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Full Length Research

Analysis of gender roles in tomato production in Municipal Area Council, Abuja, Nigeria

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ABSTRACT: This study analyzed gender roles in tomato production in Municipal Area Council, Abuja, Nigeria. The study described socio-economic characteristics of the tomato farmers, examined the activities carried out in tomato production, estimated costs and returns of tomato production, and identified constraints faced by tomato farmers in the study area. A multi-stage random sampling technique was adopted and a well structured questionnaire with scheduled interview were used to elicit information from one hundred and twenty respondents. Descriptive statistics, gross margin analysis and z-test were the analytical tools employed in this study. Results of the socio-economic characteristics of tomato farmers revealed that majority (69.2%) of the respondents were male with a mean age of 45 years old. Results showed that male tomato farmers carried out land clearing (51.8%) by personal labour while their female counterpart carried out land clearing (48.6%) by family labour. Result of the profitability analysis showed that the gross margin of ₦67,083.64 and ₦34,325.38 were realized for both male and female tomato farmers, respectively per cropping season. Tomato production in the study area was highly profitable for both male and female tomato farmers. The return on naira invested was ₦1.99k and ₦1.67k for male and female tomato farmers respectively. Results showed that inadequate capital, lack of improved planting seeds, lack of contact with extension services among others were major constraints that affect tomato production in the study area. Therefore, female tomato farmers should be encouraged to cultivate improved crop varieties with strong seed coat and longer shelf life. The female tomato farmers could pool their resources together to purchase motorcycles or vehicles for easy movement of their produce from farm gates to market places in order to reduce high perishability of tomato fruits. Also, female tomato farmers should endeavor to use farm machinery and herbicides to solve the problems of inadequate labour supply and use of simple farm tools respectively, which do not encourage large scale production. The male tomato farmers should control pests and diseases infestation, package their tomato fruits to make them more attractive to consumers in order to earn higher market price.

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Keywords: Abuja, gender, Municipal Area Council, production, roles, tomato.

INTRODUCTION

The term ‘vegetable’ refers to those plants and plant parts that are edible, especially leafy or fleshy parts that are usually eaten with staples as main courses or supplementary foods in cooked or raw forms. It is estimated that there are at least ten thousand (10,000) plant species used as vegetables worldwide, although, only about fifty (50) are of great commercial value (Shing-Jy and Hsiao-Feng, 2013). Vegetables play very significant roles in human nutrition; they contain vitamins, minerals and chemical compounds that are essential for human health. For instance, vitamin A maintains eye health and strengthens the immune system, vitamin B helps convert food to energy, folate reduces the risk of some birth effects and helps prevent heart diseases. Vitamin C increases the absorption of calcium and iron from other food. Vitamin E is a powerful antioxidant that protects the cell from cancer causing agents. Dietary fibre helps move food through the digestive tract and lower blood cholesterol levels (Food and Agriculture Organization (FAO), 2016). The World Health Organization (WHO) places

low vegetable intake sixth among its twenty risk factors of global human mortality, just behind better known killers such as tobacco use and high cholesterol (FAO, 2016). It is to this end that a minimum level of 400 g per head per day is recommended for the consumption of vegetables by the WHO. However, according to the FAO (2016), vegetable consumption per head per day in Nigeria is as low as 179 g compared to the recommended rate. FAO/ WHO report had established that eating at least 400 g of fresh fruits and vegetables a day helps to alleviate micro-nutrient deficiencies and to prevent chronic diseases associated with unhealthy urban diets and lifestyles (FAO, 2012). However, daily consumption of vegetables is insufficient in Nigeria, despite its importance (Olaitan et al., 2018). Apart from its nutritional benefits, vegetables also serve as sources of employment for both the rural and urban dwellers directly or indirectly providing smallholder farmers with much higher income and more jobs per hectare than staple crops (FAO, 2016). According to Olatona et al. (2018), consumption of low fruits and vegetables is a major global risk factor for morbidity which is associated with micro-nutrient deficiencies and premature mortality.

