intensification for the Next Generation” program funded by the United States Agency for International Development (USAID) and led by the International Institute of Tropical Agriculture (IITA). Its objective was to examine gender relationships within production and within trade, as well as between the actors in both groups. Research foci were on production activities and income, market performance and access to resources as important areas of gendered value chain analysis. Results show no pronounced gender division in the production process, with the exception of pest and disease management, input purchase and seed selection (all predominantly carried out by men). Clear differences between male and female farmers emerged in the allocation of income from various crops. An exploration of why leafy vegetables are grown revealed that the juxtaposition of food crops and cash crops in relation to gender needs to be rethought. Market performance of female producers of leafy vegetables was weaker than that of their male counterparts and that of female traders. Both male and female traders rated their decision-making power as high in relation to the income generated through vegetable sales. For female smallholders, access to land constituted a major constraint. Women in male-headed households had the least contact with extension officers and training. Without careful consideration of these and other results of gender analysis in value chains, interventions are at risk of failing to improve the livelihoods of producers and traders.

Significance of this study

What is already known on this subject?

- Gendered value chain analysis has produced little evidence in respect of vegetable production and markets.

What are the new findings?

- While there is no pronounced division of labor among men and women, there are clear differences in income allocation and market performance.

What is the expected impact on horticulture?

- The findings contribute to rethinking approaches to research and intervention to promote gender transformation.

Keywords

gender relations, value chain analysis, horticulture, traditional vegetables, vegetable production, vegetable trade, smallholder agriculture

Introduction

Male farmers in developing countries tend to be seen as producers of cash crops and marketable vegetables, while growing food crops for home consumption is deemed a female domain – a generalized conception that needs more validation on a case-by-case basis (Danso et al., 2004). Studies of gender in traditional vegetable production and sale have yielded diverse results, with women sometimes being strongly involved in trade (Obuobie and Hope, 2014). In the past decades, evidence has grown that the opportunities available to men and women differ where livelihoods in agriculture relate to intra-household differences in access to and control over resources such as land and labor (Meinzen-Dick et al., 2011). The unitary model of the household, which assumes that all members pool resources and share the same preferences, has not only been criticized but also recognized as a potential threat to development interventions that are meant to be equitable (Quisumbing, 2003). At the same time, the demand for gender integration in value chain analysis has grown (Mutua et al., 2014). As a result, interventions geared at improving income and food security are gradually taking more interest in gender as it relates to the distribution of resources, income and responsibilities in households and among value chain actors, and how this allocation affects their activities.

The study presented in this paper was conducted at the onset of a project in Tanzania that aims to increase smallholder farmers' productivity by (among others) introducing improved vegetable varieties and good agricultural practices. It is funded by USAID under the title "Africa Research in Sustainable Intensification for the Next Generation" (Africa RISING). Apart from increasing productivity, the project is committed to being gender-sensitive and to promoting the participation, learning and benefits of female farmers. The baseline therefore included an analysis of gender dynamics in household vegetable production, consumption and sale in Babati, Kiteto and Kongwa districts of Tanzania. In a survey of 360 male and female smallholder vegetable producers and 82 traders, we examined the following areas: vegetable production, access to markets, market performance, and access to resources such as land, credit and extension services. One positive screen for recruitment to the household survey was farmers' engagement in the growing of leafy vegetables as well as fruit vegetables. This was meant to allow for a comparison of male and female involvement in the production of various kinds of vegetables and staple crops. For the traders' survey, we approached men and women who sell leafy and fruit vegetables (but not staples) in green markets.

The gender analysis in this paper is based on the following questions: How do gender relations interact with production activities and income, market performance, and access to resources in the traditional vegetable value chain? Using these insights, what could be the entry points for further research and how could the results inform development interventions in the examined chain? In the Conclusions we will return to these questions. In the Theoretical approach, we review the literature to provide a backdrop for our study. Thereafter, we introduce the methodology and study sites. Then we present and discuss the main findings. The paper ends with the Conclusions.

Theoretical approach

Two themes have been prominent in the recent scholarly literature analyzing gender in smallholder vegetable production, consumption and sale in developing countries. The first theme revolves around the question whether the promotion of home gardens (largely managed by women) has a positive impact on family diets and income. A second theme goes beyond the homestead and explores gender in the traditional vegetable trade. Here scholars and practitioners have taken an interest in how interventions might influence men and women's participation in various segments of the value chain and the income linked to those activities. The last theme has been addressed by focusing on urban and peri-urban versus rural areas and some of the linkages between them. We will briefly outline some results to provide a backdrop for our own study.

Home garden interventions have been described as nutrition and gender-sensitive, but this has yet to be validated, as argued by Schreinemachers et al. (2015). In their study in Bangladesh, they examined the effects of offering women training in home vegetable production and nutrition. Their results indicate that the supply and consumption of vegetables increased in the course of the project and thus improved nutritional security. However, they concluded that "the contribution of home vegetable gardens to household income [was] negligible" (2015, 104). This last finding confirms Bouis's (2003) results, as well as those of Kumar and Quisumbing (2011), although other investigations show a positive impact on income generation (for an overview,

see Berti et al., 2004). Despite Schreinemacher et al. (2015, 104) focus on improved nutrition as their project's objective, it was women's "involvement in all tasks that involve money – buying inputs, selling produce, and receiving revenues" that empowered them to some degree. These insights could prompt discussions on how the objectives of interventions match different gender approaches. While an exclusive focus on home garden training for women may have positive outcomes for nutrition, it may at the same time endorse an accommodating approach, in the sense that female subsistence activities around the home tend to be seen as gender-congruent. Offering women a variety of opportunities in vegetable production and marketing could encourage a more transformative approach that enables participants to renegotiate intra-household resource allocation.

