

Assessment of Women's Productive Roles in Household Food and Income and Associated Factors in Kilindi District, Tanzania

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ABSTRACT

Women make up half of the global workforce in both agricultural and non-agricultural sectors to provide household food and income. The study aimed to examine women's productive roles in household food and income in the 2019/20 and 2020/21 cropping seasons and associated factors among crop farmers and agro-pastoralists in Kilindi District, Tanzania. A structured questionnaire was used in a cross-sectional survey involving 209 crop farmers and 136 agro-pastoralist women, who were selected through multistage random sampling. The data was analysed using IBM SPSS version 20. The factors associated with women's productive roles in household food and income were determined by using linear regression and multivariate ordinal logistic regression, respectively. Significance was considered at 5% ($P \leq 0.05$). The findings revealed that 40.0% of agro-pastoralists and 44.2% of crop farmer women in the 2020/21 cropping season produced 5–15 sacks of maize. About 10% of both agro-pastoralist and crop farmer women in 2019/20 cropping season earned more than Tsh. 200,000. Women with no formal education among crop farmers (AOR = 2.601, $p = 0.023$) increased their household incomes two times compared to women with primary education. Women who owned land among agro-pastoralists (AOR = 7.845, $p = 0.025$) increased household incomes seven times compared to women who did not own land. The age of female crop farmers ($p = 0.045$) decreased their contribution to the household's food production. Women face challenges in maize farming to support household food and income. This study suggests that women should have access to land, education, credit, and farming technology.

Key words: Cropping season, income, land ownership, women, farmers, agro-pastoralists

INTRODUCTION

Half of all the people in the world are women, and they make up one-third of the people who work (Khan *et al.*, 2021). Globally, both paid and unpaid work are performed by women (IFAD, 2016). Farm and non-farm jobs are among the paid jobs that women perform (Khan *et al.*, 2021). Sometimes, women do unpaid jobs, such as farming on family farms (Sharmistha and Narayan, 2011).

In developing nations, women carry out domestic, on-farm, and off-farm work (IFAD, 2016). A study done by Roy *et al.* (2017) in Bangladesh revealed that the main economic activities undertaken by women are fishing, post-harvest work, livestock management, poultry keeping, and crop production. Another study by Alemu *et al.* (2022) in Ethiopia found that women engage in a variety of small business ventures, including hair salons, wage labor, petty trade, and sales of poultry, vegetables, fruits, and livestock products.

In Tanzania, more than 80% of women are employed in the agriculture sector (Leavens *et al.*, 2021; IFAD, 2016). For women, the figure increases to ninety-eight percent (98%) in rural areas (Leavens *et al.*, 2011). Women also do non-farm activities in Tanzania, and it has been revealed by several studies: Mwaigaga (2017)

discovered that women carry out food vending, sales of farm products, selling clothes, and small businesses. Ombakah (2014) found that small-scale businesses carried out by women include selling street food, buns, vegetables (leafy vegetables, fruits, and root vegetables), fish (fried or dried), charcoal, local beer, dressmaking, and hair plaiting.

Income-generating activities carried out by women provide households with food and income (Milanzi 2011). Women are more often the primary providers of food and financial stability, and sometimes the primary earners (Sharmistha and Narayan, 2011). Women contribute significantly to farming, and their income is essential for maintaining household food access (Kalansooriya and Chandrakumara, 2014).

Globally, women contribute to 50 percent of the world's food production (FAO, 2014), in developing countries, women produce between sixty and eighty percent of food (FAO, 2014). Women in sub-Saharan Africa produce sixty to eight percent of all food produced to feed the entire population on the continent (Mkuna *et al.*, 2021). In Tanzania, food crop production is done by the majority of women, while cash crop production is done by the majority of men (Swantz, 1985; Mollel and Mtenga, 2000; Leavens *et al.*, 2011). According to FAO (2001), Tanzanian women produce about seventy percent (70%) of food, including food crops. Although women engage in many economic activities, some of the economic activities to support household food are not counted (Ogunlela and Mukhtar, 2009).

Women contribute to 37 percent of world GDP (World Bank, 2019). In developing countries, some studies show that the majority of women have incomes that are less than 50% of total household revenue. A study done by Roy *et al.* (2017) in Bangladesh discovered that the mean annual women's income support is almost forty-three (43%) of the total revenue for the household. In Ethiopia, women possess almost 36 percent (36%) of total household income (Ahmed, 2021). Other research findings from Bangladesh and Ethiopia show women earn little annual income. According to Karci's (2015) findings, eighty-seven percent (87%) of women's annual income in Bangladesh was up to Tk 200,000. Roy *et al.* (2017) discovered that the annual income of Bangladeshi women is calculated to be Tk. 42,000. In Ethiopia women's share of household income is estimated to be 32,400.50 birr per year (Ahmed, 2021)

Most Tanzanian women who work in the agriculture sector are unpaid and sometimes earn less income. (Idris, 2018). Some other women are supporting households with few incomes through non-farm activities such as small scale businesses. A study done by Milanzi (2011) in Morogoro, Tanzania, among Mama Lishe revealed that fifty-seven percent (57%) and one percent (1%) provided 3000 and 4000 Tsh and 7,000 and 8,000 Tsh to their families daily, respectively. Institutional, cultural, and economic factors confront women's support for household income (Mkuna *et al.* 2021).