Among different vegetables grown in Nigeria, tomato clearly stands out as the most important both in scale of production and level of consumption (Adejobi et al., 2011). It is an excellent source of phosphorus, iron and vitamin A, B and C. Tomato contains small amounts of B complex vitamins; thiamin, niacin and riboflavin (Dam et al., 2005). According to Mielgo–Ayuso et al. (2018), thiamin, niacin, riboflavin and vitamin B6 are essential ingredients that are mainly involved in energy metabolism; they prevent the occurrence of developmental abnormalities and chronic degenerative and neo-plastic diseases. It is grown for home consumption in the backyard gardens of almost every homestead across sub – Saharan Africa (Kale and Derek, 2020). It is a cash crop for both smallholders and medium – scale commercial farmers (Varela et al., 2003). Tomato is grown by most dry season market gardeners who regard it as the principal crop. In Nigeria, an annual total area of one million hectares is reportedly used for its cultivation and it makes up about 18 percent of the average daily consumption of vegetables in Nigerian homes (Lovendal Knowles, 2006). Nigeria is also ranked second largest producer of tomato in Africa and thirtieth largest in the world, producing 1.701 million tonnes of tomato annually at an average of 25 to 30 tonnes per hectare (FAO, 2010). Most other vegetables have restricted demand in Nigeria, but the demand for tomato is universal (FAO, 2010).

Women farmers particularly in rural areas of Nigeria have always worked and their labour plays a key role in the survival of millions of families (Adenugba and Raji, 2013). Most rural woman are the invisible farmers in Nigeria and form the backbone of rural development. The underlying facts that more than half of nigeria's food is produced by woman (Adenugba and Raji, 2013). Gender refers to the social attributes and opportunities associated with being male or female and the relationships between women and men (UNDP, 2009). It also includes the relationships between girls and boys, men and men as well as those between women and women. These attributes, opportunities and relationships are socially constructed. It is a culture relative term that changes with time and involves assignment of roles that changes from one culture to another or from one ethnic group to another. Gender roles are set of expectations as to what ought to be the appropriate behavior for men and women under particular circumstances (Idyorough, 2005).

The role that women play and their position in meeting the challenges of agricultural production and development are quite dominant and prominent. Their relevance and significance, therefore, cannot be overemphasized (Nnadozie and Ibe, 2006; Rahman, 2008). Findings from a study financed by the United Nations Development Programme (UNDP) revealed that women make up some 60 to 80 percent of agricultural labour force in Nigeria (World Bank, 2003), depending on the region and they produce two-thirds of the food crops. Yet, in spite of these, widespread assumption that men – and not women—make the key farm management decisions has prevailed. Sadly, female farmers in the country are among the voiceless, especially with respect to influencing agricultural policies. Such policies, which are aimed at increasing food security and food production, tend to either underestimate and/or totally ignore women's role in both production and the general decision-making process within the household. Various contributions of women to agricultural production in Nigeria have been variously described in the literature (Rahman, 2008; Amali, 2009; Damisa and Yohanna, 2007) but their role in decision-making process in agriculture has not been widely employed or at best, remains minimal (FAO, 2005; Rahman, 2008; Damisa and Yohanna, 2007).

Ironically, women are known to be more involved in agricultural activities than men in sub-Saharan African (SSA) countries, Nigeria inclusive. As much as 73 percent were involved in cash crops, arable and vegetable gardening, while post-harvest activities had 16 percent and agro-forestry had 15 percent (Abdullahi, 2012). Their involvement in agriculture in Nigeria has attracted greater attention in recent years. Reasons for their involvement are as many as are diverse. In some states, rural women have virtually taken over the production and processing of arable crops (Afolabi, 2008), being responsible for as much as 80 percent of the staple food items. Estimates of women's contribution to the production of food crops range from 30 percent in Sudan to 80 percent in Congo (FAO, 2005); contributing substantially to national agricultural production and food security, while being primarily responsible for the food crops. Thus, for the state to thrive in tomato production, it needs to achieve a high level of production which is essential for competitiveness and profitability. The failure of tomato farmers to meet demand