The second theme, focusing more on gender and commercialization, has yielded insights that strongly differ between contexts. In an ethnographic study in rural Mali, Wooten (2003) describes how a growing urban demand for vegetables prompted male villagers to claim garden land that had previously been cultivated by women. Access to land was re-defined as depending on lineage affiliation – a definition that disadvantages wives, who (in a patrilineal context) are outsiders in their husband's clan. In Wooten's case, market-oriented vegetable production further limited rural women's ability to fulfill household obligations, while at the same time urban trade of the produce firmly rested in women's hands. Research in West Africa provides further evidence for women's outstanding role in traditional vegetable retail and wholesale marketing (Obuobie and Hope, 2014). However, especially in urban and peri-urban areas, farming seems to be dominated by men (for a survey of West African countries, see Drechsel et al., 2006). Male dominance in production is explained by differential access to resources (although claims to urban open spaces tend to be more negotiable), heavy irrigation work, and the fact that high-priced vegetables are more often culturally regarded as male (Obuobie and Hope, 2014). A study in Nigeria (Deji et al., 2013) points to what rural male and female vegetable farmers perceive as constraints. While men mentioned storage and marketing among the four most important problems, women referred to the non-availability of land and credit. Both equally complained about high costs of inputs and little contact with extension providers. Turning to East Africa, Weinberger et al. (2011) surveyed the participation of women in supply chains for traditional vegetables in Kenya and Uganda. They found high female involvement, with more women in retailing than in farming. However, "women earn the lowest incomes in the supply chain and within each group of supply chain actors" (Weinberger et al., 2011, 179). The authors suggest that more research is needed into gender differences along the chain, and policy interventions that consider women's specific needs.

In the light of the insights gained from the above discussion, it appears that one set of studies (especially in respect of the first theme, but also in connection with the second theme) tends to focus on household members and their arrangements in vegetable production, while another set investigates market activities beyond farming – leaving a gap between both groups of actors. We intend to bridge this gap by collating the data of farmers and traders along the same value chains. The results will help development planners to understand the potential interaction of interventions with income allocation and gender dynamics, and to be aware of the opportunities and constraints of various male and female actors in the value chain.

TABLE 1. Farm household and traders' survey: respondents' characteristics.

	Male	Female
<i>Farm household</i>		
Number of interviewees (share in %)	157 (44%)	203 (56%)
Age (average in years)	39.5	39.4
Education (average level)	7 years (primary)	7 years (primary)
<i>Traders</i>		
Number of interviewees (share in %)	15 (18%)	67 (82%)
Age (average in years)	40.5	35.8
Education (average level)	7 years (primary)	7 years (primary)

Methodology

Between June and August 2015 we conducted 360 structured interviews with members of farm households in nine villages in Babati, Kiteto and Kongwa districts of Tanzania. For sampling we relied on a two-stage technique: Based on the prominence of vegetable production and marketing activities, three villages per district were purposively chosen. In the villages we randomly selected 40 farmers. For 9 villages this added up to 360 respondents. For the smallholder survey we spoke to one adult member of a household irrespective of their position (head or non-head). This is in line with gender-responsive sampling as outlined in the CGIAR (Consultative Group on International Agricultural Research) standards (Doss and Kieran, 2013). Out of the 360 respondents, 157 were male (44%) and 203 female (56%). The majority (82%) lived in a male-headed household, with 18% living in a female-headed household. Men and women had a similar educational background and were of similar age (Table 1). As a baseline, this survey informed a project that combines on-going research and scaling activities under the umbrella of a USAID-funded program called "Africa Research in Sustainable Intensification for the Next Generation (Africa RISING)".

Farmers in the three study districts have access to roads (at a reasonable distance from the cultivation areas) and at least some irrigation sources beyond rain, two factors which Everaarts et al. (2016) view as determining vegetable production in Tanzania. Labor is mainly sourced from within the household with almost no mechanization (apart from a few cases of tractor plowing). Maize constitutes the staple crop, often intercropped with legumes. Farm sizes in our sample range from 0.1 ha to 19.4 ha, with an average farm size of 2.67 ha (median 2.05). Actors along the vegetable value

chain are: input suppliers, smallholder farmers, traders (for retailing and wholesale) and consumers (Zoss, 2014). Processing is not common in the examined chain. Traders often buy at the farm gate or even harvest the produce (Everaarts et al., 2011).

Questionnaire development was preceded by qualitative interviews with farmers, district and village extension officers, as well as with vegetable traders in the project districts. Their accounts prompted us to establish a second line of inquiry on trade with 82 respondents who were active in trading fruit and leafy vegetables at green markets in villages or in smaller urban centers. Fifteen (18%) of the traders were male and 67 (82%) were female. Of the 82 traders, 69.5% lived in a male-headed household and 30.5% in a female-headed household. The low number of male traders is due to the fact that the sale of leafy vegetables was a screening criterion and respondents were approached at green markets. However, as we learned at later stages of the study, male and female leafy vegetable traders differ in their marketing channels: women sell 76% of the produce to end consumers at green markets. Men sell only 57% to end consumers and sell 38% to retailers, grocery stores or local restaurants. Our study's concentration on green markets as the "default" in vegetable marketing in Tanzania (Zoss, 2014,) therefore resulted in a non-representative male trader sample that requires caution in interpretation.

