



# Participation in and Gains from Traditional Vegetable Value Chains: a Gendered Analysis of Perceptions of Labour, Income and Expenditure in Producers' and Traders' Households

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## Abstract

Horticulture is one of the fastest growing subsectors of agriculture in Tanzania. Gender relations in vegetable-producing and vegetable-trading households need to be understood to make value chain development equitable. This study, carried out in northern and central Tanzania, is based on data from surveys, focus group discussions and semi-structured interviews. The perceptions of men and women traders and producers are investigated with regard to labour participation in traditional vegetable value chains and gains (income and expenditure) from it. Farmers were found to report more balanced intra-household labour arrangements paired with less-balanced income and expenditure shares, while traders indicated less-balanced labour contributions that went hand in hand with more-balanced shares of benefits. Farmers related limited household development not only to imbalances in benefits but also to a lack of trust and cooperation between spouses. The importance of gender-transformative approaches in agricultural value chains is emphasized herein.

**Keywords** Value chain analysis · Gender relations · Vegetables · Tanzania · Horticulture

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## Résumé

L'horticulture est l'une des branches de l'agriculture dont la croissance est la plus rapide en Tanzanie. Les relations entre les femmes et les hommes dans les ménages producteurs et commerçants de légumes doivent être comprises pour que le développement de la chaîne de valeur soit équitable. Cette étude, réalisée dans le nord et le centre de la Tanzanie, est basée sur des données d'enquêtes, de discussions de groupe (focus groupe) et d'entretiens semi-directifs. Elle examine les perceptions des commerçants et des producteurs hommes et femmes quant à la participation de la main-d'œuvre aux chaînes de valeur traditionnelles des légumes et les gains (revenus et dépenses) qui en découlent. L'on a constaté que les agriculteurs ont signalé une répartition du travail plus équilibrée au sein des ménages, associée à une répartition des revenus et des dépenses moins équilibrée. Au contraire, les commerçants ont indiqué une répartition du travail moins équilibrée et cela allait de pair avec une répartition plus équilibrée des bénéfices au sein des ménages. Les agriculteurs ont fait un lien entre le développement limité des ménages et le déséquilibre dans la répartition des bénéfices, mais également avec le manque de confiance et de coopération entre les conjoints. Nous soulignons l'importance des approches transformatrices de genre dans les chaînes de valeur agricoles.

## Introduction

Linking farmers to markets and improving traders' business skills have emerged as important objectives of agricultural and agri-business-oriented development programmes. It is expected that well-functioning markets will contribute to poverty alleviation and increased food security. However, studies have shown that value chain development interacts with gender dynamics in households and communities along the chain, with potentially unexpected and undesired consequences if social inequalities are not identified and taken into account. Therefore, scholars have demanded that gender considerations should be an integral part of interventions and that the achievement of economic prosperity for both men and women within value chains should be taken as an indicator of equitable and sustainable development (FAO 2016; Mayoux and Mackie 2007; Rubin et al. 2009; Kaaria and Ashby 2001).

The present work is a gendered analysis of producers' and traders' participation in traditional vegetable value chains in Tanzania and the benefits accrued from participation. It provides insights into intra-household perceptions as well as differences between nodes. Such an understanding is much needed, since horticulture is the fastest-growing subsector of agriculture in Tanzania, with vegetables increasingly being produced as cash crops (TPAWU, quoted in FAO 2014, p. 8) and traded on urban and peri-urban markets. Development partners should support more equitable outcomes in this process through gender-transformative approaches that pay attention to inequalities at multiple levels.



## Male Takeovers and Women's Concentration in Production?

The commercialization of agricultural household production may result in shifting gender relations to the disadvantage of women. This may concern access to land, allocation of crops and income, marketing or labour control. For instance, in the case of a rural community in Mali, Wooten (2003) describes how the growing market demand for vegetables intensified men's control and use of garden spaces previously occupied by women. In an analysis of survey data from Malawi, Njuki et al. (2011) found that, in the period between 2003 and 2007, bean production in sample households rose, while at the same time, women's control of income from beans—regarded as 'women's crops'—declined because of the greater interest shown by men in production and marketing. These takeovers do not necessarily decrease women's labour but may actually increase it under men's control (Kaaria and Ashby 2001). Even collective action as a mechanism to connect farmers to markets may work to the disadvantage of women. For example Fischer and Qaim (2013, p. 450) point out that 'traditionally, banana has been a women's crop in Kenya. Our results confirm the hypothesis that farmer groups contribute to increasing male control over banana production and revenues', if women are not included in the membership. Cultural conceptions that assign women to the domestic domain and to household provisioning may limit women's collective action and marketing activities. In an effort to avoid greater control by men, women may choose to cultivate crops with a lower market value (Njuki et al. 2011, p. 427; Njiraini et al. 2018).

David (2015, p. 2) questions the generalizability of the above results and observes a 'tendency to depict women as victims and men's and women's responses to agricultural commercialization as static and predictable'. In her investigation of the growing market production of sweet potato in northern Nigeria, she found two factors that enabled women farmers to cultivate more for sale and keep the income: first, the fact that men are responsible for supplying staple crops (in this case sweet potato) for household consumption, and second, separate plot cultivation and individual plot control for husbands and wives as a common practice. Further questions arise when notions of a stronger engagement of men in market activities are implicitly linked to the assumption that women would generally be better off in trade. Farnworth (2011, p. 3), for instance, writes: 'In smallholder farming, women are typically concentrated as producers at the bottom of the chain. They can find it difficult to take on more profitable roles as buyers, sellers and processors'. However, evidence of a general concentration of women in production and an increased profitability of roles beyond production is not (yet) given, at least not for East Africa. König et al. (2011) compared the livelihood levels of key actors in the tomato and onion value chain in Kenya and Tanzania (albeit without a gender focus). Their questionnaire covered the respondents' financial, physical, social and human assets. In Kenya, retailers and farmers had almost equal livelihood scores, whereas in Tanzania, tomato farmers scored higher than retailers and even better than intermediaries who otherwise had the best results. Taking a gender analysis approach, Weinberger et al. (2011) depict the strong involvement of women in indigenous vegetable chains in Uganda and Kenya. The proportion of women in retail was high, while men were more prominent in farming. However, small retail businesses run by



women had the lowest annual income, with farmers in a marginally better position. Across all actors, income was always higher for men than for women. These results indicate the importance of considering diverse socio-economic and cultural dynamics, how they shape men's and women's reactions to commercialization and what they gain in different value chains and at various nodes.