in the state has raised concern over the inability of these farmers to increase tomato output, in view of the growing demand. Although, several studies have been carried out on analysis of resource use efficiency in tomato production in Nigeria (Ibitoye et al., 2015; Usman and Bakari, 2013; Obayelu et al., 2014); These studies do not look at the gender roles in tomato production in Municipal Area Council, Abuja. The essence of gender roles to this study is to sharpen the focus of advocacy for equitable integration of women and men in agricultural production to curb food crisis and sustain agricultural production in the country. In an effort to reach and engage the poor, we must recognize that some issues and constraints related to participation are gender-specific and stem from the fact that men and women play different roles, have different needs and face different challenges on a number of issues and at different levels. These views are supported by Ayoola and Odiaka (2004), they described gender as a socio-economic parameter that is useful in analyzing the roles, responsibilities, opportunities and constraints of both men and women along different ethnic. The following research questions were answered in this study:

1. What are the socio-economic characteristics of tomato farmers (male and female) in the study area?
2. What are the activities involved in by tomato farmers (male and female) in the study area?
3. What are the costs and returns of tomato farmers (male and female) in the study area?

Therefore, this study described the socio-economic characteristics of the respondents (that is, men and women), examined the activities carried out by them during production, estimated costs and returns incurred and accrued respectively by them and identified the constraints faced by the respondents.

Hypothesis

Ho: There is no significance difference between the costs and returns of male and female tomato farmers respectively.

METHODOLOGY

The study was carried out in Municipal Area Council of Abuja. Abuja Municipal Area Council (AMAC) is an area council in the Federal Capital Territory, with headquarters in Abuja as shown in Figure 1. AMAC is located west of Nasarawa State, with Kuje Area Council to the south, Gwagwalada Area Council to the east, and Bwari Area Council to the north. There are 12 wards in AMAC. The 12 wards of AMAC are: City Centre, Garki, Gui, Gwagwa, Gwarinpa, Jiwa, Kabusa, Karshi, Karu, Nyanya, Orozo, and Wuse. AMAC is located between latitude 8° 40’ and 9° 20’ north of the equator and longitude 6° 40’ and 7° 40’ east of the Greenwich meridian. AMAC has land area of 1,769 square kilometres, making it the biggest local government area council in the Federal Capital Territory. It has a population of 776,298 as at the 2006 national population census, AMAC is also the biggest local government area council by population in the Federal Capital Territory, and the second biggest in the entire country. AMAC was few decades ago predominantly inhabited by the Gbagyi, however, rapid urbanization spurred by the relocation of the seat of the government of the Federal Republic of Nigeria from Lagos to the council area in 1991 has turned it into a cosmopolitan metropolis, hosting people of different races and colours, as well as languages and tribes which include the usual suspects like the Igbo, the Hausa and the Yoruba. AMAC experiences three weather conditions annually. This includes a warm, humid rainy season and an extremely hot dry season. In between these seasons, there is a short period of harmattan accompanied by the north east trade wind, with the main feature of dust haze, intensified coldness and dryness. The rainy season begins from April and ends in October, when daytime temperatures reach 28 to 30 degrees and night time lows range around 22 to 23 degrees. In the dry season, daytime temperatures can reach 40 degrees and night time temperatures can drop to 12 degrees, resulting in chilly evenings. The major occupation of people in the study is farming while only few proportions of the residents engaged in white collar jobs and artisanship for example furniture, clothing, decorative arts, sculptures etc. AMAC is blessed with a mix of agricultural produce such as tubers and root crops such as (yams, cassava, maize and plantains), vegetables such as (tomatoes, onions, pumpkin, pepper and grain (sorghum, guinea corn and rice).

The population for this study comprises of tomato farmers (male and females) in Municipal area council of Abuja. A purposive sampling technique was used to select three wards from the Local Government Areas. The three wards selected were: Kabusa, Gwagwa, and Karshi. These wards were purposively selected based on high level of involvement in tomato production. Two communities from each of the wards were randomly selected to give a total of six communities for the study. Ten male and ten female farmers from each community were selected using random sampling techniques respectively, making a total sample size of one hundred and twenty respondents. Structured questionnaire with scheduled interview were used to elicit primary data from the respondents. Data were analysed using descriptive statistics, gross margin analysis and z-test analysis. The socio-economic characteristics of tomato farmers, activities carried out by respondents in tomato production and various constraints to tomato production were achieved using descriptive statistical tools such as frequency count, mean, mode and percentage. The costs and returns on tomato production were obtained through gross margin analysis and z-test analysis for hypothesis test.