Results and discussion

Production activities and income

The first part of the survey was concerned with the involvement of men and women in the production management of leafy vegetables (amaranth, Chinese cabbage, Ethi-

TABLE 2. Production management and income distribution by gender.

	Who <i>mainly</i> manages the production of the crop?						Who <i>mainly</i> receives income from sales?					
	Male		Female		Both		Male		Female		Both	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Maize	139	48.1	27	9.3	123	42.6	209	72.3	29	10.0	51	17.6
Sorghum	11	35.5	6	19.4	14	45.2	24	85.7	3	10.7	1	3.6
Pigeon pea	70	65.4	8	7.5	29	27.1	83	77.6	8	7.5	16	15.0
Tomato	69	31.7	50	22.9	99	45.4	85	39.0	80	36.7	53	24.3
African eggplant	17	30.9	7	12.7	31	56.4	20	43.5	16	34.8	10	21.7
Onion	6	21.4	7	25.0	15	53.6	8	28.6	14	50.0	6	21.4
Amaranth	42	27.1	41	26.5	72	46.5	40	25.8	81	52.3	34	21.9
Chinese cabbage	64	29.0	62	28.1	95	43.0	67	30.3	104	47.1	50	22.6
Ethiopian mustard	29	25.9	41	36.6	42	37.5	35	31.3	57	50.9	20	17.9

opian mustard), fruit vegetables (tomatoes, onions, African eggplant), staple crops (maize, sorghum), and legumes (pigeon pea). The results presented in Table 2 show no significantly higher involvement of men or women in management, with the exception of maize and pigeon pea. In the case of maize, 48.1% of the men managed production alone, as opposed to only 9.3% of the women. In the case of pigeon pea, the differences were even more pronounced: 65.4% for males in contrast to 7.5% for females. Other crops showed joint involvement of both men and women in production, or relatively equal shares of sole management.

Differences in the allocation of income generated from crops were more significant. In more than 72% of all households, men received the income generated from growing maize (72.3%), sorghum (85.7%) and pigeon pea (77.6%), although in more than 40% of the households, production was managed jointly by men and women (except for pigeon pea). Looking at leafy vegetable and onion production, a different picture emerged: in more than 50% of the households the income went to women (Chinese cabbage only 47.1%). Revenue from tomato and African eggplant sales were equally distributed. In all female-headed households in the survey, the household heads managed production and received the entire income. These results confirm that staple crops (such as maize and sorghum) as well as cash crops (pigeon pea is rarely consumed in the investigated districts) tend to be defined as male. However, leafy and fruit vegetables do not seem to be clearly gender-allocated, and therefore allow women opportunities for more income generation. This is in line with Mwaura et al. (2013),

who show in Kenya that the share of leafy vegetables in total income was significantly higher for women than for men.

In spite of female farmers deriving higher benefits from leafy vegetable sales, male farmers in our sample had a stake in the production of these crops. Some 56% of men and women living in male-headed households indicated that the head initiated cultivation (with only 34.2% for initiation by the wife, 8.8% for both and 1% for others). In what way this relates to the head's decision-making power in terms of what vegetables to grow, his approval of potentially separate income-generating opportunities for his spouse or his actual involvement in production needs to be explored further. In an open-ended follow-up question (that was coded later), we explored why the same respondents opted to grow leafy vegetables. Three main reasons emerged: for sale only, for sale and consumption, and for consumption only. Of the 317 responses we received linked to these reasons, 56% went to sale and consumption, 35% to sale and 9% to consumption. Separating men, women in male-headed households, and women in female-headed households confirmed the overall trend, but also brought out nuances. Female heads had a stronger interest in cultivation for income (44% of their answers) as compared to women in male-headed households (38%) and men (30%). At the same time, female heads had the least interest in production for consumption (5% of their answers, followed by 8% for men and 11% for women in male-headed households). Looking at combined production for income and consumption, 62% of the responses given by men were in favor of it, with only 51% of women in male-headed households, and 51% of women in female-headed households. These findings show that in the communities studied, female farmers are proponents of commercial leafy vegetable production, while at the same time many retain some produce for consumption at home. Related to vegetables in general, we asked respondents who in their household decides on the share for home consumption and the share to be sold (see Table 3). The results point to a high decision-making power of women in this respect, not only in female-headed households but also in male-headed households (the latter with 59.7% for the wife and 18% for joint decision-making with the husband). This should be of

TABLE 3. Household decision-making on consumption and sale.

		MHH (in %)	FHH (in %)
Who in your household decides about the share of vegetable crops used for home consumption and the share to be sold on the market?	Husband	22.0	1.5
	Wife	59.7	98.5
	Both	18.0	0.0
	Others	0.3	0.0

TABLE 4. Comparison of activities during leafy vegetable, fruit vegetable and cereal production by gender and household type (in %).