## Participation and Gains

To support the integration of research findings (such as those above) into development activities, several frameworks and toolkits for gendered value chain analysis have been published during the past decade (e.g. Bolwig et al. 2008; Mayoux and Mackie 2007; Rubin et al. 2009; Coles and Mitchell 2011; Stoian et al. 2018). Most of them share Elson's (1993) idea of the gendered economy and recognize that agricultural commercialization (just like any other economic activity) is embedded in social institutions and 'works through and within gendered relationships' (1993, p. 237). This comes with a departure from the unitary household model, which a growing body of literature has questioned since the 1990s. Alternative collective models assume that household members can have different preferences and do not necessarily pool their resources. They may either cooperate and enter into bargaining processes or develop 'autonomous subeconomies' (Quisumbing 2003, p. 6). As a result, men and women partially or completely pool their resources or keep some for their individual benefit (Njuki et al. 2011, p. 428). Elson (1993, p. 244) emphasizes the 'need to distinguish between male and female patterns of resource control, work and expenditures', and the need to investigate whether income redistribution is 'a stressful or peaceful process, one achieved in a way at odds or compatible with the autonomy and dignity of household members'. For such an analysis at the value chain and household levels, Coles and Mitchell (2011) propose a conceptual framework of 'participation' and 'gains'. Participation in chains depends on institutions that govern access to productive resources, education, information, social networks and other aspects. Here, men and women often face different barriers to general entry or to entering certain nodes. Equally, gains are strongly gendered and do not always relate to the degree of engagement. Several scholars have used a juxtaposition of participation and gains in gendered value chain analysis (e.g. Rubin and Manfre 2014; Njuki et al. 2011; Farnworth 2011; Nakazibwe 2016).

In the present work, the framework of participation and gains (Coles and Mitchell 2011) is applied to the production and trade of vegetables in Tanzania. More specifically, men's and women's perceptions of intra-household labour (as a crucial aspect of participation) and income and expenditure contributions (as representing potential gains) are analysed. The analysis is conducted on the level of the household (for both farmers and traders) and the level of the chain (comparison between nodes). With regard to participation, previous investigations in Tanzania have drawn divergent conclusions concerning the labour and time burdens of men and women. Palacios-Lopez et al. (2017, p. 57) found that the share of women's labour in agriculture is above 50% for all crops except fruits and vegetables, where the share is 45%. Others argue that women spend more time on childcare and domestic chores as



compared with men, and therefore have fewer opportunities to allocate time to productive and income-generating activities (Manzanera-Ruiz et al. 2016; Fox 2016). Apart from time, access to land, credit and extension are important prerequisites for value chain participation. Coexisting statutory and customary laws create a situation where women legally hold the same land rights as men, but customary laws continue to deny women land ownership (Leavens and Anderson 2011). Fischer et al. (2017) confirm that men have a higher level of documented and undocumented land ownership. Women in men-headed households (MHHs) have access to smaller plots (below 0.1 ha) only for sole management. Access to credit is the lowest for men and the highest for women heads. Women producers in MHHs experience the least extension contact and participation in training.

Turning to benefits, income depends on a variety of aspects, such as crop choice, market performance and income control. Although men's dominance in commercial crop cultivation is documented for some locations, women may have opportunities to individually or collectively produce for cash. This is frequently framed by gender struggles concerning income control (Mnimbo et al. 2017; Manzanera-Ruiz et al. 2016). With regard to the value chains investigated in this work, Fischer et al. (2017) described women farmers as proponents of market-oriented leafy vegetable production. In price negotiations, however, women producers (in both men-headed and women-headed households) emerged as weaker than men producers, and weaker than women traders. The ensuing implications for income need to be further explored. Both men and women traders living in MHHs regard their decision-making power on income as high. Less information is available on expenditure allocation. In an oft-cited study, Sender and Smith (1990) stated that men spend more on personal consumption than on other household members' needs, but no newer literature on Tanzania has been found to confirm or differentiate this point.

This paper builds on the above insights from Tanzania. This responds to the need expressed by several scholars to investigate more clearly gendered patterns of labour, income and expenditure allocation along value chains (Elson 1993; Coles and Mitchell 2011; David 2015). It focusses especially on one novel aspect, namely men's and women's perceptions of balances and imbalances in contributions to labour and the benefits derived from it. This will deepen the understanding of equity issues in agricultural commercialization and allow for drawing conclusions in respect to further research and development activities.

## Methods

### Data Collection, Analysis and Study Approach

Between August 2016 and July 2017, data were collected in three districts in Tanzania, namely Babati and Kiteto in Manyara Region and Kongwa in Dodoma Region. A mixed methods approach that combines the representativeness of quantitative findings with the contextual understanding gained from qualitative inquiry was followed. An initial survey generated insights into gender relations in vegetable producers' households. Focus group discussions (FGDs) complemented and validated



the results. FGDs were organized separately for women and men; women's groups with a female facilitator and men's groups with a male facilitator. In a subsequent survey, the same research questions were investigated with vegetable traders and semi-structured interviews with traders, market chairpersons and extension officers for additional background information were added. All survey tools were pretested. The language of investigation was Swahili. FGDs with producers and interviews with traders were audio-recorded with the participants' consent. Transcriptions (and notes from expert interviews) were coded with the qualitative data analysis software Atlas.ti. For survey data, STATA statistical software was used.

The following approach was applied in the collection and analysis of data: during both surveys, only one member per household was interviewed. In men-headed households, either the head or the female partner was interviewed, and information was requested not only concerning themselves (for instance their own labour) but also concerning their spouse. In women-headed households, the head was interviewed but information on a spouse (for instance migrant husband) was included where available. This strategy was employed being aware of the discrepancies in inter-spouse responses that may occur. Researchers have explained these discrepancies by a systematic bias related to over- or underestimation of self and spouse. The source of 'wrong' estimations lies in respondents' differential perceptions of intra-household gender relations and social desirability (Tao 2013; Kamo 2000). While some have called this the 'he said, she said dilemma', others have used such estimations not as statistically accurate information but as an entry point for the analysis of gender dynamics (Tavener et al. 2018, p. 4; Kamo 2000; Ambler et al. 2017). Another reason for discrepancies is the incomplete sharing of information within households. As Fisher et al. (2010, p. 966) note, 'differences among household members over the preferred distribution of resources suggest that members have strategic reasons to withhold information on personal income generation from one another'. Further discrepancies arise from the collection of data through recall. Diary studies could have produced more accurate results, yet would have come at a higher cost and time investment. Triangulating the survey results with qualitative data from FGDs and interviews, areas of convergence and divergence were explored in the perceptions of men and women (Tavener et al. 2018, p. 14) and how they relate to the gendered institutions in which traditional vegetable value chains in Tanzania are embedded.