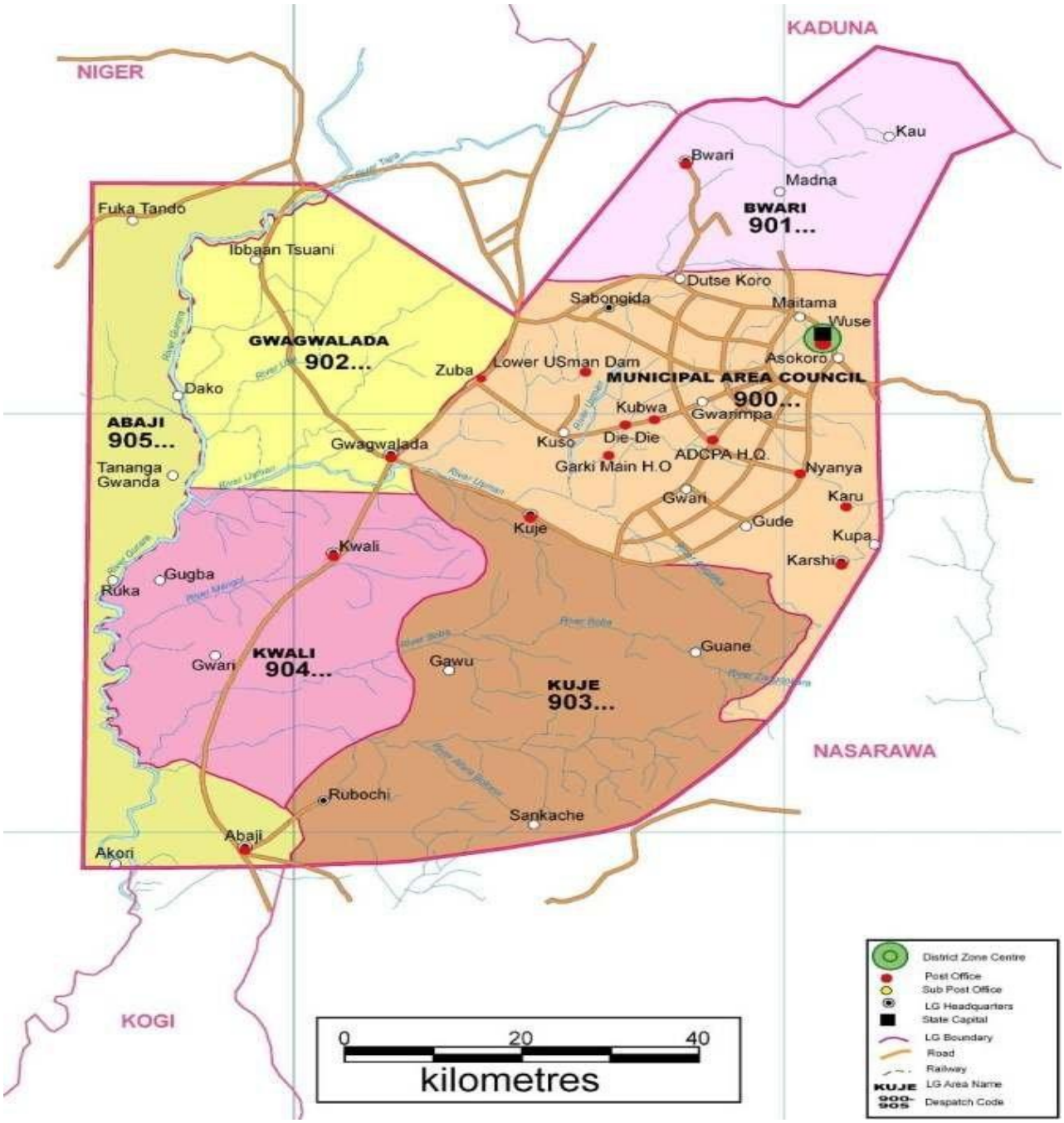

Figure 1. Map of Abuja Municipal Area Council, Abuja
Source: Geograhic Information System, 2010.