	Leafy vegetable production					Fruit vegetable production					Cereal production				
	MHH		FHH			MHH		FHH			MHH		FHH		
	Women	Men	Both	Women	Men	Women	Men	Both	Women	Men	Women	Men	Both	Women	Men
Making money related decisions	26.2	68.7	5.1	96.8	3.2	20.6	74.3	5.1	97.5	2.5	9.2	84.5	6.4	95.2	4.8
Managing labor	31.2	44.6	24.2	96.6	3.4	22.5	47.8	29.7	97.5	2.5	11.1	54.2	34.7	95.2	4.8
Nursery management	29.8	33.9	36.3	96.9	3.1	24.1	36.2	39.7	97.6	2.4	8.5	27.9	63.6	96.7	3.3
Planting/transplanting	30.1	28.1	41.8	96.9	3.1	23.8	28.5	47.7	97.6	2.4	10.2	25.1	64.7	96.7	3.3
Seed selection	26.6	50.2	23.2	96.9	3.1	21.5	56.3	22.3	97.6	2.4	8.7	56.4	34.8	95.3	4.7
Plowing	27.4	35.8	36.8	96.8	3.2	21.2	36.0	42.8	97.6	2.4	8.3	35.1	56.5	96.7	3.3
Pest and disease control	21.7	73.8	4.5	96.6	3.4	16.7	80.5	2.8	97.4	2.6	6.2	86.9	6.9	96.0	4.0
Irrigation	28.1	36.3	35.6	93.8	6.3	22.3	35.5	42.2	97.6	2.4	8.6	41.0	50.5	95.8	4.2
Weeding	33.4	21.4	45.2	96.9	3.1	26.0	22.4	51.6	97.6	2.4	9.2	22.0	68.9	96.3	3.7
Harvesting	34.0	22.8	43.2	96.9	3.1	26.0	22.8	51.2	97.6	2.4	8.2	20.4	71.3	95.0	5.0
Processing crops for consumption or sale	40.4	22.6	37.0	96.9	3.1	31.8	28.2	40.0	97.6	2.4	8.1	24.0	67.8	95.2	4.8
Selling products	48.6	29.5	21.9	96.9	3.1	34.9	38.9	26.2	97.6	2.4	13.8	69.6	16.6	95.3	4.7

TABLE 5. Leafy vegetables: comparison of farmers' and traders' negotiation power during price negotiations with buyers.

Respondent	Farmers			Traders	
	MHH		FHH	Male (%)	Female (%)
	Male (%)	Female (%)	Female (%)		
I decide about the price	31.5	22.6	26.5	55.6	37.8
I ask the other farmers/ask other traders	15.9	23.0	14.7	0.0	9.8
I take what the trader/customer is willing to pay	18.5	31.7	37.3	16.7	3.7
I only sell when the price is reasonable	33.7	22.6	21.6	-	-
I always add a percentage to the purchase price	-	-	-	27.8	48.8
Others	0.4	0.0	0.0	0.0	0.0

interest to interventions targeted at increasing vegetable consumption and production for income generation, or a combination of both. The assumption that women cultivate for consumption and men for sale (Danso et al., 2004) cannot be confirmed by our study. Future research should go beyond the juxtaposition of vegetable cash crops and food crops, and pay more attention to a third category that emerged in our analysis: production for both cash and food, in a flexible manner depending on decisions that in our case involved women to a high extent.

Table 4 provides a more detailed account of the different activities in the production of leafy and fruit vegetables, as well as cereals, which corroborate the findings for male-headed households presented in Table 2. Male smallholders were predominantly engaged in the marketing of cereal crops, while women tended to be responsible for selling leafy vegetables. However, male and female household members cooperated in most of the production stages. Only for the following activities did a higher labor share of male household members become visible: money-related decision-making (such as input purchase and seed selection), and pest and disease control. This higher labor share was observed across all crops, even for leafy vegetables.

Our data confirm Weinberger and Msuya's (2004) and Keller's (2004) findings for similar contexts in Tanzania. They concluded that men's involvement in pesticide application is particularly high. Differences from one context to another emerge when it comes to nursery management. Our findings suggest that (except in the case of female-headed households) most nursery management is carried out by men and women, either in cooperation or in equal shares. Only in the case of cereals are men more active in this production step. By contrast, household surveys in Ghana have found that nursery management of vegetable crops in urban areas is a male domain (Cornish et al., 2001).

Market performance

An indicator of the market performance of vegetable producers is their impact on producer prices during price negotiations. In our household survey, we investigated the roles assumed by female and male household members during price negotiations with buyers of tomatoes and leafy vegetables. It became apparent that, in general, farmers' desire to negotiate prices (instead of accepting a given price) is significantly higher for tomatoes than for leafy vegetables. Whether this is due to the high perishability of leafy vegetables, or other factors such as the perceived value of crops, requires further investigation. Differences between male and female respondents emerged when we considered the relationships between decision-making on leafy vegetable prices and price negotiations, on the one hand, and gender and household type on the other (Table 5). Overall,

male producers appeared more confident and independent in their decisions on prices than their female counterparts. For instance, for the sale of leafy vegetables male heads were less likely to accept traders' offers than female respondents living in male-headed households. Women in female-headed households had the highest willingness to accept traders' prices without negotiation. These are important insights, since income from leafy vegetables goes more often to women (compare Table 2). A separate evaluation for tomatoes confirmed the above trend, with men exhibiting the highest resistance to prices offered and female heads the lowest.