Even though women support family income and food (Sharmistha and Narayan, 2011), in Tanzania, women confront some challenges in farming and income-generation activities. JICA (2016) revealed that cultural norms and customary law in Tanzania prohibit women from possessing land in rural areas. Several studies done in Tanzania indicate that women face obstacles in food production and income generation, such as a lack of credit, poor working conditions, insufficient education, unfavorable customary laws, and insufficiently favorable government laws and regulations (Nyawazwa, 2013; Komba and Njau, 2014; Maingwa, 2015). Many studies have shown factors facing women in non-farm activities in Tanzania, but women who are farmers may also face similar challenges.

In Tanzania, information on women's support for household food and income in various economic activities is limited. It is crucial to study how women's economic activities support household income and food in informal sectors in Tanzania, such as crop farming, which has employed women more than 80%, and to determine factors that hinder their efforts.

This study aims to examine women's productive roles in household food and income in the 2019/20 and 2020/21 cropping seasons and their associated factors among crop farmers and agro-pastoralists in Kilindi District, Tanzania. The results of the study can be used by the government and other development partners to implement gender sensitization programs, such as women's empowerment, in order to increase food and income generated by women crop farmers and agro-pastoralists to support family wellbeing.

LITERATURE REVIEW

Empirical Review

Milanzi (2011) performed a study in Morogoro, Tanzania, with a focus on the role of Mama Lishe (petty food business) income in reducing household poverty. According to the survey findings, 57.8 percent, 22.2 percent, 15 percent, and 1.1 percent of Mama Lishe provided to their family around 3,000 and 4,000 Tshs, 5,000 and 6,000 Tshs, 2,000 and 2,000 Tshs, and 7,000 and 8,000 Tshs, respectively. The study concluded that Mama Lishe has considerably benefited their family with the income earned. Not only does Mama Lishe play a significant role in household income, but other social economic groups operating in the informal sector, such as women farmers and agro-pastoralists, may also have a positive impact on household food and income.

According to other studies done in Tanzania by Philipo (2008), Nyawazwa (2013), Komba and Njau (2014), Philip and Nzali (2014), and Mwaigaga (2017), on women's support to household income. These studies discovered that factors such as lack of access to financing, inadequate training, bad working conditions, limitations relating to consumers, family dynamics, unfavorable government rules and regulations, price fluctuation of raw materials, a lack of customers, taxes, and interference from local authorities impeded women support to family income.

According to Philip and Nzali's (2014) research, women who have completed formal education contribute more financially to their households than women who have not. This study suggests that non-farm activities, such as small-scale businesses, should be the only basis for policy formulation that guarantees women's preference when it comes to obtaining financial resources.

The policy should address women's needs after analyzing the needs and challenges facing other social and economic groups, such as farmers, who are not present in this study. It is better to understand how much these factors increase or decrease women's support for household income and crop production.

Mwaigaga (2017) revealed that women in Morogoro Municipality, Tanzania, work in small enterprises, cultivating crops, raising livestock, producing food, and selling various products and clothes. The study discovered that women's involvement in earning money was facilitated by several factors, including lessening reliance on husbands, lowering family financial difficulties, supporting gender equality and equity, life enhancement, boosting community cooperation, and educating women about the existence of income-generating activities worldwide (Mwaigaga, 2017).

The causes of women's income generation activities differ from urban to rural areas and other social and economic groups. Generally, women perform various productive activities to support household well-being. These studies done in Tanzania focus on women's support for household income, especially for women doing non-farm activities. Women performing farm activities such as farmers and agro-pastoralists may also support household food and income as well.

In Bangladesh, women's support for household income was examined by Roy *et al.* (2017). The study showed that raising poultry, managing cattle, producing crops, engaging in post-harvest operations, and fishing are the primary economic roles of women. Women's major annual income is projected to be Tk. 42000, or around 43.52 percent of the total earnings of households. The study demonstrates how earnings for women correlate negatively with age, family size, and debt but are positively associated with women's education and farm size. Women's education and farm size may also have a positive or negative association with other pillars of household food security, such as household food production. The factors that have been found to influence households' levels of income and food security status are almost endless, depending on the nature of economic activities, demographic factors, location, culture, and economic factors, and they may change from time to time.

Based on studies on women's involvement in income-earning activities conducted in Ethiopia by Ahmed (2021) and Alemu *et al.* (2022). Women's involvement in income-earning activities may be influenced by the age of the mother, husband's level of education, women's level of education, size of the family, size of the land, market location, and distances, livestock keeping, and loan availability. The exact factors that might seriously affect

women's involvement in income-generating activities as well as how they could raise or decrease it are yet unknown. According to Ahmed (2021), women provide an average amount of assistance for the household income, approximated to be birr 32,400.50 per year or around thirty-six percent (36%) of the total revenue of the household.