Gross margin is the difference between the gross farm income (GI) and the total variable cost (TVC). It is a useful planning tool in a situation where fixed capital is a negligible portion of farming enterprise as in the case of small scale subsistent agriculture (Abdullahi, 2012).

Gross margin analysis

GM=TR–TVC.....i

NFI = GM – TFC..... ii
Profit (π) = TR – TC.....iii
TC = TFC + TVC.....iv

The following profitability ratio was calculated:

ROI = (TR/TC) – 1..... ... v

Where: ROI = Return on investment, GM = Gross Margin

(₦/Ha), TR = Total Revenue (₦/Ha), TVC = Total Variable Costs (₦/Ha), TFC = Total Fixed Cost (₦/Ha), TC = Total Costs and NFI = Net Farm Income

Z-test model specification

Z-test is any statistical test for which the distribution of the test statistic can be approximated by a normally distribution (Vinay, 2015). Z test is used in testing significance difference, if the sample size is large enough to invoke the Central limit Theorem (usually n≥30 is a good rule of thumb) (Teshone, 2019). It was used to test whether there were significance differences in the costs and returns of male and female tomato farmers respectively.

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} \quad \text{..... vi}$$

Z = Z-Test, $\bar{x}$ = Sample mean, μ = Population mean, σ = Standard Deviation, n = Number of observation.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The distribution of respondents according to their socio-economic characteristics is presented in Table 1. The results showed that about 41.0 % of the male tomato farmers were in the age range of 40 to 49 years while 32.43% of the female farmers were in the age range of 30 to 39 years. The mean age of the male respondents was 47 years while the mean age of the female respondents was 44 years. By implication, tomato farmers in the study area were in their active age and were able to carry out various production activities involved in tomato production. This finding agrees with Ibitoye et al. (2015) who reported that majority 82.5 percent of tomato farmers were within the age range of 41 to 60 years. Majority (87.95%) of the male farmers were married while about 75.68% of female farmers were married. These showed that the respondents were married and responsible. This implies that the respondents have many dependants who could also serve as sources of family labour in tomato production. Thus, reducing the cost of hired labour and it could also be a plus in tomato productivity. This agrees with Sekumade and Toluwase (2014), who reported that 74.8% of the respondents in their study were married. Results of descriptive statistics showed that54.22% of male tomato farmers and 51.35% of the female tomato farmers had 11 to 20 years of farming experience. The mean years of farming experience was 13 years. This implies that a greater number of the respondents have been involved in tomato production for a long time and could have learnt from their past mistakes and are able to correct them as well as anticipate and predict changes in climatic and economic factors. This may increase their level of efficiency, because the more experienced a farmer is, the more efficient he/she is and vice versa. These findings are in consonance with Maurice (2004), who reported a positive and significant relationship between farming experience and technical efficiency among farmers in Adamawa State.

The results further showed that in male headed households, 49.40% had household size of between 6 and 10 persons, while majority 51.35% of the female headed households had between 1 and 5 persons. This large number of household size could be an added advantage in terms of labour supply. This finding agrees with Saliu and Obasi (2011), who reported that a high percentage (55.29%) of farmers had a household size range of between 6 and 15. The results also showed that 39.76% of the male tomato farmers had no formal education while 43.24% of the female farmers had primary school education. It is evident from this finding that female respondents were more educated than their male counter parts in the study area. The level of education acquisition has an implication in the utilization or adoption of information on agriculture. This finding agrees with Issa et al. (2016), who reported that majority of the farmers 65.8% had primary education and the low literacy level of the male farmers also agreed with findings of Ndaghu et al. (2015), who discovered that 14.0% of the maize farmers had no formal education in their study. The implication is that education increases the ability to assess, interpret, and process information about a new technology, enhancing farmers' managerial skills including efficient use of agricultural inputs. The descriptive analysis further showed that majority (75.90%) of male headed household and 78.38% of female headed household cultivated between 1 and 5 hectares of land per season. The mean number of hectares per household for male and female tomato farmers were 4.2 and 3.62 hectares respectively. It is evident from this finding that male tomato farmers have more farm land than their female counterparts in the study area. This agrees with the findings of Ibitoye et al. (2015), who reported that about 95.8 percent of tomato farmers in Kogi state cultivated tomato on an area of less than 5 hectares.

