Gender Dynamics and Dietary Diversity among Small Scale Legume Farmers in Singida District, Tanzania

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Abstract
The paper explores the association of consuming nutritious food groups including legumes with the relationship and the interactions between men and women small-scale farmers in Singida District, Tanzania. A cross-sectional design was used, and a sample size of 200 legume farmers comprising 88 males and 112 females was used. A 24-hour dietary recall checklist and a food frequency questionnaire were used to collect data by sorting out food groups. Groups of food items consumed were categorized into two levels of regularly consumed (three times or more per week) and rarely consumed (once per week). The qualitative data were analysed using content analysis while quantitative data were analysed quantitatively by computing descriptive statistics and a chi-square test. It was found that the association between gender and consumption of legume species was statistically significant ($p < 0.05$). The Pearson's chi-square test showed a slight association between legume consumption and sex category. The results showed that socio-economic characteristics; including income level, access to resources, and decision-making; were significantly associated with households' food consumption levels ($p < 0.05$). The study concludes that, due to a number of factors, such as women's limited access to resources and lack of women's involvement in nutritional decisions, gender dynamics within households are a barrier to diversity of food consumption at the household level. Therefore, the study recommends that men should be sensitized to increase the diversity of the food items they consume and recognize women's roles as essential to ensure their right to equality and to an adequate standard of living.

Keywords: Legume consumption, gender dynamics, dietary diversity**,** small-scale farmers.
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1. Introduction

A wide variety of food items made from legumes are important sources of plant-based proteins for people. In the hope of preventing diseases like cancer, diabetes, and high blood pressure, many health organisations and health institutes have promoted legume seeds as a staple meal (Praharaj and Maitra, 2020). Tanzania's estimated daily consumption of legumes per person is 14.14 g, which is less than 30 g per person recommended by the United Nations Food and Agriculture Organization (FAO) (Mfikwa and Kilima, 2014). Gender is a key factor in explaining variation in access to and control of resources at the household level for complementary feeding as well as social services in rural low-income communities. In this study, gender dynamics refers to the relationships and interactions between and among people, based on gender. What is considered masculine and feminine varies by culture, by time, and across groups within cultures (Sultan, 2018).

Across the globe, women's poverty and exclusion are correlated with gender inequalities when it comes to land and other productive resources. Men have a tendency of increasing their participation once a crop gains high profitability and economic opportunities while leaving women's role in crops with less profitability (Mando, 2020). This is caused by women having limited access to and control of resources. A study which was conducted by Fletschner and Kenney (2014) revealed that women's equal access to and control over economic and financial resources is critical for achievement of gender equality and empowerment of women and for equitable and sustainable economic growth and development. Therefore, women's access to, use of and control over land and other productive resources are essential to ensuring their right to equality and to an adequate standard of living. Women are frequently more in charge of making sure that their homes are supplied with the right, healthy and balanced food that is linked to dietary diversity. Women also make sure that food is available in the home and that members of the family eat nutrients from a variety of food categories, making the nutritional outcome a crucial factor (Nithya and Bhavani, 2018). Moreover, the effect of women's autonomy in nutritional decision-making for their households has been highlighted by different studies including a by Sougou, et al., (2020) which revealed that 6.26% of women had decision-making autonomy in relation to their household nutritious food intake. For 80.33% of the women, their husbands/partners made nutritional-related decisions for them.

Decision-making autonomy increased significantly with the age of the woman. Therefore, autonomy in household decision-making would reduce unmet needs among women.