Small sample sizes for some social economic groups, which might not be a true representative of a particular population, for example, daily laborers (18 in number), tea and coffee sellers (20 in number), and other social economic groups not mentioned might be farmers, who are 18 in number.

Alemu *et al.*, (202) revealed that Women work in wage labor, petty trade, poultry keeping, sales of vegetables, livestock products, and fruit, and hairdressing, which are small business ventures performed by women. Though crop-farming activities are not listed, they can be carried out in both urban and rural areas, as well as in any community.

Khan *et al.* (2012) examined the involvement of women in agriculture activities in the district of Peshawar in Pakistan. The results demonstrated that the number of adult males living in the home, educational attainment, and total financial status of the family had a negative but significant impact on women's involvement in crop production. The finding also revealed that the study participants' age and marital status showed a significant impact but showed a positive association with the involvement of women in farming.

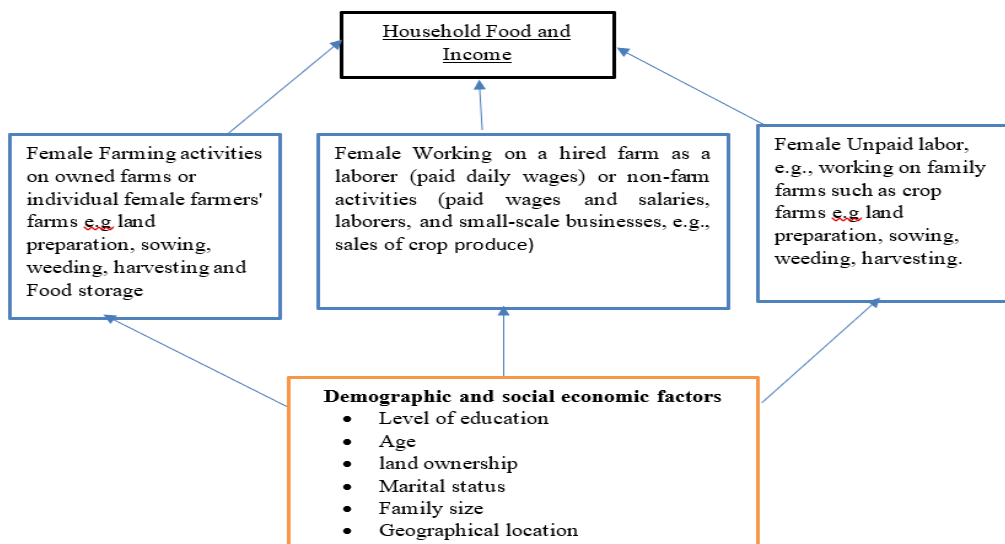
Hartatie *et al.* (2021) in Indonesia found that lending attitudes on the part of consumers, price fluctuation of raw materials, few customers income taxes, insufficient capital, and disruptions from local authorities had an impact on women's engagement in income-generating activities. How much female farmers produce, earn and factors affecting their effort also have to be incorporated into various studies so as to help policymakers and the government initiate women's empowerment.

Conceptual Framework

Women's productive roles in supporting household food and income and associated factors in this study are explained by using the framework presented in Figure 1.

Women's involvement in farming, whether on family farms, owned or rented farms, or non-farm occupations, is affected by a number of factors, such as geographical location, age, family size, education level, and credit accessibility. Both non-farm activities, such as small-scale businesses and the salaries or wages paid to women, and farm activities, like clearing land, planting, weeding, applying fertilizer, and harvesting techniques, have the potential to either increase or decrease household income and food.

Figure 1: Conceptual frame work on productive roles of women in household food and income and associated factors.



Source: Sharmistha and Narayan (2011).

Theoretical Frame work

The human capital theory

The theory of human capital originated with Schultz in the early 1960s (Wuttaphan, 2017). Human capital theory is adopted to analyze the productive roles of women to support household food and income in Kilindi District, Tanzania. Human capital" can be defined as knowledge, abilities or skills, attitudes, talents, and other inherited characteristics or traits that support production (Goode 1959). This theory relies on the knowledge, capacities, and skills of the people in a company or an organization (Blair, 2011). Three primary components make up human capital: skills and knowledge acquired through training; inherent or acquired ability; and talents, competencies, and experience developed through on-the-job training (Fleischhauer, 2017; Blundell *et al.*, 1999). Human capital theory suggests that investing in education or training increases skills and abilities, which ultimately increases income and productivity. According to Blundell *et al.* (1999), workers who received or participated in vocational training receive an average of slightly more than 5% increased salaries or wages compared to those who did not receive training. According to this theory, women's productive roles in supporting household food and income depend on inherited skills and knowledge from ancestors or parents or skills and knowledge obtained from formal education and training.

Therefore, to ensure sustainable household food and income, women are supposed to undergo education and training, especially in agriculture production and entrepreneurship, to build their awareness and capacity to increase crop productivity and income and ensure their support to household food and income for the wellbeing of household members.