A comparison of leafy vegetable producers and traders (Table 5) demonstrates that women traders are much stronger in price negotiations than women producers. Female traders may even realize higher profit shares than their male counterparts, a result, however, that needs further confirmation, since the male sample cannot be taken as representative. One of the reasons for women's potentially strong performance could be their specialization in selling at local green markets. As pointed out in the sample description, female traders have a preference for supplying the demand of end consumers, while male traders are more involved in wholesale to restaurants and grocery stores. Further quantitative and qualitative research is required to understand the factors supporting or weakening the position of female traders in leafy vegetable value chains. In Table 5, producers' answers refer to encounters with traders, whereas traders' responses refer to encounters with customers. As a result, findings provide information about general confidence in market performance and not about direct farmer-trader negotiations.

Table 6 indicates the share of the final selling price available to traders to cover their costs and make a profit, after subtracting the price paid to producers. It shows that compared to farmers, traders realize a much higher share of the final selling price, especially for leafy vegetables. For instance, for Ethiopian mustard female traders receive 58% of the final selling price, while 42% of it goes to the producers. This calculation, however, neglects the costs traders incur, such as market stand fees, transportation or labor, and the

TABLE 6. Traders' share in final selling price per crop (in %).

Crop	Male (%)	Female (%)
Tomatoes	35	34
Sweet pepper	20	25
Onion	31	30
Amaranth	50	57
Chinese cabbage	49	56
Ethiopian mustard	50	58

TABLE 7. Decision-making on income in traders' households (MHHs only).

		Male traders (%)	Female traders (%)
Who decides about the use of income generated through vegetable sales?	Husband	77	5
	Wife	8	73
	Both	15	20
	Others	0	2

farmers' need to cover their inputs, labor and land. Therefore, more detailed studies are needed to determine profit margins. Questions such as the following can then be addressed: If leafy vegetable production allows women to generate more income than other crops, as outlined above (see Table 2), and at the same time traders' shares in final selling prices for leafy vegetables are the highest in comparison to other crops, does this constitute an imbalanced or balanced appropriation of total profit by different actor groups?

While the above results testify to high shares for traders in leafy vegetables, they do not reveal how income is shared in male-headed households. We therefore asked traders who in their household decides upon the use of income from the sale of vegetables (Table 7). Interestingly, both male and female respondents regard their decision-making power in this respect as high. Only 5% of the women name the household head as being in charge of decisions, and only 20% indicate joint decision-making. This provides an entry point for more detailed studies on gendered intra-household income allocation. These should include income sharing in the households of both producers and traders.

Smallholder farmers can increase their negotiation power through collective action based on cooperatives or producer groups (see, e.g., Chirwa et al., 2005; Shiferaw et al., 2011; Batt, 2016). We asked respondents whether they are members of formal farmer groups and whether they cooperate with other farmers in informal business relationships. Table 8 shows that one quarter of the male respondents were members of a formal farmer group. The same was much lower for female respondents. 15.6% of the female heads and only 10.3% of women in male-headed households indicated to be a member of a formal group. Male farmers also seem to be better connected in informal business networks. 71.5% of male respondents were participating in these, whereas only half of the female respondents in male and female-headed households were engaged in informal business relationships with other farmers. This might also explain why male farmers are more successful in price negotiations than female farmers (see Table 5).

Access to resources

Access to resources is essential for value chain participation and for the benefits to be accrued from it (Coles and

Mitchell, 2011, 4–7). In our household survey, we looked at three different resources men and women have access to: (a) access to physical resources – land; (b) access to financial resources – credit; and (c) access to human capital – extension.

Questions on documented land ownership revealed that in all 295 male-headed households in the sample only one woman was the documented owner of a piece of land. In general, husbands legally owned the biggest share of land cultivated by a household; one quarter was rented and a minor share belonged to the husband's or wife's clan. In female-headed households, at least 14% of the land under cultivation officially belonged to the (deceased, divorced, separated, etc.) husband. A higher rate of land ownership among women in female-headed households was observed for smaller plots (0.1 to 0.5 ha) that are often used for vegetable production (as opposed to larger plots used for maize). The four divorced female heads included in the survey cultivated land that was owned by their own clan (75%) or was rented (25%). These results show a significant ownership gap between men and women that is in line with data from the World Bank's "Living Standards Measurement Study – Integrated Surveys on Agriculture" (LSMS-ISA) for Tanzania (2010–2011). The LSMS-ISA data, however, also indicate levels of undocumented ownership (14% for women, 36% for men, and 31% for joint ownership) that need to be taken into account (results as evaluated and presented by Doss et al., 2013, 24). Over and above this, ownership must not be taken as synonymous with control over, or access to, land (Doss et al., 2013). Therefore, we included the question "Who cultivates the land?" and received the following results: in male-headed households joint cultivation by husband and wife was the most common practice for plot sizes ranging from 0.1 ha to over 2 ha. In 73.7% of the cases, smaller plots (below 0.1 ha) were cultivated by the wife only. In female-headed households, women had better access to larger plots than their counterparts in male-headed households. In general, male-headed households in our sample cultivated 2.8 ha on average and thus almost 0.7 ha more than female-headed households (2.1 ha). These findings reveal that women tend to have lower levels of documented (and undocumented) land ownership as compared to men. For women in male-headed households, access to land depends on joint cultivation, with only smaller plots under their exclusive management. Female heads have even larger plots under sole cultivation.