Results on extension services showed that 57.83% of male farmers affirmed to have had contact with extension agents while only about 32.43% of the female tomato farmers had contacts with extension agents. It is evident from this finding that male tomato farmers have more extension contacts than female in the study area. The increased frequency of extension agent visits is an opportunity to transfer skill, knowledge and information which facilitate farming operations. This is in agreement with Onu (2006) who reported that farmers who had access to extension adopted improved farming technologies than those who had no access to extension services.

The results also showed that majority (93.98%) of male farmers and 89.19% of female farmers were members of farmers association while only 6.02% and 10.81% of male tomato farmers and female belong to cooperative societies

Table 1. Socio-economic characteristics of tomato farmers.

Variable	Male		Female		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Age (Years)						
20-29	5	6.02	4	10.81	9	7.50
30-39	12	14.46	12	32.43	24	20.00
40-49	34	40.96	11	29.73	45	37.50
50-59	23	27.71	4	10.81	27	22.50
60-69	9	10.84	5	13.51	14	11.67
70-79	0	0	1	2.70	1	0.83
Total	83	100	37	100	120	100
Mean	45		43		45.01 (10.56)*	
Marital status						
Married	73	87.95	28	75.68	101	84.17
Single	7	8.43	7	18.92	14	11.67
Divorced	2	2.41	0	0	2	1.67
Widow	1	1.2	2	5.41	3	2.5
Total	83	100	37	100	120	100
Farming experience (years)						
1-10	29	34.94	13	35.14	42	35.00
11-20	45	54.22	19	51.35	64	53.33
21-30	7	8.43	4	10.81	11	9.17
31-40	1	1.20	1	2.70	2	1.67
41-50	1	1.20	0	0.00	1	0.83
Total	83	100	37	100	120	100.00
Mean	13		13		13.78(7.45)*	
Household size						
1-5	37	44.58	19	51.35	56	46.67
6-10	41	49.40	18	48.65	59	49.17
11-15	4	4.82	0	0	4	3.33
16-20	1	1.20	0	0	1	0.83
Total	83	100	37	100	120	100.00
Mean	6		5		5.89(2.57)*	
Level of education						
Non-formal	33	39.76	11	29.73	44	36.67
Primary	23	27.71	16	43.24	39	32.5
Secondary	20	24.1	8	21.62	28	23.33
Tertiary	7	8.43	2	5.41	9	7.5
Total	83	100	37	100	120	100
Farm size						
1-5	63	75.90	29	78.38	92	76.67
6-10	17	20.48	8	21.62	25	20.83
11-15	2	2.41	0	0	2	1.67
16-20	1	1.20	0	0	1	0.83
Total	83	100	37	100	120	100.00
Mean	4.25		3.62			

Table 1. Contd.

Variable	Male		Female		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Extension service						
Contact with extension services	48	57.83	12	32.43	60	50
No extension contacts	35	42.17	25	67.57	60	50
Total	83	100	37	100	120	100
Association						
Farmers Association	78	93.98	33	89.19	111	92.5
Cooperative Society	5	6.02	4	10.81	9	7.5
Total	83	100	37	100	120	100
Occupation						
Engaged in other occupation	56	67.47	25	67.57	81	67.5
No other occupation	27	32.53	12	32.43	39	32.5
Total	83	100	37	100	120	100
Occupation						
Trading	71	85.54	28	75.68	99	82.5
Civil	10	12.05	3	8.11	13	10.83
Artisanship	2	2.41	6	16.22	8	6.67
Total	83	100	37	100	120	100
Source of land						
Purchase	30	36.14	13	35.14	54	45
Rent	9	10.84	4	10.81	13	10.83
Lease	3	3.61	2	5.41	5	4.17
Inherited	41	49.4	18	48.65	48	40
Total	83	100	37	100	120	100
Source of capital						
Personal Saving	55	66.27	22	59.46	77	64.17
Friends and family	19	22.89	10	27.03	29	24.17
Cooperative society	1	1.2	4	10.81	5	4.17
Bank	8	9.64	1	2.7	9	7.5
Total	83	100	37	100	120	100