### Sampling and Sample Description

In the present work, producers and traders of leafy vegetables (amaranth, African nightshade, Ethiopian mustard and Chinese cabbage) and fruit vegetables (tomatoes and African eggplant) were targeted. For the producers' survey, a two-stage sampling procedure was employed. First, three villages per district were purposively selected based on the prominence of vegetable production and marketing activities. Secondly, 40–45 farmers were randomly chosen from the nine villages, resulting in 378 complete cases (178 women, 200 men). In a strict sense, the results presented in this paper are only representative of the nine selected villages. Six FGDs were



conducted in the three investigated districts, three with men (22 participants) and three with women vegetable farmers (24 participants). Group members were purposively chosen. The traders' survey was run in four markets, in which the vegetable produce is sold, namely Kongwa, Kibaigwa, Babati and Kibaya. Traders were first mapped in each market and then randomly picked from the maps. In the survey, 116 traders participated (81 women, 35 men), out of which 59 were retailers (47 women, 12 men), 20 wholesalers (9 women, 11 men) and 37 were involved in both types of trade (25 women, 12 men). In Babati, 15 additional semi-structured interviews with 13 retailers (12 women, 1 man) and 2 wholesalers (1 woman, 1 man) were conducted. The higher proportion of women in retailing reflects the gender segmentation of the vegetable value chain in the study area, as confirmed by other research (Fischer et al. 2017; Zoss 2014). Key informants consisted of five extension officers (two men, three women) and three market chairmen and one chairwoman. Table 1 provides basic socio-economic characteristics of the survey respondents. Only two respondents in the survey sample indicated that they lived in polygamous households. Of the traders, a 25% additionally engaged in farming activities.

## Empirical Estimation

Descriptive statistics are presented in Table 1. Women heads were on average older than men and women living in men-headed households. This was significant for both producers and traders at the 1% and 10% level respectively. At both nodes, men had more years of education than women (in the two female respondent categories). There was a statistically significant difference in terms of the share of expenditure covered by vegetable sales. Among the producers, men covered a larger share than women in MHHs and women heads ( $p < 0.01$ ), while among traders, women heads had the largest share ( $p < 0.05$ ).

The ordinary least squares (OLS) regression model was used to estimate the determinants of household income and expenditure of men and women in men-headed households in vegetable production. For women heads and all respondent categories in trade no estimation was made due to the sample size. The econometric model for the household income and expenditure for different respondent categories in production is presented in Eq. 1:

$$Y_i = \alpha_i + \beta_i X_i + \mu_i, \quad (1)$$

where  $Y_i$  income or expenditure is in USD.  $\alpha_i$  and  $\beta_i$  represent the unknown non-random regression parameters and  $\mu$  is random error.  $X_i$  are the independent variables in the model. The empirical specifications of the OLS for income and expenditure are presented in Eqs. 2 and 3.

Income equation

$$Y_1 = \beta_0 + \beta_1 \text{ Household size} + \beta_2 \text{ Farm size} + \beta_3 \text{ Age} + \beta_4 \text{ Education} \\ + \beta_5 \text{ Access credit} + \beta_6 \text{ Extension training} + \beta_7 \text{ Distance to market} \\ + \beta_8 \text{ Group membership}, \quad (2)$$



**Table 1** Basic socio-economic characteristics of vegetable producers and traders

Particulars	Producers			Traders			<i>F</i> -test ( <i>F</i> -value)
	Men heads ( <i>n</i> =200)	Women MHHs ( <i>n</i> =118)	Women heads ( <i>n</i> =60)	Men heads ( <i>n</i> =38)	Women MHHs ( <i>n</i> =42)	Women heads ( <i>n</i> =36)	
Household size (mean)	5.7	5.7	5.1	4.6	4.9	3.6	6.28***
Farm size (mean, acres)	10.6	9.1	6.4				1.13
Age (mean, years)	44.7	40.8	46.9	38.0	34.0	40.0	6.42***
Education (mean, years)	6.7	5.8	6.0	7.3	7.2	6.1	4.56**
Access credit (%)	5.5	10.2	10.0	13.2	2.4	13.9	1.41
Attendance extension training (%)	45.5	44.9	51.7				0.84
Distance to market (mean, km)	8.8	5.9	4.0				1.27
Group membership (%)	28.0	33.9	43.3	15.8	11.9	13.9	2.60*
Share of expenditure covered by vegetable sales (%)	28.4	20.8	23.6	37.7	34.5	42.3	5.93***

\**p*<0.1, \*\**p*<0.05, \*\*\**p*<0.01

### Expenditure equation

$$\begin{aligned}
 Y_2 = & \alpha_0 + \alpha_1 \text{ Household size} + \alpha_2 \text{ Farm size} + \alpha_3 \text{ Age} + \alpha_4 \text{ Education} \\
 & + \alpha_5 \text{ Access credit} + \alpha_6 \text{ Extension training} + \alpha_7 \text{ Distance to market} \quad (3) \\
 & + \alpha_8 \text{ Group membership} + \alpha_9 \text{ Share expenditure} + \alpha_{10} \text{ Income.}
 \end{aligned}$$

$Y_1$  and  $Y_2$  are income earned and expenditure by men and women in MHHs. Description and measurements of the independent variables are provided in Table 1. After estimating the equation, the existence of multicollinearity among the independent variables was tested using a variance inflation factor (VIF). The average VIF of less than 10 implies that the variables in the model had no serious multicollinearity (Gujarati 2004). Durbin–Watson (DW) tests were also applied to test autocorrelation of the error term. DW-test value was  $\geq 2$ , which is within the tolerable range of autocorrelation.

## Results and Discussion

Quantitative and qualitative findings as well as potential explanations for the results are presented in this section. First, perceptions of participation are dealt with (3.1), and second, gains from participation are outlined (3.2) in terms of income and expenditure.

### Participation

Participation in value chains can be assessed through the time spent in the labour process. Survey respondents were requested to indicate their own time investment in various activities as well as that of their spouse and children. Children's engagement in vegetable production and sale proved to be tangential. Therefore, Tables 2 and 3 concentrate on the labour of adult women and men.