Concerning access to finance, women in male-headed households are disadvantaged in comparison to female household heads. Access to credit was generally low, with males having the lowest rate. Thus, only 3.8% of men confirmed having received credit, as against 5.1% of female respondents in male-headed households and 10.9% of female household heads. Another factor that can have a significant effect on crop production, productivity and income is access

TABLE 8. Formal and informal cooperation among farmers.

	MHH		FHH			
	Male respondents (%)	Female respondents (%)	Male respondents (%)	Female respondents (%)	Yes	No
Are you member of a formal producer group or cooperative?	25.6	74.4	10.3	89.7	15.6	84.4
Do you cooperate with other farmers in an informal business relationship?	71.5	28.5	48.9	51.1	50.7	49.3

TABLE 9. Vegetable producers: ownership and access to land in MHHs and FHHs.

FHH	<i>Female-headed households: Who owns the land (based on certificate)?</i>						
	Husband	Wife	Both	Rented	Husband clan	Wife clan	Others
	Shares below in %						
>2 ha	27.3	27.3	0.0	18.2	0.0	27.3	0.0
2-1 ha	25.0	33.3	0.0	16.7	0.0	25.0	0.0
1-0.5 ha	28.2	12.8	0.0	38.5	0.0	18.0	2.6
0.5-0.1 ha	14.5	46.1	0.0	21.1	0.0	17.1	1.3
<0.1 ha	14.3	0.0	0.0	57.1	0.0	28.6	0.0
MHH	<i>Male-headed households: Who owns the land (based on certificate)?</i>						
	Husband	Wife	Both	Rented	Husband clan	Wife clan	Others
	Shares below in %						
>2 ha	66.7	0.0	0.0	25.2	2.2	3.0	3.0
2-1 ha	63.0	1.7	0.8	27.7	3.4	0.0	3.4
1-0.5 ha	62.5	0.0	1.1	27.3	2.3	1.1	5.7
0.5-0.1 ha	54.2	0.0	0.5	32.4	2.9	2.9	7.3
<0.1 ha	47.4	0.0	0.0	47.4	0.0	5.3	0.0
FHH	<i>Female-headed households: Who cultivates the land?</i>						
	Husband	Wife	Both	Son/daughter	Others		
	Shares below in %						
>2 ha	4.6	86.4	4.6	4.6	0.0		
2-1 ha	0.0	84.0	4.0	4.0	8.0		
1-0.5 ha	3.2	90.3	0.0	3.2	3.2		
0.5-0.1 ha	1.3	93.4	0.0	1.3	4.0		
<0.1 ha	0.0	66.7	0.0	33.3	0.0		
MHH	<i>Male-headed households: Who cultivates the land?</i>						
	Husband	Wife	Both	Son/daughter	Others		
	Shares below in %						
>2 ha	22.2	7.4	66.7	1.5	2.2		
2-1 ha	22.7	3.4	72.3	0.0	1.7		
1-0.5 ha	13.3	9.1	63.6	3.6	10.3		
0.5-0.1 ha	19.4	15.3	53.0	3.9	8.5		
<0.1 ha	5.3	73.7	21.1	0.0	0.0		

to the extension system. Tanzania maintains a comprehensive agricultural extension system. It employs specialists at district level, as well as village extension officers. In the survey we asked respondents: (a) whether they had met an extension officer during the past four months; and (b) whether they had participated in extension training in the past two years. The results show that male and female heads were the ones who had met extension officers most frequently in the past four months. In contrast, women living in male-headed households seemed to be disadvantaged in this regard. Also, the latter had the lowest rate of participation in extension training over the last two years (18.7%). Female heads had a participation rate of 21.9%, whereas almost 30% of the male heads had undergone training in the indicated period. Weinberger and Juetting (2001) argue that women are more reluctant to participate in group activities (including training) due to their high domestic workload. The result could also relate to a lack of gender-responsiveness in extension delivery, and a still unfavorable extension/farmer ratio in Tanzania (Hella, 2013). More research is required to identify the particular reasons for this low participation rate, especially among women in male-headed households.

Conclusions

This study investigates gender relations in rural vegetable production and markets. Linking a value chain approach to gender analysis, it explores male and female actors' different opportunities based on their division of labor, income allocation and access to productive resources. The results show that there is no pronounced division of labor among women and men in the production process. Clear differences between male and female smallholders emerge in the allocation of income from various crops. Market performance for leafy vegetables differs between men and women producers and female traders. Both men and women traders regard their decision-making power on income allocation as high. Access to land is a constraint, especially for women in male-headed households. This group also has the least contact with extension officers and the lowest level of participation in training activities.