MATERIALS AND METHODS

Description of the Study Area

Kilindi district is surrounded to the east by Handeni District, to the northwest by the Manyara Region, and to the south by the Morogoro Region. The total population is 398,391 (URT *et al.*, 2022). The main food and cash crops are maize and beans, but maize is the leading source of income and food. Livestock kept includes cattle, poultry, and goats. The ethnic groups are the Masai, Nguu, Zigua, Kaguru, and Kamba Iraqw, Burunge, Chagga, Pare, Meru, and Sambia. Kilindi District has cosmopolitan populations who are livestock keepers and farmers, with diverse cultural attributes that are representative of most ethnic groups in Tanzania.

Study design and population

This study used a cross-sectional study design. This study's design enables rapid data gathering at a relatively cheap cost. The study's participants were mothers between the ages of 15 and 49. Mothers who accepted to take part in the study were included, whereas those who were not permanent residents of the village, neither crop farmers nor agro-pastoralists, were excluded.

Sampling procedure

Multistage sampling was used to select study participants. The selection of wards was based on ethnic groups (Masai, Meru, Iraqw, Nguu, Zigua, and Kaguru), and the wards that were chosen were Kweikivu, Kimbe, Pagwi, Mkindi, and Kiberashi. Geographical location (wards located in the east, north-west, and south) was used as criteria for selection of study participants, as well as agriculture activities. It was deliberate to choose one village per ward, where the majority of the population were agro-pastoralists and crop producers, in which purposive sampling was employed for selection.

All eligible participants were listed by the sub-village chairpersons of the selected six villages. To select households nested within the six villages, proportional stratified random sampling was applied to choose a random sample of 209 crop farmers and 136 agro-pastoralists.

Sample size determination

Taro Yamane's formula was used to extract a sample from a population (Adam, 2022), which is as outlined below.

$$N = N/(1+N(e^2))$$

Whereby 'n' is a sample size,

'N' is the population size of Kilindi District, which is 398,391 (URT *et al.*, 2022).

'e' is the error detection estimated to be 5% or 0.05

The sample size for this study was $n = 398391/(1+398391 \times 0.05 \times 0.05) = 400$

The sample size is approximated to 400. Time and money constraints led to the selection of a sample size of 345.

Procedures for Data Collection

Data were collected through a personal interview in which mothers met face-to-face with the interviewer and used a structured questionnaire as a data collection tool. Personal interviews were conducted at designated gathering centers, such as schools and dispensaries, and on personal premises.

The study objectives were the basis for the formulation of an English-language questionnaire that was translated into Swahili for ease of use and accuracy. The questionnaire was used to collect information on socioeconomic characteristics and the contribution of women in household food and income in the 2019/20 and 2020/21 cropping seasons.

Pre-testing of questionnaire

Pre-testing of the pilot survey questionnaire was conducted using ten percent (10%) of the sample size for the households in a Negero village that were not part of the study. The aim was to check whether the questions were clear and not contradicting. The questions were revised and modified based on the answers from respondents.

Data processing and analysis

Data were cleaned, coded, entered, and analysed using IBM SPSS version 20. Significance was considered at 5% ($P \leq 0.05$). Descriptive analysis such as percentages was used to determine the contribution of women's productive roles in household food and income and the economic characteristics of respondents. Linear regression and multivariate ordinal logistic regression were used to determine the factors affecting the contribution of women in household food production and income generation activities respectively.

Ethical considerations

Letters of permission for conducting research were obtained from Kilindi District Office and SUA. The participants were given details on the study protocol. Before the interview, after explaining the aims of the study to each participant, their verbal informed consent was obtained.

RESULTS

The study area's findings are presented in this chapter. The following sub-sections are used to present the results: socio-economic characteristics of women among crop farmers and agro-pastoralists; women's productive roles in household food and income in cropping seasons 2019/20 and 2020/21; and factors associated with women's productive roles in household food and income in cropping seasons 2019/20 and 2020/21 among crop farmers and agro-pastoralists.

Social-economic characteristics of respondents

About 59.1% of women crop farmers and 47.6% of agro-pastoralists had no formal education. Crop farmers and agro-pastoralists had 73.6% and 94.9% of households with land, respectively. Crop farmers' households had land sizes of less than 5 acres, which accounted for 70.2% of the total, while agro-pastoralists had 54% (Table 1). Maize is grown exclusively by 63.5% of agro-pastoralists and 70.2% of crop farmers (Table 1).

Table 1: Respondents' social-economic characteristics (n=total number of respondents)

Social economic Groups			
Characteristics	Agro-Pastoralists (N=137) n (%)	Crop Farmers(N=208) n (%)	All(N=345) n (%)
Farm size			
Less than 5 acre	74(54)	146(70.2)	220(63.8)
5-15 acres	55(40.1)	58(27.9)	113(32.8)
More than 16 acres	8(5.8)	4(1.9)	12(3.5)
Crops often grown			
Maize and Beans	49(35.8)	57(27.4)	106(30.7)
Maize Only	87(63.5)	146(70.2)	233(67.5)
Maize and sunflower	1(0.7)	5(2.4)	6(1.7)
Mother's level of education			
Primary Education	50(36.5)	96(46.2)	146(42.3)
Secondary education	2(1.5)	12(5.8)	14(4.1)
Lack of Formal Education	81(59.1)	99(47.6)	180(52.2)
Not having finished secondary school	3(2.2)	0(0)	3(0.9)
Not having finished primary school	1(0.7)	1(0.5)	2(0.6)
Land ownership			
Rented land	7(5.1)	55(26.4)	62(18)
I have land	130(94.9)	153(73.6)	283(82)

Source: Research Result (2024).