### Participation of Producers

Table 2 captures producers' perceptions of men's and women's labour in terms of their own time investment (men heads concerning men's labour; women in MHHs and women heads concerning women's labour) and their perceptions of their counterparts' labour (men heads concerning women's labour; women in MHHs and women heads concerning men's labour). Note that this is perceived labour (information obtained from one household member) and not self-reported labour (information obtained directly from several household members). A divergence of views is noticeable in respect of the total workload and for different activities. On the one hand, for all labour steps in leafy and fruit vegetable production, men and women gave their own time investment as higher than that of their counterparts, with a few statistically significant exceptions: there was consensus that men engage more in pest and disease control (for both vegetable types), a point confirmed by qualitative



**Table 2** Producers: perceived labour time in vegetable production (working hours per cultivation period)

Activity	Leafy vegetable production						Fruit vegetable production											
	Men heads			Women in MHHs			Women heads			Men heads			Women in MHHs			Women heads		
	On men	On women	t-value	On men	On women	t-value	On men	On women	t-value	On men	On women	t-value	On men	On women	t-value	On men	On women	t-value
Money related decisions	4.5	2.8	3.213***	2.2	2.8	0.898	0.4	2.3	2.789**	4.1	2.7	2.605***	1.6	1.9	0.515	0.8	1.9	1.591
Managing labour	12.4	9.4	0.740	1.9	3.6	1.631	20.0	26.0	0.304	7.5	4.4	1.927*	1.3	2.1	1.038	7.9	8.5	0.059
Ploughing	14.9	11.1	1.672*	8.7	12.0	1.569	9.3	11.8	0.934	14.0	12.9	0.296	6.2	9.0	1.437	6.7	6.7	0.038
Nursery management	10.0	5.9	2.760***	4.0	7.7	2.721**	3.3	7.3	2.198**	9.4	5.9	2.169**	3.0	5.2	2.176**	2.9	7.3	1.936*
Planting	13.5	10.9	1.658*	9.7	15.5	1.686*	6.5	11.5	2.541**	12.9	10.3	1.397	8.1	12.2	1.113	3.7	7.4	2.107**
Pest and disease control	10.3	1.3	5.939***	4.4	3.2	1.024	6.0	3.2	0.833	10.8	1.2	6.637***	5.3	3.3	1.187	5.7	3.0	0.802
Irrigation	41.1	20.2	3.09***	20.5	39.6	2.612**	17.7	34.3	1.905*	41.3	16.9	2.763**	18.1	33.2	1.656*	15.9	23.2	0.865
Weeding	28.9	23.7	1.129	12.6	21.4	2.561**	15.8	21.4	0.952	29.3	22.9	1.353	10.9	16.4	1.582	10.5	12.8	0.524
Harvesting	15.5	18.6	0.772	8.0	56.3	3.137***	9.4	18.2	1.805*	19.3	14.8	1.289	8.6	45.9	3.178***	8.5	17.7	1.482
Processing	2.9	6.2	3.946***	1.6	3.7	2.699**	1.8	3.9	1.535	2.7	4.7	2.680***	1.2	2.5	1.965*	1.9	2.2	0.209
Selling	15.2	14.3	0.193	3.5	41.7	2.577**	5.5	17.7	2.002**	17.1	13.3	0.766	4.9	31.4	2.389**	5.9	14.8	1.439
Total workload	169.1	124.4	2.477**	77.2	207.5	3.661***	95.7	157.6	1.820*	168.6	110.0	2.803***	69.2	163.1	2.750***	70.5	105.5	1.224

Of a total of 60 women heads, 38 responded on men's labour time for leafy vegetables; 27 out of 60 women heads responded on men's labour time for fruit vegetables

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$



**Table 3** Traders: perceived labour time in vegetable sale (working hours per day)

Activity	Leafy vegetable trade						Fruit vegetable trade											
	Men heads		Women in MHHs		Women heads		Men heads		Women in MHHs		Women heads							
	On men	t-value	On men	t-value	On men	t-value	On men	t-value	On men	t-value	On men	t-value						
Purchase	1.2	0.7	0.588	0.1	0.6	2.464**	0.1	1.2	3.647***	1.6	0.8	1.786*	0.4	1.2	1.287	0.0	1.5	7.834***
Sorting	0.3	0.0	1.732	0.0	1.3	2.712**	0.0	1.5	2.450**	0.4	1.4	1.270	0.0	0.9	6.081***	0.0	0.7	5.249***
Cleaning	0.3	0.3	0.307	0.2	0.5	1.067	0.1	0.6	1.813*	0.5	0.8	0.655	0.0	0.8	2.426**	0.0	0.9	11.129***
Grading	1.7	0.6	1.327	0.0	0.8	1.567	0.1	0.6	2.274**	0.9	0.8	0.249	0.0	1.0	1.885*	0.0	1.0	7.057***
Packing	2.0	0.5	3.000**	0.5	0.7	0.277	0.0	0.6	1.667	1.3	1.2	0.065	0.2	0.2	0.000	0.0	1.5	3.000**
Transporting	1.2	0.0	1.572	0.4	0.7	0.727	0.0	2.6	2.836**	3.0	0.0	5.613***	0.6	1.0	0.566	0.0	2.9	2.886**
Selling	3.1	1.5	1.287	0.1	4.2	5.635***	0.0	5.1	6.312***	4.5	0.7	3.883***	0.2	4.7	6.277***	0.6	6.6	6.665***
Total work-load	9.6	3.6	2.154**	1.3	10.6	6.151***	0.3	12.4	6.315***	12.2	5.5	5.015***	1.4	9.8	6.652***	0.6	14.9	7.780***

Out of 36 women heads, 1 responded on men's labour time for leafy vegetables; 2 out of 36 women heads responded on men's labour time for fruit vegetables

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

data. Women, on the other, appeared to be more involved in harvesting and processing of crops. Overall, men rated their own workload for leafy and fruit vegetable farming as almost equal, while women assessed leafy vegetable cultivation as more time consuming than fruit vegetable cultivation. Irrigation, weeding, harvesting and selling turned out to be the four most time-consuming activities in men-headed households.

During FGDs, men producers underlined that they invest more time in farming (including vegetable farming) than women. A man in Babati said:

A woman's labour contribution is at home. But the percentage in agriculture is very small. If we compared domestic labour, father and mother, who does more house work, she would be on top. But in agriculture, no!