Entry points for further studies have been referred to in the presentation of the results, but will be further elaborated here. Coles and Mitchell (2011) propose two areas of gendered value chain analysis: first, participation, and second, gains from involvement. Each node has prerequisites for participation, for instance access to productive resources and skills. At the same time there are determinants of gains,

such as rules of household income allocation and negotiating power in markets. Participation and gains are interrelated in complex ways, but “participation does not necessarily produce gains” (Coles and Mitchell, 2011, 6). As our study confirms, participation in terms of labor in the production process does not in all cases translate into equitable gains from involvement. However, future studies should document in more detail how time allocation to vegetable production relates to intra-household income distribution. This should include additional factors of production apart from labor. Participation and gains could also be explored in more depth for actors in trade. What roles do men and women play in vegetable marketing? What are the costs traders incur to be able to sell, and how is the resulting income appropriated within their households? Taking all of this into account, where are the balances and imbalances within producers’ and traders’ households and among value chain actors? Data on gendered income allocation should be supplemented by data on gendered expenditure patterns, to provide researchers and development planners with more comprehensive evidence. While quantitative studies may provide measurable answers to the above questions, they will not suffice to explain and address gender inequalities in households and value chains. Here a more qualitative approach is needed that places the socio-cultural context of gender relations at the heart of the analysis. Kruijssen et al. (2016) show how a better understanding of the underlying causes of gender inequality in value chains can inform the design of gender transformative interventions. Such an examination would not only focus on norms and beliefs, policies, laws and other institutions that shape men’s and women’s roles and access to resources, but would also encourage research participants to discuss the potential for rendering gender relations more equitable. Since changes can only be sustainable if actors at various levels endorse them, gender-transformative interventions depart from the “one representative per household” (in many cases the head) track and deliberately target several household members, traditional leaders and other authorities. Some results of this study support a transformative approach. For instance, the problem of women’s restricted access to land and extension services in male-headed households can only be tackled through the cooperation of various household, community and government actors. Training in vegetable production should be offered to both husbands and wives, and could be supplemented by context-sensitive discussions on income and resource allocation, but also by elaborating the advantages of different concepts of formal and informal cooperation among farmers to improve their negotiation power. The potential outcomes of women-specific training in leafy vegetable production and marketing – based on their higher gains from this crop, as outlined above – should be thoroughly analyzed in advance. Women-only vegetable interventions may run the risk of (inadvertently) increasing men’s control of women’s labor and gains (Riisgaard et al., 2010, 39; see also Shiundu and Oniang’o, 2007). Last but not least, policies and business strategies in the horticultural sector should engage with gendered value chain analysis to support equitable development. The Tanzania Horticultural Development Strategy for 2012 to 2021 (HODECT, 2010), for instance, outlines weaknesses and gaps in the existing chains. Gender relations in production and trade are not spoken of in the document.

References

- Batt, P.J. (2016). Key success factors in mobilizing collaborative farmer groups. In *Enabling More Inclusive and Efficient Food and Agricultural Systems in Africa*, C. Da Silva, J. Mpagalile, J. van Rooyen and C. Rizzo, eds. FAO session at the IFAMA World Forum, 18 June 2014, Cape Town, South Africa (Rome, Italy), p. 45–56.
- Berti, P., Krasevec, J., and FitzGerald, S. (2004). A review of the effectiveness of agriculture interventions in improving nutrition outcomes. *Public Health Nutr.* 7(5), 599–609. <https://doi.org/10.1079/PHN2003595>.
- Bouis, H. (2003). Commercial vegetable and polyculture fish production in Bangladesh: Impacts on income, food consumption, and nutrition. In *Household Decisions, Gender, and Development. A Synthesis of Recent Research*, A. Quisumbing, ed. (Washington, DC, USA: International Food Policy Research Institute), p. 73–77.
- Chirwa, E., Dorward, A., Kachule, R., Kumwenda, I., Kydd, J., Poole, N., Poulton, C., and Stockbridge, M. (2005). *Farmer organisations for market access: principles for policy and practice* (London: Department of Agricultural Sciences, Imperial College).
- Coles, C., and Mitchell, J. (2011). *Gender and agricultural value chains. A review of current knowledge and practice and their policy implications*. ESA Working Paper 11-05 (FAO).
- Cornish, G.A., Aidoo, J.B., and Ayamby, I. (2001). *Informal irrigation in the peri-urban zone of Kumasi, Ghana – an analysis of farmer activity and productivity*. Report OD/TN 103 (HR Wallingford).
- Danso, G., Cofie, O., Annang, L., Obuobie, E., and Keraita, B. (2004). *Gender and urban agriculture: the case of Accra, Ghana*. Paper presented at Woman Feeding Cities Workshop on Gender Mainstreaming in Urban Food Production and Food Security (Accra, Ghana: RUAF/IWMI/Urban Harvest).
- Deji, O., Koledoye, G., and Owombo, P. (2013). Gender analysis of constraints to vegetable production in Ondo State, Nigeria. *Nigerian J. of Rural Sociol.* 13(3), 72–80.
- Doss, C., and Kieran, C. (2013). *Standards for collecting sex-disaggregated data for gender analysis: A guide for CGIAR researchers*. Consortium of International Agricultural Research Centers (CGIAR) (Washington DC, USA: Research Program on Policies, Institutions and Markets).
- Doss, C., et al. (2013). *Gender inequalities in ownership and control of land in Africa. Myths versus reality*. IFPRI Discussion Paper 01308 (International Food Policy Research Institute).
- Drechsel, P., Graefe, S., Sonou, M., and Cofie, O. (2006). *Informal irrigation in urban West Africa: An overview*. IWMI Research Report Series 102 (Colombo, Sri Lanka: International Water Management Institute).
- Everaarts, A., de Putter, H., and Amon, W. (2011). *A survey of field vegetable production in Tanzania. Recommendations for improvement* (Wageningen, The Netherlands: Wageningen University).
- Everaarts, A., et al. (2016). *Vegetable production in Tanzania*. *Chronica Hortic.* 56(1), 26–37.
- Hella, J. (2013). *Study to establish return to investment in agricultural extension service in Tanzania. A consultancy report to AGRA through MAFSC*.
- HODECT (Horticultural Development Council of Tanzania) (2010). *Tanzania Horticultural Development Strategy (2012–2021)*.
- Keller, G. (2004). *African nightshade, eggplant, spiderflower et al. – production and consumption of traditional vegetables in Tanzania from the farmers’ point of view* (Göttingen, Germany: University of Göttingen, unpublished M.Sc. thesis).