Source: Field survey, 2019.

respectively. Social affiliation/relationship is a characteristic of rural communities and serves as an avenue of interaction and obtaining information on events in their locality. This is supported by the findings of Akinsanmi et al. (2005), who reported that cooperatives are vehicle for development since they provide informal credit to farmers. Members of the cooperative, ceteris paribus, are likely to perform better than non-members because of possible economies of scale. In addition, 67.47% of male tomato farmers and 67.57% of female farmers engaged in other activities aside farming. This implies that majority of the tomato farmers engaged in other income generating activities, to meet up other farming responsibilities. On other occupation engaged by tomato farmers, majority (85.54%) of male tomato farmers and 75.68% of female tomato farmers engaged in trading. Participation in off-farm work was necessary so as to provide insurance against agricultural production risks. In the same assertion, Verter and Bečvářová (2014) argue that owing to the meager income from agricultural activities; some smallholder farmers are “pushed” to diversify into non-farm activities to complement their low earnings from farming activities. 49.4% of male tomato farmers and 48.65% of female tomato farmers cultivated land acquired through inheritance from their lineage for production respectively. The implication of this result is that majority of the farmers

Table 2. Types of activities carried by tomato farmers.

Activities	Male			Female		
	PL	FL	HL	PL	FL	HL
Land clearing	43 (51.8)	20 (24.1)	20 (24.1)	12 (32.4)	18 (48.6)	7 (18.9)
Staking	26 (31.3)	40 (48.2)	17 (20.5)	6 (16.2)	20 (54.1)	11 (29.7)
Bed making	20 (24.1)	46 (55.4)	17 (20.5)	9 (24.3)	18 (48.6)	10 (27.0)
Planting	23 (27.7)	41 (49.4)	19 (22.9)	6 (16.2)	24 (64.9)	7 (18.9)
Fertilizer application	18 (21.7)	45 (54.2)	20 (24.1)	6 (16.2)	21 (56.8)	10 (27.0)
Watering	22 (26.5)	42 (50.6)	19 (22.9)	14 (37.8)	15 (40.5)	8 (21.6)
Weeding	16 (19.3)	36 (43.4)	31 (37.3)	10 (27.0)	17 (45.9)	10 (27.0)
Thinning	19 (22.9)	42 (50.6)	22 (26.5)	8 (21.6)	18 (48.6)	11 (29.7)
Supplying	20 (24.1)	44 (53.0)	19 (22.9)	10 (27.0)	18 (48.6)	9 (24.3)
Harvesting	22 (26.5)	41 (49.4)	20 (24.1)	10 (27.0)	18 (48.6)	9 (24.3)
Transporting of input	16 (19.3)	52 (62.7)	15 (18.1)	12 (32.4)	19 (51.4)	6 (16.2)
Marketing	27 (32.5)	39 (47.0)	17 (20.5)	12 (32.4)	15 (40.5)	10 (27.0)

PL = Personal labour, FL = Family labour, HL = Hired labour (Source: Field Survey, 2019 values in parenthesis are percentages).

do not pay for land rent and therefore do not consider cost of land in production process. The result further revealed that, the right to the use of land in the study area is to a large extent customary. However, other system of land acquisition in the study area includes rent and purchase. Olukosi and Erhabor (2008) also discovered that in some subsistence farming communities, pieces of land were acquired through inheritance from one generation to another while others are either bought or rented. According to the findings, majority (66.27%) of male tomato farmers and 59.46% of female sourced credit from personal savings. This implies that both male and female tomato farmers did not have access to formal credit sources. Thus, there would be limitation in their rate of expansion. According to Ndaghu et al. (2015), who reported that 11.7% of farmers in Safana local government area of Katsina State have access to credit facilities while majority (88.3%) of farmers do not have access to credit facilities. However, access to credit is important to resource poor farmers to enable them access improved technologies along with their associated inputs like fertilizer.