Women's productive roles in household food and income in the 2019/20 and 2020/21 cropping seasons

During the 2019/20 cropping season, 34.3% of agro-pastoralist women and 29.8% of crop farmer women harvested 5 to 15 sacks of maize; 24.1% of agro-pastoralist women and 29.8% of crop farmer women harvested less than 5 sacks; and 14.6% of agro-pastoralist women and 9.6% of crop farmer women harvested more than 15 sacks (Table 2). Approximately 27% of agro-pastoralists and 33.2% of crop farmers' women produced less than 5 sacks in the 2020/21 cropping season, 40.0% of agro-pastoralists women and 44.2% of crop farmers' women produced 5 to 15 sacks, and 12.4% of agro-pastoralists and 5.8% of crop farmers' women produced more than 15 sacks (Table 2). When it comes to earning money from selling maize produce, 6.6% of agro-pastoralist women and 13.9% of crop farmer women earned Tsh. 10,000 to Tsh. 100,000 in the 2019/20 cropping season, 6.6% of agro-pastoralists and 8.2% of crop farmer women earned Tsh. 101,000 to Tsh. 200,000, and 10.2% of agro-pastoralist women and 10.6% of crop farmer women earned more than Tsh. 200,000 (Table 2). In the

2020/21 cropping season, approximately 4.4% of crop farmers women and 16.3% of agro-pastoralists women earned between Tsh. 10,000 and Tsh. 100,000; 8.8% of agro-pastoralists and 7.7% of crop farmers women earned between Tsh. 10,000 and Tsh. 200,000; and 8.8% of agro-pastoralists and 8.2% of crop farmers' women earned more than Tsh. 200,000 (Table 2).

Table 2: Women's productive roles in household food and income in the 2019/20 and 2020/21 cropping season (n=total number of respondents)

Social economic activities			
	Agro Pastoralists(N=137) n (%)	Crop Farmers(N=208) n (%)	Total (N=345) n (%)
Maize produced by women as source of food in 2019/20 cropping season			
Less than 5 sack	33(24.1)	62(29.8)	95(27.5)
5-15 sacks	47(34.3)	86(41.3)	133(38.)
More than 15 sacks	20(14.6)	20(9.6)	40(11.6)
I have not cultivated	23(16.8)	33(15.9)	56(16.2)
I have cultivated but not obtained produce	6(4.4)	7(3.4)	13(3.8)
I don't remember	8(5.8)	0(0)	8(2.30)
Maize produced by women as source of food in 2020/21 cropping season			
Less than 5 sack	37(27)	69(33.20)	106(30.)
5-15 sacks	56(40.9)	92(44.2)	148(42.)
More than 15 sacks	17(12.4)	12(5.8)	29(8.4)
I have not cultivated	19(13.9)	27(13)	46(13.3)
I have cultivated but not obtained produce	2(1.5)	8(3.8)	10(2.9)
I don't remember	6(4.4)	0(0)	6(1.7)
Income generated by women in 2019/20 cropping season			
10,000-100,000	9(6.6)	29(13.9)	38(11)
101,000-200,000	9(6.6)	17(8.2)	26(7.5)
More than 200,000	14(10.2)	22(10.6)	36(10.4)
No income generated (I have not cultivated)	20(14.6)	33(15.9)	53(15.4)
No income generated (They have not sold produce)	81(59.1)	103(49.5)	184(53.)
No income generated (I have cultivated but I have not obtained produce)	4(2.9)	2(1)	6(1.7)
I don't remember	0(0)	2(1)	2(0.6)
Income Generated by women in 2020/21 cropping season			

10,000-100,000	6(4.4)	34(16.3)	40(11.6)
101,000-200,000	12(8.8)	16(7.7)	28(8.1)
More than 200,000	12(8.8)	17(8.2)	29(8.4)
No income generated (I have not cultivated)	19(13.9)	36(17.3)	55(15.9)
No income generated (They have not sold produce)	86(62.8)	102(49)	188(54.)
No income generated (I have cultivated but I have not obtained produce)	2(1.5)	2(1)	4(1.2)
I don't remember	0(0)	1(0.5)	1(0.3)

Source: Research Result (2024).

Factors associated with women's productive roles in household food in the 2019/20 and 2020/2 cropping seasons

Land ownership and age of the mothers among the crop farmers community did not contribute to household food through maize farming. Increased land ownership ($p = 0.034$) and the age of the mothers ($p = 0.045$) decrease the probability of the women's support for the household's food through maize farming in the 2019/20 and 2020/21 cropping seasons, respectively (Table 3).