The Government of Tanzania has made effort to address the question of low consumption of legumes and lack of dietary variety by promoting adequate nutrition education and encouraging farmers to grow a variety of crops (Huang et al., 2018). According to findings by a Tanzania National Panel Survey, 57% of Tanzanian households grow legumes throughout the long and/or short wet seasons, which was an improvement over previous years. Moreover, despite the government's effort to sensitize Tanzanians to increase legume consumption, in some areas, including Singida District, still legumes are grown and consumed in very low amounts. Furthermore, the majority of studies on gender dynamics, legume consumption and dietary diversity; such as those by Fikirie et al. (2016), Bacon et al. (2023) and Mando et al. (2020); have revealed that consumption of legumes is still constrained by subjective norms, limited land ownership, and negative attitude towards legume consumption, while diversification is key for agro ecological transformations. Men's negative attitude toward consuming legumes and the fact that women are given less weight in terms of land ownership are among gender dynamic issues at the household level. The purpose of this study was to identify the association between gender dynamics and dietary diversity among small-scale farmers. The association between gender dynamics and dietary diversity can be multifaceted and influenced by various factors such as cultural norms, social roles, access to resources, and nutritional knowledge and education. It is important to note that these associations can vary across different regions, cultures, and socio-economic contexts. Gender dynamics and their impact on dietary diversity should be understood within specific social, cultural, and economic contexts in which they occur. Additionally, it is crucial to recognize that gender is not limited to a binary construct and can encompass a range of identities beyond male and female.

2.0 Methodology

2.1 Research Design

This study made use of a cross-sectional research design to collect data from different farmers at a single point in time. The cross-sectional design helped to compare different variables at the same time including gender, age, and education level in relation to legume consumption with little or no additional cost. The design fits best the current study over other designs as it allows external validity and can capture and control a large number of variables (Setia, 2016). The study population included male and female small-scale farmers from five wards of

Merya, Ikhanoda, Mtinko, Ilongero, and Mwasauya in Singida District of Tanzania. This was done as part of the Farmer Research Network (FRN) project, which was carrying out under a non-governmental organisation called Research, Community and Organizational Development Associates (RECODA).

2.2 Sampling procedures

The study applied both purposive and random sampling techniques, whereby the respective wards were selected purposively considering the intervention made by RECODA. A simple random sampling technique used to select small-scale legume farmers who were FRN project beneficiaries from their respective village groups, based on at least three years of membership in the project. A total number of 12 key informants (KIs) were interviewed. These included two farmer group leaders from each group and two RECODA FRN project officers who had relevant information about farmers who practised legume farming and their field performance on the respective crops. Moreover, convenience sampling technique was used to select 8 and 7 participants for both male and female focus group discussions (FGDs) and 9 participants for only female participants who were chosen to provide information about how women were prioritized in each family when it comes to owning and using land. What part does the woman play in terms of the family's financial resources? How can a woman contribute to the diversification of the household meals? Respondents provided cooperative responses; therefore, accurate data were obtained.

2.3 Sample size

The sample size (n) of 200 small-scale farmers was calculated using the formula by Kothari (2004): n= $\frac{Z^2 \cdot p \cdot q \cdot N}{e^2 (N-1) + Z^2 \cdot p \cdot q}$ where n = the sample size, p = Sample proportion, q = 1 – p, e = Acceptable error, Z = Standard variety at a given confidence level and N = Size of the population. In the case of this study:

n = $\frac{Z^2 \cdot p \cdot q \cdot N}{e^2 (N-1) + Z^2 \cdot p \cdot q}$, where p = 0.1 for farmers, e = 0.05 for farmers, Z = 1.96 (confidence interval of 95%) and N = 420 for farmers. Therefore the sample, n = [3.8416 x 0.5 x 0.5 x 420] ÷ [(0.0025 x 419) + (3.8416 x 0.25)] = 200

2.4 Data Collection

A mixed-methods research approach was employed in which both qualitative and quantitative data were collected. Quantitative data were collected by using two tools, namely a food frequency questionnaire (FFQ) and a dietary diversity score. The former was used to recall food frequency consumed within seven days before the interview. For such a tool, researchers rely on a longer recall period of

respondents in order to capture food items that are not consumed every day but are still part of respondents' typical diets (Cui et al., 2021). Data were collected in ten groups of farmers and included frequency of consumption, major sources and availability. Legume consumption was categorized into two levels: (i) regularly consumed (three times or more per week), and (ii) rarely consumed (once per week), according to Al-Shaar et al., (2021). The dietary diversity score was used for collecting data following the list of foods consumed in the 24-hour dietary recall as listed in the twelve food groups, DDS accounts for the types of food items consumed by households in specific periods (usually within the previous 24 hours) (Worku et al, 2017). The respondents' answers were recorded 'Yes' if specified food items within a food group had been consumed and 'No' if specified food items had not been consumed in the previous 24 hours. The units of legumes consumed were analysed and converted into kg by following the national standard measures which indicate 1 bag = 6 baskets and 1 basket = 20 kg (Chuma et al., 2021).