While men described themselves as 'breadwinners' through agricultural production, the majority of women participating in FGDs contested men's higher labour involvement. Some women described men as unreliable in their labour contributions. They saw women's domestic chores as an additional burden but not as keeping them from farming. In spite of this general divergence, key informants as well as farmers agreed on gender differences in terms of labour involvement in various crops. Women were seen as tending to cultivate leafy vegetables, while men focussed more on tomatoes and maize. This mirrors some indications in Table 2, especially women's higher workload for leafy vegetables, but also raises the question as to why the gendered crop choices did not become more visible in the survey results, in particular men's alleged control over tomatoes. One potential explanation could be that labour in vegetable cultivation occurs in both joint plots (husband and wife) and individual plots, with fluid rather than strict crop allocation in terms of gender.

Asked to give reasons for gendered crop preferences, some men farmers argued that leafy vegetables are often grown in smaller plots near the homestead, while other crops are cultivated on bigger plots away from the home. Women's domestic responsibilities restrict their labour in more distant fields, suggesting greater attention to nearby crops. However, several respondents also linked this preference to women's disadvantaged access to land and their restricted land ownership. Men farmers underlined the importance of land ownership for vegetable production, and specifically their superior opportunities in terms of crop and plot choice and income generation. Where women had access to land, their access to water sources was in part limited. In one FGD, women described how men guarded a dam and ensured that their vegetable fields were irrigated first. Apart from water and land, access to knowledge was seen as essential for participation in certain value chains. As one woman extension officer from Babati explained, cultural norms restrict women's participation in public gatherings and result in lower extension exposure. This again prevents women from getting more involved in fruit vegetable production and makes them focus on leafy vegetables, as their cultivation is seen as 'easy and cheap'. In the survey, there were no significant gender differences in respect of general attendance at extension training events (Table 1). However, men heads indicated that they met government extension officers in the previous four months on average twice as often as women in MHHs



and women heads. The results also show that (under current conditions) access to credit may be less important for vegetable production than control over income. The latter allows some men to select more capital-intensive and profitable fruit crops. This relates especially to the application of pesticides. As one woman in Kiteto said, in the case of tomatoes:

Without pesticides you won't succeed. That is why farmers of this crop are men and we women are very few.

At this point, interactions between participation and income become obvious, in the sense that income constitutes not only an outcome of participation but also a prerequisite.

### Participation of Traders

In the survey, traders were asked how much time they spent in activities related to leafy and fruit vegetable sale. Just like producers (Table 2), men and women traders assessed their own labour investment as higher than that of their counterparts (Table 3). Comparing both crop types, work processes related to fruit vegetables tended to be perceived as more time consuming than those related to leafy vegetables.

The analysis of semi-structured interviews with traders and market chairpersons revealed a more nuanced picture. Some traders harvest vegetables themselves in farmers' fields, while others collect vegetables already picked by farmers. A number of women retailers said they carried vegetables to market on their heads. Traders with larger volumes use carts, bicycles, motorcycles or public transport (where available), thereby reducing their labour time. Some rely on collectors or wholesalers who collect vegetables from the farms. Some labour processes, such as cleaning and sorting, are done at the market stalls, a point that explains the rather short hours for selling indicated in the survey. Although their required presence at the stall was seen as conflicting with women's domestic duties and involvement in childcare, respondents depicted retailing vegetables as a women's task. A woman in Babati said of her husband: 'He does not get involved in work at the stall. This is women's work (laughter). Even when he is here, he cannot do it'. Not only the women heads but also many women in MHHs reported that they arrange their work without interference by men, emphasizing that vegetable trading is 'their business'. A market chairman in Kibaiywa recalled how men used to dominate vegetable retail in the past:

Men have failed. They have been pushed away. Women have come up. Now they are there in high numbers. They are sharp to do business and when they buy, they are fast to sell and a man might stay with his vegetables for long. So men stopped, just like: okay let them do it.

The market chairman in Kongwa confirmed a feminization of vegetable retail in recent years, but attributed women's 'advancement' not to their business skills but to men's exodus to more secure work (such as trade with less perishable goods and



formal employment). This raises the question as to how women (and men) put up capital for participation in trade. In the survey, credit access emerged as generally low (Table 1). Credits were exclusively issued by village cooperative banks, neighbours and friends, but not by formal banks. Most participants had taken capital from their own savings to fund their businesses (69%). Of women in MHHs, 31% indicated support from their spouse ( $p < 0,01$ )—a source of capital that neither men heads nor women heads reported. One may therefore conclude that income and savings matter most for participation.

Comparing farmers' and traders' gendered perceptions of workload, one tendency becomes clear: for both vegetable types and across all respondent categories, farmers indicate a more balanced labour allocation between men and women than traders. Taking the example of leafy vegetables, men heads in production saw their own share at 58% as compared with 73% among men heads in trade. Similarly, women in MHHs perceived a 73% share in production and a 89% share in trade. This could indicate that trade is more often conducted on an individual basis (with less labour sharing) than production, where there are both individually and jointly cultivated plots. However, a broader assessment and comparison of farmers' and traders' various livelihood strategies and time investments would be needed to determine overall differences between nodes. Such an in-depth investigation of time investment is beyond the scope of this study.

## Gains

### Income

Gains from vegetable activities depend on gendered intra-household income contributions. In the survey, producers and traders were asked about the average annual income of their household, as well as the perceived shares of income earned by different household members. *F*-tests showed that the average income of all three respondent categories is significantly different at the 10% level or below. Men farmers indicated higher household earnings (915 USD) than women in MHHs (652 USD), while the opposite applied for traders: women traders in MHHs perceived a higher household income (1657 USD) than men heads (1567 USD). In all cases, women heads had the lowest income (365 USD for women heads in production and 1113 USD for women heads in trade).

Traders generally indicated earning more than producers. Disaggregated by business type (Table 4), traders combining wholesale and retail had the highest average household income (1656 USD), followed by retailers (1390 USD) and wholesalers (1295 USD). This was a trend for all respondent categories (although significant for women heads only,  $p < 0.05$ ). There was a large variation of income among women retailers living in MHHs, with 35% of them indicating household earnings below 1000 USD per year, 48% between 1000 and 2000 USD and 17% above 2000 USD. Those with the lowest household income earned even less than women producers in MHHs (average 652 USD/year). This picture was confirmed in the qualitative interviews. Further investigations are necessary to validate and explain this result.