Table 3: Factors associated with women productive roles in household food in the 2019/20 and 2020/21 cropping seasons

Variable	Crop Farmers				Agro-Pastoralists			
	Unstandardized Coefficient (Beta)	P-Value	95% CI		Unstandardized Coefficient (Beta)	P-Value	95% CI	
			Lower	Upper			Lower	Upper
Factors associated with women in 2019/20 cropping season								
Geographical location	-0.012	0.444	-0.043	0.019	-0.037	0.178	-0.092	0.017
Age of mother	-0.125	0.13	-0.287	0.037	0.012	0.936	-0.272	0.295
To household size	0.043	0.453	-0.07	0.157	-0.061	0.435	-0.216	0.093
Crops grown	-0.049	0.362	-0.154	0.057	0.01	0.884	-0.128	0.149
Land ownership	-0.125	0.034*	-0.241	-0.01	-0.288	0.055	-0.582	0.007
Farm size	-0.077	0.148	-0.182	0.028	0.057	0.325	-0.058	0.172
Mother level of education	-0.013	0.464	-0.046	0.021	0.015	0.496	-0.029	0.06
Crop Farmers: Modal is significant at ($p=0.045$), $R^2=0.068$, *Significant at $p\leq 0.05$								
Agro-Pastoralists: Modal is not significant at ($p=0.411$), $R^2=0.053$,								
Factors associated with women in 2020/21cropping season								

Geographical location	-0.026	0.078	-0.055	0.003	0.013	0.604	-0.038	0.064
Age of mother	-0.152	0.045*	-0.301	-0.003	-0.139	0.3	-0.405	0.126
To household size	0.062	0.24	-0.042	0.167	-0.029	0.695	-0.173	0.116
Crops grown	-0.048	0.326	-0.145	0.048	0.032	0.621	-0.097	0.162
Land ownership	-0.07	0.197	-0.176	0.036	-0.131	0.349	-0.406	0.145
Farm size	-0.028	0.574	-0.124	0.069	0.019	0.721	-0.088	0.127
Mother level of education	-0.019	0.22	-0.05	0.012	0.019	0.365	-0.022	0.061
Crop Farmers: Modal is significant at (p=0.037), R ² =0.071,						*Significant at p≤0.05		
Agro-Pastoralists: Modal is not significant at (p=0.757), R ² =0.032,								

Source: Research Result (2024).

Factors associated with women productive roles household income in the 2019/20 cropping season

Women with no formal education among crop farmers (AOR = 2.002, p = 0.023) increased the support of household income through sales of maize produce 2 times more compared to women with primary education. In an agro-pastoralist community, women who own land (AOR = 6.996, p = 0.019) increased their support for household income through sales of maize 6 times as compared to women who do not own land (Table 4).

Table 4: Factors associated with women productive roles in household income in the 2019/20 cropping season

Variable	Crop Farmers				Agro-Pastoralists			
	P-Value	AOR	95% CI for AOR		P-Value	AOR	95% CI for AOR	
			Lower	Upper			Lower	Upper
Geographical Location								
Kiberashi		1				1		
Kimbe	0.845	1.128	0.338	3.766	0.928	1.104	0.13	9.41
Kweikivu	0.191	0.508	0.184	1.404	0.221	3.284	0.49	22.023
Mkindi	0.77	1.158	0.433	3.093	0.338	2.392	0.402	14.248
Negero	0.551	1.349	0.505	3.603	0.58	0.581	0.085	3.965
Pagwi	0.324	1.663	0.605	4.572	0.755	1.423	0.155	13.096
Age of mothers								
15-35 years		1				1		
36-49 years	0.346	0.645	0.259	1.606	0.1	0.232	0.041	1.319
Size of the to household s								

1-5 people		1				1		
6-10 people	0.06	1.842	0.974	3.483	0.09	0.453	0.181	1.13
Crop often grown								
Maize and beans		1				1		
Maize only	0.193	0.656	0.348	1.237	0.178	0.537	0.217	1.328
Maize and sunflower	0.224	0.295	0.041	2.109	1	2.03 E-09	0	.b
Land ownership								
Rented land		1				1		
I have land	0.854	1.064	0.55	2.058	0.019*	6.996	1.378	35.535
Farm size								
Less than 5 acres		1				1		
5-15 acres	0.581	0.826	0.419	1.629	0.144	0.492	0.19	1.273
More than 15 acres	0.098	0.126	0.011	1.468	0.126	0.291	0.06	1.416
Mother's level of education								
Primary Education		1				1		
Secondary education	0.846	0.895	0.29	2.763	0.156	10.58 4	0.408	274.62 9
Lack of Formal Education	0.023*	2.002	1.101	3.639	0.104	1.986	0.869	4.541
Not having finished secondary school					0.497	2.368	0.197	28.427
Not having finished primary school	1	5.36 E-10	0	.b	0.621	3.503	0.024	503.85 8
Crop farmers: modal is significant at p=0.008), R-Square (R²) =0.158								
Agro-Pastoralists: modal is significant at p=0.001), R-Square (R²) =0.191 *Significant at p≤0.05								

Source: Research Result (2024).