Furthermore, qualitative data were collected using a guide for Focus Group Discussions (FGDs) and a checklist for Key Informant Interviews (KIIs). Three FGDs and a KII (which involved 10 farmers group leaders from all the five wards and two RECODA FRN project officers) were conducted. The FGDs were conducted at Mtinko with five women and three men, making a total of eight members while four women and three men from Ikhanoda were among the interviewees and nine members from Sekoture who were all women.

2.5 Data Analysis

Analysis of qualitative data involved content analysis from key informant interviews and focus group discussions which were taken in the form of notes. These were transcribed and coded. The codes were combined into themes based on the study's specific objectives and research questions.

Quantitative data from the questionnaire were analysed using IBM-SPSS (version 20) whereby descriptive statistics (frequencies, means, standard deviations and percentages) were determined. To measure gender dynamics and dietary diversity among the small scale farmers, the study adopted an approach employed by Poorrezaeian et al. (2015). In the study, the questionnaire served as the main tool for data collection whereas, descriptive analysis enabled the researcher to identify who consumed the most legumes and which food group was consumed the most by men and women in the household. Moreover, Pearson's chi-square test was conducted to assess the association between legume consumption sex (being men or women). Food Frequency Questionnaires (FFQ)

and Dietary Diversity Score (DDS) were used to aggregate household-level data on the diversity and frequency of food group consumed. FFQ relied on longer recall period which was seven days in order to capture foods consumed everyday but were still part of the individuals' typical diet. Food frequency was determined by using the questionnaire which included questions about varieties of food consumed in households.

3.0 Results and Discussion

3.1 Demographic Characteristics of Legume Farmers

This section presents results on socio-demographic characteristics of the respondents.

3.1.1 Marital status

The results from the study (Table 1) show that the majority of male respondents (96.6%, n = 85) were married while only three (3) of them (3.4%) were single, whereas among female respondents 95 (84.8%) were married while 17 of them (15.2%) were single. The findings showed that most men regarded marriage to be one of the critical elements promoting productive farming, which ensured a supply of labour for male farmers since they had support of their wives and children.

3.1.2 Age

The results showed that 39 (44.3%) of the male respondents were within the age bracket of 45-54 years while 38 (33.9%) of the female respondents were within the same age bracket. The minimum age of the respondent involved in the study was 25 years while the maximum age was 71 years, with a mean age of 48 years. This suggests that the population from which the sample was drawn was dominated by mature respondents who could actively engage in different economic activities including farming.

3.1.3 Education

Education is an important factor that plays a main role in household decision on food consumption. It helps much in creating awareness on food diversity among household members. The results in Table 1 show that, the majority of the respondents were primary school graduates (male 89.8% while female is 85.7 %). The results also show that 1.1 % of male and 4.5% of female had not gone to school. This implies that a larger proportion of the individuals had at least completed primary education and could access written information potential for improving household wellbeing and development in general.

3.1.4 Land size

The results in Table 1 show that the majority of farmers (85.5%) had small farm sizes ranging from 1 to 5 acres. The findings show that the majority of female farmers (85.7%) were using land owned by their husbands while 14.3% of female farmers had bought their own land. The high per cent of male farmers who owned their own land indicates that the majority of women in Singida District have limited access to land ownership. Moreover, the production of legumes crops was highly dominated by female farmers who had inadequate ownership of land and poor access to income generating activities which often hampered their effort to realize women's potential and their ambitions to grow different legume crops of their choice for dietary diversity. The study's finding is in line with what was reported by George and Osabuohien (2014) that women, unlike men, are handicapped in making decisions on the acquisition, use and disposal of land. In spite of various land policies that prescribe rights to land in modern society, women remain marginalized in access to and economic utilization of land, despite their massive engagement in agriculture.