**Table 4** Annual average household income earned by traders per business type in USD

Respondent category	Business type			<i>F</i> -test ( <i>F</i> -value)
	Wholesalers ( <i>n</i> = 20)	Retailers ( <i>n</i> = 59)	Both ( <i>n</i> = 37)	
Men heads	1505.00 (711.75)	1544.87 (1136.24)	1640.77 (729.40)	0.070
Women in MHHs	1250.16 (555.25)	1642.69 (1854.65)	1947.53 (734.30)	0.47
Women heads	698.78 (168.86)	971.83 (405.16)	1424.83 (692.64)	4.02**
Average	1294.87 (648.38)	1390.41 (1349.95)	1656.09 (729.65)	0.960

Note Figures in parentheses are standard deviations

**Table 5** Volume and shares of annual average household income in USD (MHHs only)

	Producers			Traders		
	Men heads ( <i>n</i> = 200)	Women in MHHs ( <i>n</i> = 118)	<i>t</i> -value	Men heads ( <i>n</i> = 38)	Women in MHHs ( <i>n</i> = 42)	<i>t</i> -value
Total annual average household income	915	652	1.39	1567	1657	0.33
Earned by husband	95%	61%	2.64***	67%	41%	2.08**
Earned by wife	5%	40%	6.28***	32%	57%	2.92***
Earned by other household members	<1%	<1%	0.37	1%	2%	0.69

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Perceptions of income shares generated by husband and wife diverged remarkably in MHHs, especially for farmers (Table 5). While men producers rated their own share at 95% (and that of their wife at 5%), women producers saw themselves as contributing 40%. These divergences persisted for traders, yet in a less pronounced manner. Men traders perceived their own share to be 67% and that of their wife 32%. Women traders, however, saw themselves as earning 57%. Producers and traders were asked how far their perceptions of spouses' income were grounded on knowledge and how far on estimation. For both nodes and both fruit and leafy vegetables, the following pattern emerged for MHHs: men more often than women said that they knew about the income of their partners, and thus did not have to estimate.

In the qualitative data, men and women mentioned different motives for keeping their earnings confidential. Several men farmers said they hid some of their income to generate savings for emergencies and prevent women from spending it on 'unnecessary' items that are not part of the household budget. By contrast, women farmers complained about their husbands' dishonesty in terms of available income and use for personal pleasures. Being afraid of divorce or domestic violence, women expressed a preference for being economically active instead of asking for money. Partial or complete financial independence from their husbands constituted a strong motivation for women traders to start up a business. Subsequently, women may also



hide their income to strengthen their position in intra-household negotiations and prevent their husbands from making financial demands. Although for the most part information on income is not shared, men and women producers and traders describe a small number of contrary cases. In these instances, husband and wife pool their income and decide jointly on how to spend it. Both men and women viewed households with a high level of cooperation as being more likely to move out of poverty. The following statement by a man in a FGD in Babati illustrates this:

Homes that lack participation, involvement of the mother in family responsibilities, these are the homes that we say are still based on patriarchy (mfumo dume). Even when you look at their level of development, they haven't reached far. Because if the mother cannot advise the father, he is likely to do whatever he thinks is right, even if it is not.

This quotation underlines the importance of women's participation in decision-making and income control for household development. Some respondents described how men tend to appropriate other household members' income and take sole decisions on it. They saw cultural and religious norms as demanding this behaviour and as assigning women to uncritical acceptance. Even if labour is shared or women cultivate independently on their own land, husbands may still control the income generated through these activities. Market chairpersons maintained that men farmers usually lead sales processes, including price negotiations, and receive the income, a claim that contradicts the results in Table 2. In Table 2, not only female but also male respondents rate women's involvement in selling as high. However, market chairpersons also observed that women producers are slowly engaging more in selling. Male income control was less pronounced among the women traders interviewed. 'I tell my husband about my construction activities, but money as money – to be honest, I cannot give him because it will be spent wastefully', one woman said. Another woman trader said: 'Sometimes I might give my husband money, sometimes I won't, because I need it for household expenses. The rest is to buy from the farm the next day'. This stronger position of women traders in MHHs is reflected in some of the results in Table 4: women traders are perceived or perceive themselves as earning larger shares of household income (32% men's perception and 57% women's own perception) than women producers (5% men's perception and 40% women's own perception).

## Expenditure

To analyse men's and women's benefits from vegetable production and sales, an understanding of both income and expenditure allocation is needed. Therefore, the main household expenditures, expenditure contributions by different household members and the question whether unequal income allocation is offset by expenditure allocation are examined in this section.

In the survey, respondents were asked to identify the three most important household expenditures. Producers most frequently mentioned food products



(76%), clothes (62%) and assets (38%; for instance house construction, purchase of land, car or motorbike). Statistically significant gender differences among farmers ( $p < 0.01$ ) emerged in terms of expenditure for hygiene products (37%) and assets. Women more often reported spending on hygiene products (49% of women in MHHs, 42% of women heads versus 29% of men) and referred less often to assets (24% of women in MHHs, 30% of women heads versus 49% of men). Also, women more often said to pay house rent (6% of women in MHHs, 5% of women heads versus 1% of men), a result significant at the 5% level. For traders, food products (96%), hygiene products (46%) and clothes (36%) were the most frequently indicated expenditures with no statistically significant differences between the respondent categories.

Similar to income (Table 5), producers and traders were asked about the total average expenditures of their household as well as the perceived shares of expenditures covered by different household members (Table 6). A comparison of both tables yields several insights. Farmers not only have a lower income but also lower expenditures than traders. Among producers, men heads again had the highest volume (this time for expenditures; 452 USD), followed by women in MHHs (369 USD) and women heads (241 USD). Results for traders were 819 USD for men heads, 971 USD for women in MHHs and 734 USD for women heads. Differences in the annual average household expenditures of the three respondent categories were significant at the 10% level for producers and not significant for traders (*F*-test). While men farmers' share of income and share of expenditures were rated as almost equal, women farmers' contribution to the household income and expenditure emerged as 40% and 29%, respectively. Among traders, the divergence in perceptions is again less pronounced. Women traders in MHHs see themselves as earning more and spending more than their husbands.