Factors associated with women's productive roles to household income in the 2020/21 cropping season

Women who owned land among agro-pastoralists (AOR = 7.845, p = 0.025) increased household income 7 times through sales of maize as compared to women who did not own land (Table 5).

When compared to Kiberashi ward, the geographical locations of agro-pastoralists in Kimbe ward (AOR = 0.049, p = 0.038) and Negero ward (AOR = 0.061, p = 0.038) had a lower likelihood of increasing the women's support for household income through sales of maize (Table 5).

Regarding crop farmers, Kweikivu ward's geographic location (AOR = 0.258, p = 0.009) had a lower likelihood than Kiberashi ward of increasing women's support for household income from sales of maize (Table 5).

Table 5: Factors associated with the contribution of women to household income in the 2020/21 cropping season

Variable	Crop Farmers				Agro-Pastoralists			
	P-Value	AOR	95% CI for AOR		P-Value	AOR	95% CI for AOR	
			Lower	Upper			Lower	Upper
Geographical Location								
Kiberashi		1				1		
Kimbe	0.958	0.968	0.29	3.232	0.038*	0.049	0.003	0.846
Kweikivu	0.009*	0.258	0.093	0.715	0.765	1.513	0.1	22.8
Mkindi	0.754	1.166	0.445	3.057	0.35	0.3	0.024	3.744
Negero	0.547	0.746	0.287	1.937	0.038*	0.061	0.004	0.856
Pagwi	0.213	1.929	0.686	5.421	0.382	0.275	0.015	4.969
Age of mothers								
15-35 years		1				1		
36-49 years	0.979	1.013	0.394	2.603	0.552	1.823	0.252	13.167
Size of the households								
1-5 people		1				1		
6-10 people	0.237	1.458	0.781	2.723	0.055	0.406	0.162	1.02
Crop often grown								
Maize and beans		1				1		
Maize only	0.211	0.667	0.354	1.258	0.628	0.414	0.012	14.641
Maize and sunflower	0.444	0.512	0.093	2.834	0.117	0.464	0.178	1.211
Land ownership								
Rented land		1				1		
I have land	0.144	1.633	0.846	3.151	0.025*	7.845	1.294	47.576
Farm size								
Less than 5 acres		1				1		
5-15 acres	0.158	0.612	0.31	1.209	0.18	0.527	0.207	1.345
More than 15 acres	0.082	0.121	0.011	1.311	0.429	0.496	0.087	2.818
Mother's level of education								
Primary Education		1				1		
Secondary education	0.999	1.001	0.288	3.476	0.165	17.863	0.305	1047.59

Lack of Formal Education	0.333	1.338	0.742	2.41	0.938	0.967	0.413	2.261
Not having finished secondary school					0.138	12.866	0.44	375.803
Not having finished primary school	0.999	2.72E-10	0	.b	0.603	6.231	0.006	6097.869
Crop farmers: modal is significant at p=0.000, R-Square (R²)=0.194								
Agro-Pastoralists: modal is not significant at p=0.000, R-Square (R²)=0.387							*Significant at p≤0.05	

Source: Research Result (2024).

DISCUSSION

During the 2019/20 and 2020/20 cropping seasons, more than ninety-eight percent of both crop farmers and agro-pastoralists were involved in maize farming for food and business. Maize is produced by almost all women in the study areas, more than any other cereal crop. Culture, climatic, and edaphic factors favour maize production more than any other cereal crops in the study area. The findings are supported by findings from Badmus *et al.* (2015), in Nigeria, who discovered that fifty-seven percent of the women farmed maize for their consumption, seventy-nine percent farmed for both domestic and commercial use, and eighty-three percent of the women farmed maize with the intention of selling the crop.

The majority of crop farmers and agro-pastoralist women produced between 5 and 15 sacks of maize, and few produced more than 15 sacks of maize in both seasons. Reasons for low production by the majority of farmers are inadequate skills in maize production, the use of hand hoes, inadequate access to credit, disease and pest outbreaks, and climatic factors. Almost fifty-nine percent of female crop farmers and more than forty-nine percent of agro-pastoralists did not sell maize as a source of income in both seasons (2019/20 and 2020/21). Maize produce was stored by women in the household for domestic use and consumption (Badmus *et al.*, 2015).