Table 1: Demographic characteristics of the respondents

Variable	Male(n = 88)		Female(n = 112)	
	Frequency (n)	Per cent (%)	Frequency (n)	Per cent (%)
Locality				
Rural	38	36.5	66	63.5
Pre urban	50	52.1	46	47.9
Marital status				
Single	3	3.4	17	15.2
Married	85	96.6	95	84.8
Age				
25-34 years	17	19.3	11	9.8
35-44 years	16	18.2	30	26.8
45-54 years	39	44.3	38	33.9
Above 54 years	16	18.2	33	29.5
Education level				
Not educated	1	1.1	5	4.5
Primary	79	89.8	96	85.7
Secondary	6	6.8	11	9.8
Tertiary	2	2.3		
Size of land				
1-5	74	84.1	97	86.6
6-10	9	10.2	13	11.6
11-15	2	2.3	1	0.9
16-20	3	3.4	1	0.9

3.2 Legume Consumption Pattern

The frequency of consumption of each food group by men and women is shown in Table 1, shows the distribution of the respondents' consumption frequency of legumes. The association between gender and each legume consumed in the study area was further tested using Pearson's chi-square test at $\alpha < 0.05$ level of significance. It was found that there was slightly higher consumption of legumes among women compared to men ($p < 0.05$). In particular, there was slightly higher consumption of beans, peas, pigeon peas, lablab, chickpeas, soybeans, Bambara nuts, and green grams, whereas a higher proportion of men reported eating more peas, cowpeas, and groundnuts. The difference in legume consumption between male and female was caused by dominance of mothers' decision on legume consumption. The findings showed that 84.5% of both male and female household farmers' decision on legume consumption was made by mothers while only 2.5% of the decisions were made by fathers. Moreover, the majority of the mothers fed their households legumes when there was shortage of food. The results also showed that 61.6% (69) of mothers feed their households with legumes when there was shortage of food while only 38.4% mothers found alternative sources of food items other than legumes. These findings are in line with what reported by Sanga (2019) who found that there was a significant association between food consumption and sex (men and women) whereby, at large women participated in household decision making on income expenditure and food consumption pattern.

Table 2: Frequency of consumption of different legume species available in the community consumed within seven days

Food	Male (n= 88)		Female (n= 112)		
	Regularly consumed	Rarely consumed	Regularly consumed	Rarely consumed	P- Value
Beans	85(46.2)	3(18.8)	99(53.8)	13(81.2)	0.034
Peas	34(55.7)	54(38.8)	27(44.3)	85(61.2)	0.027
Cowpeas	45(52.3)	43(37.7)	41(47.7)	71(62.3)	0.039
Pigeon peas	83(46.6)	5(22.7)	95(53.4)	17(77.3)	0.033
Lablab	10(11.4)	78(88.6)	26(23.2)	86(76.8)	0.030
Chickpeas	29(35.4)	59(50.0)	53(64.6)	59(50.0)	0.040
Soybeans	29(34.9)	59(50.4)	54(65.1)	58(49.6)	0.030
Bambara nuts	61(49.6)	27(35.1)	62(50.4)	50(64.9)	0.044
Green grams	22(33.8)	66(48.9)	43(66.2)	69(51.1)	0.045
Groundnuts	74(84.1)	14(15.9)	81(72.3)	31(27.7)	0.048

3.3 Dietary Diversity Score among Individual Legume Farmers

The results in Table 3 show different food groups consumed during 24 hours, considering each food group taken once per day. The results show that there was

a higher consumption of foods which contain oil and fats by both sex categories. According to the research, Singida produces a lot of sunflower, making it simple for most farmers to use oil and fat in their meals on a regular basis. The study's findings are consistent with what Isinika and Jeckoniah, (2021) reported that Singida is one of the top places in Tanzania for producing sunflower, in which socio-economic factors are among the factors which influence smallholder farmers' participation in the sunflower value chain.