- Kruijssen, F., et al. (2016). Adding gender transformation to value chain analysis. In *A Different Kettle of Fish? Gender Integration in Livestock and Fish Research*, R. Pyburn, and A. van Eerdewijk, eds. (Volendam, The Netherlands: LM Publishers), p. 45–53.
- Kumar, N., and Quisumbing, A. (2011). Access, adoption, and diffusion: understanding the long-term impacts of improved vegetable and fish technologies in Bangladesh. *J. of Dev. Effectiveness* 3, 193–219. <https://doi.org/10.1080/19439342.2011.570452>.
- Meinzen-Dick, R., Johnson, N., Quisumbing, A., Njuki, J., Behrman, J., Rubin, D., Peterman, A., and Waithanji, E. (2011). Gender, assets, and agricultural development programs. A conceptual framework, Working Paper No. 99, CGIAR Systemwide Program on Collective Action and Property Rights (CAPRI).
- Mutua, E., Njuki, J., and Waithanji, E. (2014). Review of gender and value chain analysis, development and evaluation toolkits (Nairobi, Kenya: International Livestock Research Institute, ILRI).
- Mwaura, S.N., Muluvi, A.S., and Mathenge, M.K. (2013). African leafy vegetables and household wellbeing in Kenya: A disaggregation by gender. Paper presented at 4th International Conference of the African Association of Agricultural Economists (Hammamet, Tunisia: AAAE).
- Obuobie, E., and Hope, L. (2014). Characteristics of urban vegetable farmers and gender issues. In *Irrigated Urban Vegetable Production in Ghana: Characteristics, Benefits and Risk Mitigation*, 2nd ed., P. Drechsel, and B. Keraita, eds. (Colombo, Sri Lanka: International Water Management Institute [IWMI]), p. 28–37.
- Quisumbing, A.R. (2003). What have we learned from research on intrahousehold allocation? In *Household Decision, Gender, and Development: A Synthesis of Recent Research*, A. Quisumbing, ed. (Washington, DC: International Food Policy Research Institute).
- Riisgaard, L., Fibla, A., and Ponte, S. (2010). Gender and value chain development. DANIDA Evaluation Study 2010/2.
- Shiferaw, B., Hellin, J., and Muricho, G. (2011). Improving market access and agricultural productivity growth in Africa: what role for producer organizations and collective action institutions? *Food Security* 3(4), 475–489. <https://doi.org/10.1007/s12571-011-0153-0>.
- Schreinemachers, P., Patalagsa, M.A., Islam, M.R., Uddin, M.N., Ahmad, S., Biswas, S.C., Ahmed, M.T., Yang, R.Y., Hanson, P., Begum, S., and Takagi, C. (2015). The effect of women's home gardens on vegetable production and consumption in Bangladesh. *Food Security* 7(1), 97–107. <https://doi.org/10.1007/s12571-014-0408-7>.
- Shiundu, K., and Oniang'o, R. (2007). Marketing African leafy vegetables: Challenges and opportunities in the Kenyan context. *Afr. J. of Food, Agric., Nutr. and Developm.* 7(4), 1–17.
- Weinberger, K., and Juetting, J. (2001). Determinants of participation in local development groups: Experiences from group based projects in Kashmir and Chad (Bonn, Germany: University of Bonn, Center for Development Research).
- Weinberger, K., and Msuya, J. (2004). Indigenous vegetables in Tanzania: significance and prospects. Technical Bulletin 31 (Shanhua, Taiwan: AVRDC).
- Weinberger, K., Pasquini, M., Kasambula, P., and Abukutsa-Onyango, M. (2011). Supply chains for indigenous vegetables in urban and peri-urban areas of Uganda and Kenya: a gendered perspective. In *Vegetable Production and Marketing in Africa, Socio-economic Research*, D. Mithöfer, and H. Waibel, eds. (Wallingford, Oxfordshire, UK: CABI Publishing), p. 169–181. <https://doi.org/10.1079/9781845936495.0169>.
- Wooten, S. (2003). Women, men, and market gardens: gender relations and income generation in rural Mali. *Human Organiz.* 62(2), 166–177. <https://doi.org/10.17730/humo.62.2.b5gew5paf8qer3q0>.
- Zoss, M. (2014). Governance modes, collective organisation and external facilitators' interventions in vegetable value chains in Northern Tanzania (Zürich, Switzerland: ETH, unpublished Doctor Sc. thesis).

Received: Feb. 14, 2017

Accepted: May 30, 2017

Addresses of authors:

G. Fischer¹, A. Gramzow² and A. Laizer²

¹ International Institute of Tropical Agriculture (IITA),
P.O. Box 10, Duluti, Arusha, Tanzania

² World Vegetable Center, Eastern and Southern Africa,
P.O. Box 10, Duluti, Arusha, Tanzania