Twenty-eight percent of women, both agro-pastoralists and crop farmers, sold maize produce as a source of income in the 2019/20 and 2020/21 cropping seasons. The finding from this study is lower than the finding from Badmus *et al.* (2015) in Nigeria, who found seventy-four percent of women involved in the sale of maize. The differences are due to variations in maize yield. Few women, both crop farmers and agro-pastoralists, earn more than Tsh. 200,000 per year. Women farmers and agro-pastoralists in the study area support family income through the sales of maize, but the income generated is not enough to sustain household necessities throughout the year. The income earned by women is used to buy food and other household necessities (Adepoju *et al.*, 2015). Study findings from Bangladesh and Ethiopia indicate women earn a low income (Karci , 2015; Roy *et al.* 2017 ; Ahmed, 2021). This study revealed the earnings of crop farmers and agro-pastoralists women is lower than that of Karci (2015) in Bangladesh, who discovered the annual income of women was up to Tk 200000. Roy *et al.* (2017) found that the mean annual women's support for household income was estimated to be Tk. 42,000. Ahmed (2021) in Ethiopia revealed that women's support for household income was estimated at birr 32,400.50 per year. The reason is due to differences in currencies and income generating activities. In Ethiopia, women earn less as compared to men in the household (Ahmed, 2021). Women in developing countries face similar challenges that restrict their involvement in supporting household income, such as access to education, land, and credits; unfavourable policies; and inadequate production or business skills, which could contribute to low-income earnings. (Maingwa, 2015; Roy *et al.*, 2017; Alemu *et al.*, 2021).

Increase in land ownership among crop farmer's women, decreased household's food through maize farming in 2019/20 in cropping. Though some of crop farmers' women own land, poor agronomical practices, a lack of funds for farming and agriculture machinery, heavy women's workloads, inadequate extension service support, and gender-based violence contributed to low maize yield through farming. Low maize yields decreased household food. According to Megasari *et al.* (2019), access to resources has a direct impact on the degree to

which women farmers support the food security of their families. The finding contradicts the finding from a study done by Newman *et al.* (2015) in Vietnam, which suggests that the assignment of land titles is likely to matter for productivity. According to Owoo and Boakye-Yiadom (2015) in Kenya, farmers with tenure security seem to have more maize per acre than farmers without land titles. The differences in data collection procedures, data analysis, and cultures caused variations in findings. As the age of the mother among crop farmers increases, support for household food through farming also decreases. The physical quality of the labour force is decreasing as the average age of female farmers rises because they lack the energy required to effectively execute the agricultural chores that require strenuous physical labour. In other words, they spend less time working in agriculture and more time engaging in non-agricultural activities. The findings from this study are supported by Tambi *et al.* (2017) findings from rural Cameroon that revealed factors affecting women's participation in farming including the mother's age.

Women with no formal education among crop farmers increased household income through sales of maize two times compared to women with primary education in the 2019/20 cropping season. The majority of women with no formal education live in poor households, which drives them to sell all their maize in order to meet household necessities. The finding from this study is not supported by findings from Philipo and Nzali (2014) in Tanzania, who found that women with non-formal education support less household income as compared to women with formal education. The difference in findings is due to variations in the methods used to gather and analyse the data, income status as well as the types of economic activities.

In an agro-pastoralist community, women who own land increased their contribution to household income through sales of maize seven times as compared to those who do not own land in the 2019/20 and 2020/21 cropping seasons. Women who owned land had access to credit for farming operations by offering pieces of land and crop produce in the field as collateral, and some of them also obtained money for farming operations by renting some plots, which contributed to an increase in maize yield. Participation in farming was also high due to access to and control of land, as well as an increase in self-confidence, which led to an increased maize production through farming, which contributed more to households' income through sales of maize produce as compared to women who do not own land. For many households, land is their most valuable asset because it provides them with immediate financial benefits through production, income and acts as credit collateral (USAID 2013). Land ownership for women is crucial for combating discrimination and making women the main contributors to household income through farming (Moyo, 2017). Women who are denied such access are typically disadvantaged, which leads to economic powerlessness (Moyo, 2017). There is proof that owning property gives women more self-confidence, decision-making authority, control over their reproductive attitudes, borrowing capacity, and financial independence (Pandey, 2010). Women who own farmland may produce more and of higher quality, but more crucially, they may have more control over the household revenue that is spent to ensure their own and other family members' well-being (Kelkar, 2009).

The geographical locations (Kimbe and Negero wards) of agro-pastoralists and Kweikivu ward among crop farmers had a lower likelihood of increasing the women's contribution to household income through sales of maize in the 2020/21 cropping season as compared to Kiberashi ward. Kimbe, Negero, and Kweikivu wards women experienced low maize productivity due to poor agronomical practices, inadequate inputs such as fertilizers and pesticides, lack of funds for farming operations, crop diseases, climate change, and inadequate agriculture extension information. Low maize productivity reduced women's support to household income through sales of maize produce. Gallup *et al.* (1999) showed that location and climate can cause expenses for transportation, disease burdens, and impacts on agricultural productivity, all of which have a big effect on income levels and income growth.

CONCLUSION AND RECOMMENDATION

Despite seasonal variations in maize productivity, among crop farmers' women and agro-pastoralists, they almost support household food and income. Women with no formal education among crop farmers increased household income through maize sales two times more than women with primary education in the 2019/20 cropping season, and women who own land among agro-pastoralists increased household income through maize sales seven times more than women who do not own land in the 2019/20 and 2020/21 cropping seasons. Land ownership and the age of women among crop farmers decreased women's support for household food through farming in the 2019/20 and 2020/21 cropping seasons, respectively. Women face many challenges in maize

farming. They should be targeted for empowerment in terms of education, credit, technology, and access to and control over resources.

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