Moreover, men, on the other hand, showed a higher intake (100%, n = 88) of foods which contain grains, oats, maize, barley, wheat, sorghum, and millet than women who were (95.5, n = 107). This revealed that food rich in carbohydrate including cereals are mostly preferred by men as they are energy giving foods which provide men with energy for agricultural activities. These findings are in line with what has been reported by Trommsdorff et al. (2021) that crops including maize, sorghum, and pulses are some of the most important food groups to be consumed for energy provision to the body.

The results in Table 4 show that the majority (78.4%, n = 69) of males consumed fish, while (93.8%, n = 105) of women consumed vegetables. This reveals that females consumed low caloric foods which are fruits and vegetables while males were more likely to consume high caloric foods like fish. According to the study's findings, males were engaged in fishing activities that induced them to consume high-calorie foods like fish, while women tended to consume vegetables because they are easier to reach in the home environment. The study is in line with what has been reported by Wah (2016).

The majority of women (85.7%, n= 96) consumed legumes, primarily pigeon peas, which were combined with other food groups such as maize flour or mixed with beans as their cultural way to consuming pigeon peas. Due to their traditional habit of mixing pigeon peas with maize or beans primarily, many households, particularly those headed by women, consume pigeon peas when combined with other food types. The study is in line with what has been reported by Ayenan et al. (2017) that women legumes have special nutrients rich in protein which is helpful for women reproductive health. Moreover, 29 (33%) consumed foods made from roots or tubers which are important crops grown as sources of energy, second to cereals which makes it more preferred by men. Furthermore, both men and women consumed very little animal-source protein, such as meat, milk, and eggs. According to the study, Singida's District small farmers consume animal proteins less frequently than other ethnic groups because of their fragile financial situation and inadequate understanding about their nutritional value.

Only 27 (30.7%) of males and 21 (18.8%) of females consume meat per day; 20 (22.7%) of males and 19 (17.0%) of women consume milk per day; and 12 (13.6%) of male and 8 (7.1%) of female consume eggs per day.

Table 3: Farmers' household dietary diversity score for different foods consumed in the last 24 hours

Food groups	Male (n= 88)		Female (n= 112)	
	Frequency (n)	Per cent (%)	Frequency (n)	Per cent (%)
Oil	88	100	112	100
Grains	88	100	107	95.5
Fish	69	78.4	80	71.4
Vegetables	68	77.3	105	93.8
Legumes	65	73.9	96	85.7
Coffee/ tea	41	46.6	14	12.5
Fruits	30	34.1	68	60.7
Sugar	29	33	40	35.7
Roots and tubers	29	33	33	29.5
Meat	27	30.7	21	18.8
Milk	20	22.7	19	17
Eggs	12	13.6	8	7.1

Household food intake among small-scale farmers in Singida does not reflect access to a variety of foods which are there, and the majority of families do not follow a healthy eating pattern; they consistently consume the same food types, rather than basing their choices on the diversity of foods that is advised for good health. This finding is in line with what has been reported by Jones et al. (2014) that dietary diversity is associated with household or individual food availability and intake of nutrients from different food groups and is an important component of nutritional outcomes.

3.4 Gender Dynamics in Relation to Dietary Diversity

Gender differences in food intake and selection first appear within households. Men consume more foods rich in calories including red meats, pork, chickens and grains than women. Moreover, sexes have different eating styles, which indicate that women have been socialized to eat in a more feminine manner (Nwaka et al., 2020). The results of this study indicate that gender dynamics between men and women in the household result in an unequal relationship and dissociation that prevents the households from having access to a variety of food groups. Decision-making is also limited, and women have less control over and access to resources.