The above survey results would suggest that gender asymmetries in income shares are compensated by gender asymmetries in expenditure shares. FGDs with producers, however, painted a less balanced picture. Applying a participatory approach, each participant was given ten beans representing the income of a man farmer. The beans had to be allocated to two glasses, the first one standing for income spent on household expenditures and the second one for income used for personal spending. This process was documented and then repeated for the income of a woman farmer. After completing the exercise, members of two out of the three focus groups with men concluded that men spend a bigger share of their income on household expenditures than women. Participants in all three groups of women claimed the contrary, namely that women allocate a bigger part of their income to household expenditures than men. In the discussions, some men argued that their higher earnings and their role as 'budget planners' oblige them to ensure that household expenses are covered. Women complained about receiving little income from their own activities and getting insufficient financial support from their husbands for family needs. Quite a number of men shared this perception, stating that men tend to keep their income for personal spending. Men's high decision-making power in respect of income was identified as a critical factor that assigns their wives to a financially dependent position. A woman in Kiteto said:



**Table 6** Volume and shares of annual average household expenditures in USD (MHHs only)

	Producers			Traders		
	Men heads ( <i>n</i> = 200)	Women in MHHs ( <i>n</i> = 118)	<i>t</i> -value	Men heads ( <i>n</i> = 38)	Women in MHHs ( <i>n</i> = 42)	<i>t</i> -value
Total annual average household expenditures	452	369	1.31	819	971	0.28
Covered by husband	93%	69%	2.13**	76%	40%	2.46**
Covered by wife	5%	29%	5.37***	23%	59%	5.23***
Covered by other household members	2%	3%	0.40	1%	1%	0.44

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

There are two types of men. There are men who cooperate with their family. These are the families where you will see that even the available income suffices. You will see that even the man contributes a large part to take care of his family. These are the families that farm together. But the second type, those men who distribute their income, here there is trouble.

Men and women described expenses for personal entertainment as part of a masculine lifestyle that may force women to cover the household needs with their limited economic power.

In the interviews with traders, all women declared that they completely or largely cover their household's food expenses, the budget item most frequently mentioned in the survey. Some married women emphasized that the ability to do so released them from daily waiting for money from their husbands, which at times would not materialize. For other expenses, a diversity of arrangements emerged for MHHs: school fees were frequently the responsibility of one of the partners, but rarely of both. Husbands often paid house rent, but some women with a good income constructed their own houses. One man cooperating with his wife in trade had complete control over income and expenditure, while in another case, a man wholesaler underlined how joint decision-making had improved his marital relations. All in all, women traders appeared less dependent on their husbands' expenditure decisions than women producers.

In Fig. 1, perceptions of benefits are summarized. The figure shows the percentage of farmers and traders who view men's contribution to household income and expenditure as above 75%, women's contribution as above 75%, and men's and women's shares as between 25% and 75%. The results demonstrate that perceptions of men's share being above 75% were more common in producers' households, while a balance of men's and women's shares between 25% and 75% was more prominent in traders' households. Women heads for the most part indicated that their own share was above 75%. Setting narrower thresholds for women's and men's joint contributions between 33% and 67% showed the same trends.



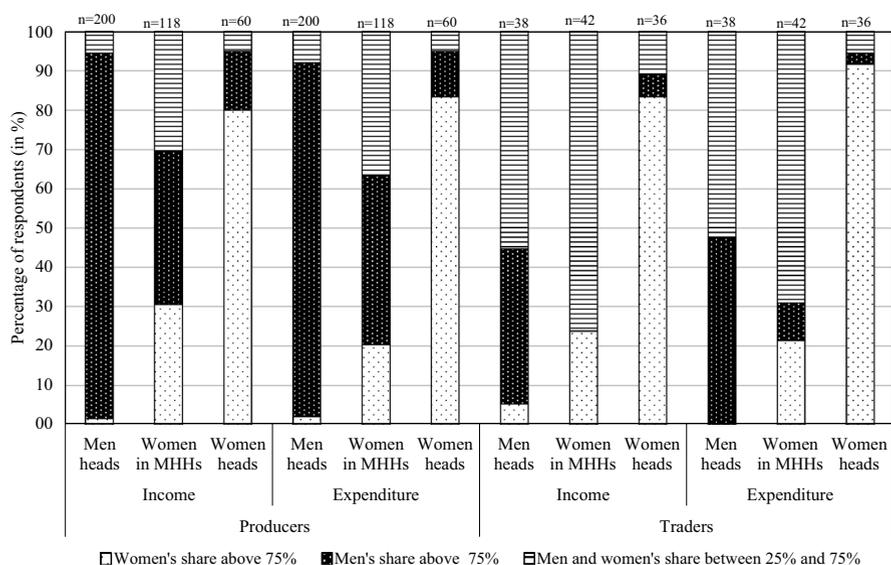


Fig. 1 Perceived income and expenditure shares by percentage of respondents

Using an OLS regression model, other potential influences on gendered income and expenditure perceptions in MHHs in production were further investigated (Table 7). Women with larger farm sizes indicated higher household incomes and higher expenditures. This confirms the importance of land as a resource to increase household income. Respondents reported that they derive most of their income from the sale of staple crops and legumes (mentioned by 61% of the respondents), leafy vegetables (79%) and fruit vegetables (53%). Labour on other farms (24%) as well as salaries and wages (10%) played a minor role. Another result shows that attendance at extension training events was related to lower expenditures, as stated by both women and men. This could be explained by the exposure to and use of good agricultural management practices and integrated pest management technologies, which potentially reduce the purchase of inputs. In producers' households, expenditures for agricultural inputs were ranked fifth with 35% of the respondents mentioning them. This underlines the importance of extension contact for benefits from value chain participation. An increase in the distance to markets negatively affects expenditure, a result significant for the women surveyed. This may be due to an increase in the transaction costs associated with distance to purchase household goods and services. For both respondent categories, higher incomes were related to higher expenditures. However, what men and women's higher income shares are spent on would require further investigation.



**Table 7** Results of OLS regression model for producers (MHHs)

Variables	Income		Expenditure	
	Men heads	Women in MHHs	Men heads	Women in MHHs
Household size (number)	26.93 (25.03)	21.23 (32.27)	-3.899 (43.52)	-2.742 (18.42)
Farm size (acreage)	4.651 (2.853)	18.77** (9.198)	8.502 (10.18)	18.34*** (4.562)
Age (years)	-11.19 (7.850)	3.134 (6.214)	12.82 (13.48)	-1.678 (3.990)
Education (years of schooling)	31.12 (23.47)	49.91 (25.33)	143.1 (106.0)	21.15 (14.74)
Access credit (1, if access credit, 0 otherwise)	56.38 (208.2)	715.5 (432.4)	169.5 (189.9)	-94.83 (103.1)
Attendance extension training (1 yes, 0 otherwise)	-162.2 (178.0)	-217.3 (193.0)	-285.6* (168.1)	-332.1*** (112.7)
Distance to market (km)	1.818 (3.581)	-0.788 (0.890)	3.958 (5.875)	-2.506*** (0.924)
Group membership (1, if a member, 0 otherwise)	151.3 (306.4)	-34.03 (197.3)	-88.93 (114.6)	129.1 (111.1)
Share of expenditure covered by vegetable sales (%)			-3.774 (6.769)	2.442 (2.780)
Income			0.159** (0.0752)	0.116* (0.0670)
Constant	1015.3 (622.2)	-13.69 (366.1)	-794.2 (901.5)	252.5 (219.1)
Observations	200	118	200	118
R <sup>2</sup>	0.013	0.190	0.170	0.276
VIF	1.15	1.2	1.14	1.23
Durbin-Watson test	2.05	1.69	2.00	2.00