According to the study's findings, 81.5% of the women in households made decisions on what foods to eat, particularly legumes. Women decision on food consumption in Singida District was influenced by gender division of power within households; in many households women were responsible for making meals for their families. Moreover, the results in Table 4 show that the majority of women (85.7%) preferred feeding their families with legumes when they lacked quick food to provide to their families. This implies that legumes are abundantly produced by small farmers in Singida District, although they are not regarded as an essential part of the families' meals. As a result, when an individual household is out of food to eat at a specific time, they choose to consume legumes.

The study also revealed that the majority of women (86.6%) had access to land for growing crops like maize, with 79.5% of women using their spouses' land and only 20.5% of women owning and using their own land. This shows that women had restricted land ownership, which limited their ability to grow a variety of crops, particularly legumes, for use in their households to broaden dietary diversity.

Table 5: Gender dynamics affecting the small-scale farmer's dietary diversity

	Male (n= 88)		Female (n= 112)	
	Frequency (n)	**Per cent (%)**	**Frequency (n)**	**Per cent (%)**
Member decision on legumes consumption				
Father	7	7.9	17	15
Mother	77	87.5	91	81.5
Children	4	4.6	4	3.5
Shortage of food makes you feed your household legumes	65	73.9	96	85.7
Size of land				
1-5	74	84.1	97	86.6
6-10	9	10.2	13	11.6
11-15	2	2.3	1	0.9
16-20	3	3.4	1	0.9
Source of land				
Bought	16	18	9	8
Inherit	71	81	14	12.5
Spouse	1	1	89	79.5

Key Informant Interviews (KIIs) were held with RECODA officers and local leaders, and focus group discussants were held with both men and women from Mdilu village. The results showed that income was also a challenge as the majority of legume farmers did not have savings; hence they could not consume pigeon peas and lablab which they grew; they sold them to obtain money to meet other needs including buying school uniforms for their school-going children and other food items. There is often an association between dietary diversity and income levels among farmer households, with lower income households generally facing challenges in achieving greater dietary diversity including limited purchasing power whereas lower-income farmer households in Singida District had limited financial resources to purchase a wide variety of food, particularly those that are more expensive or considered to be of higher nutritional value including meat. As a result, they relied on cheaper and more staple food items, which might offer them limited diversity in terms of nutrients. Additionally, it was found that there was difference in legume consumption among men and women. Women had more dominance in growing food groups such as legumes and vegetables from which they earned low income when sold, thus giving more opportunity for the women to consume legumes than male and also to make decisions on household consumption of legumes. During focus group discussions with both men and women, it was argued that, despite the high nutritional value of legumes, some legume spices, such as lablab, had an unpleasant taste, causing male and child household members to consume fewer of them.

4.0 Conclusions and Recommendations

The study revealed that gender dynamics within small-scale legume farmers' households to be a barrier to the household dietary diversity which was caused by different factors including limited ownership of resources to women and nutritional decision making. As the results are rolled out and scaled up, gender inequity still adversely affects adherence to different ways for women and men who grow legumes. From the findings of this study, it is concludes that household decision making on access to and control over resources affects the consumption level in the household. Women have limited access to land for growing crops including legumes as men perceive legumes as less profitable. Moreover, maintaining a good diet was a problem reported by most of the respondents regardless of their sex, income and education levels owing to a lack of financial resources. This limits the ability to purchase and consume diversified source of food. Although income reported was a challenge to both men and women, women have no decision-making power over household resources particularly income. Therefore, the study concludes that there is a need to promote alternative

livelihood activities to improve income for both men and women to increase access to food items that need to be bought.

Therefore, given the gender dynamics found in dietary diversity among small-scale legume farmers in Singida Region, it is recommended that the gender aspect continues to be an integral part of dietary diversity to improve access and control for both women and men in Singida District. Furthermore, as male awareness of the value of legume crops is raised by the public and private sectors, consumption will rise, and increasing the percentage of women who own land at the same time. This would enhance production of diverse food sources including legumes and equitable distribution of money. Small-scale farmers should be supported to get alternative sources of income in order to increase their revenue and ensure that they can afford to buy nutritious food on a daily basis. Finally, there is a need to conduct awareness campaigns about how crucial it is for women to participate in joint decision-making and have access to resources including land.

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