Robust standard errors in parentheses

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

## Relevance for Literature

Views on labour contributions to vegetable production and trade diverged, with men and women consistently rating their own time investment higher than that of their counterparts. However, looking at MHHs, farmers indicated more gender-balanced labour allocation than traders, a result that could stem from the fact that joint cultivation could be more common than joint trading activities. Behind these views, gendered crop allocation and trade segmentation emerged to be more fluid than strict. Women producers' propensity to cultivate leafy vegetables relates to forms of discrimination (access to land, labour, knowledge and income control) that are entrenched in broader gender relations and play a decisive role in respect of market



participation (Coles and Mitchell 2011). Gendered crop allocations are linked to social norms, the profitability of crops and the control of productive resources in the household (David 2015; Leavens and Anderson 2011; Njiraini et al. 2018). Contrary to Farnworth's claim regarding women's concentration in production (2011, p. 3), there were signs of a feminization of vegetable retail. The causes could be men's move to formal market channels or more secure employment (Croft et al. 2016; on a reverse trend among urban vegetable retailers in Ghana, see Overa 2007), the potentially better market performance of women as compared with men traders (Fischer et al. 2017) and lower entry barriers for women traders in contrast to production, where access to land is needed.

In general, farmers perceived lower average household incomes and expenditures than traders (with high income variations among women retailers in MHHs), a result that confirms the findings of Weinberger et al. (2011). Perceptions of the volume of and contributions to income and expenditures diverged more strongly between men and women producers than between men and women traders. This can be explained by men farmers' higher decision-making power in respect of income as compared with men traders (Fischer et al. 2017). Women traders in MHHs not only thought that their household earnings were higher than those of the heads but also that they covered more expenses. At both nodes, women-headed households had the lowest income and expenditures. A closer investigation of how producing and trading households differ in their livelihood strategies could further explain the income gap between the two groups. Better insights into intra-household dynamics around benefits could be provided by interviewing both marital partners and by relating their diverging and converging perceptions to outcomes, an innovative approach used by Ambler et al. (2017). Qualitative research should additionally explore the gender norms and attitudes that underlie perspectives and behaviours. For instance the present study shows that men's and women's disagreement on household income feeds on the strategic non-disclosure of individual earnings. It can also be assumed that men's perceptions of their own high income and expenditure contributions are at least partly based on ideals of masculinity that deny women's resources and agency. Qualitative inquiry can validate and broaden these insights.

With regard to men's and women's labour and benefits at both nodes, farmers indicated more-balanced labour arrangements paired with less-balanced income and expenditure shares. Traders indicated less-balanced labour contributions that went hand in hand with more-balanced shares of benefits. How far the latter constitutes an increase in women's resources and agency or a withdrawal of men from household responsibilities or both cannot be determined herein. This juxtaposition has, of course, limitations: respondents at both nodes pursued a variety of other non-vegetable-related livelihood strategies whose gendered time investments were not included—let alone women's engagement in child care and domestic chores that frees up men. Nevertheless, the contrasting results for farmers and traders provide fertile ground for further questions concerning individual and joint labour, income and expenditure contributions and how they relate to gender equity. This points back to David (2015), who outlined how separate plot cultivation with individual income control facilitates women's benefits from sweet potato commercialization in her studied region. Respondents in the present study related the limited development of



farm households not exclusively to labour arrangements or the volume and shares of benefits but also to a high degree of sole income control and decision-making by men, the lack of trust and cooperation between marital partners and some men's diversion of money to personal entertainment. This is in line with Coles and Mitchell (2011), who emphasized that the extent to which actors benefit from participation is shaped at the household level. Elson's (1993) question whether income redistribution is a stressful or peaceful process might be answered by saying that respondents depicted it as tending to be more stressful in farmers' than in traders' households. Why and how men and women traders relax patriarchal norms constitutes an important topic for further research. One of the questions to pursue is whether this relaxation relates to strengthened independent subeconomies or income pooling and joint decision-making. Currently, respondents' narratives suggest the former, but additional evidence is needed.

## Conclusions

What are the implications of these results for sustainable and equitable vegetable value chain development? Gender-transformative approaches recognize the need for tackling inequalities at different levels to achieve synergies. At the community level, interventions should consider the differential barriers women and men have to overcome in value chain participation (such as access to land and water). In this respect, Ellis et al. (2007, p. 12) recommend raising customary leaders' awareness and readiness to support the unlocking of women's economic potential. Walsh (2013) underlined the benefits of involving women vegetable producers in collective action, a measure that, in his project, promoted women's economic progress. At the household level, equitable benefits will not be safeguarded as long as patriarchal norms restrict women's control of income and their contribution to decision-making. In the present study, respondents identified marital partners' cooperation as a crucial aspect for development. Cooperation could take the form of income pooling and joint decision-making or independent sub-economies with fair labour, income and expenditure shares. Household methodologies can promote cooperation (Bishop-Sambrook and Farnworth 2014) and should be included in agricultural development interventions. In these methodologies, household members define shared goals and closely work towards their achievement. Inequitable gender norms 'emerge as a factor limiting the achievement of household goals' (ibid, p. 2) and are reflected upon and addressed of one's own free choice. At the market level, the Food and Agriculture Organization of the United Nations (FAO) (2018) proposes improving women's general access to market information and the provision of gender-sensitive business development services. Finally, inclusive value chain development requires a better harmonization of efforts by development actors (Walsh 2013), and the consideration of gender issues in Tanzania's Horticultural Development Strategy. In a period of increasing vegetable commercialization in Tanzania, attention to multiple levels is paramount to ensure equitable value chain participation and gains for women and men.



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## Compliance with Ethical Standards

**Conflict of Interest** On behalf of all authors, the corresponding author states that there is no conflicts of interest.

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