Activities carried out by respondents in tomato production

Table 2 showed the results of activities carried out by the respondents in the study area. According to the results, male tomato farmers carried out land clearing (51.8%) by personal labour while their female counterpart carried out land clearing (48.6%) by family labour. Male and female tomato farmers in the study area used family labour to carry out the following activities: staking (48.2% male, 54.1% female), bed making (55.4% male, 48.6% female), planting (49.4% male, 64.9% female), fertilizer application (54.2% male, 56.8% female), watering (50.6% male, 40.5% female), weeding (43.4% male, 45.9% female), thinning (50.6% male, 48.6% female), supplying (53.0% male, 48.6% female), harvesting (49.4% male, 48.6% female), transporting inputs (62.7% male, 51.4% female) and marketing (47.0% male, 40.5% female) was carried out by family labour. This implies that family labour plays important roles in the activities of tomato farmers on the farms. Since family labour are used by most of these farmers in the study area, it implies that the cultivation of tomato becomes more profitable since the farmers pay less for labour. Agriculture uses combination of male and female household labor, most of the family labor in agriculture is often offered by female and children (Shaw, 2004). Farm operations that required a lot of energy such as land clearing and land preparation were predominantly carried out by male, while female predominantly carry out relatively lighter operations in the farm which include; processing, harvesting and storage (Audu, 2009).

Costs and returns of tomato farmers

The costs and returns of tomato production are indicated in Table 3. The results show the list of variable costs that tomato farmers incurred, these includes; cost of seeds, cost of agrochemical, cost of fertilizer, cost of labour and other costs. The results showed that the cost of agrochemicals was the major variable costs incurred in tomato production by both male and female tomato farmers with an estimated amount of ₦11,730.72 and ₦8,740.54per cropping season respectively. Male and female tomato farmers spent much on agrochemicals and there is significant difference at 1.0 percent level of significance between the amount spent by both genders. This implies that cost of agrochemicals is the highest variable cost incurred. This agrees with Ibitoye et al. (2015), in their work on resource use efficiency among

Table 3. Costs and returns of tomato farmers

Item	Male (83) [ln ₦]	Female (37) [ln ₦]	Pooled (120) [ln ₦]	Z-test
(A) 1. Variable cost				
a. seeds	958.55	953.78	957.08	0.03
b. Agrochemical	11,730.72	8,740.54	10,808.75	2.46***
c. Fertilizer	4,412.05	3,565.68	4,151.08	0.81
d. Labour	8,719.28	8,375.14	8,613.17	0.30
e. Others	5,558.80	4,301.35	5,171.08	1.41
Total variable cost (TVC) = (a+b+c+d+e)	31,379.40	25,936.49	29,701.17	2.22**
2. Fixed cost				
f. Land renting	16,180.72	8,951.35	13,951.67	1.49
g. Depreciaton cost on fixed inputs	1,933.43	1,278.24	1,731.42	1.62
Total fixed cost (TFC) = (f+g)	18,114.16	10,229.59	15,683.08	1.55
Total cost (TC) =(TVC+TFC)	**49,493.55**	**36,166.08**	**45,384.25**	**2.46*** **
(B) Return				
h. Yield (No of baskets)	24.72	18.35	22.76	2.18**
i. Price (₦/basket)	3,983.13	3,283.78	3,767.50	3.08***
Total revenue = (h*i)	**98,463.04**	**60,261.87**	**85,742.02**	2.77***
Gross margin = (TR - TVC)	**67,083.64**	**34,325.38**	56,040.85	2.34**
(NFI) = GM - TFC)	**48,969.48**	**24,095.79**	40,357.77	1.59
ROI = (TR/TC) – 1	**0.99**	**0.67**	0.89	0.9

***p< 0.01; **p< 0.05; *p< 0.1.
Source: Field survey, 2019.

tomato farmers in Kogi State who reported that farmers spent more on pesticide.

The results showed that total variable cost of ₦31,379.40 and ₦25,936.49 per cropping season for male and female tomato farmers respectively. There is significant difference among male and female with respect to the total variable cost. The total cost of production for male and female tomato farmers were ₦18,114.16 and ₦10,229.59 per cropping season respectively. This implies that male tomato farmers spent more on total cost than their female counterpart and this could be justified by the high number of male tomato farmers in the study area. Based on the computation per basket, the average basket of tomato was 70 kg and average price per basket was ₦3.983.13 for male tomato farmers and ₦3,283.78 for female tomato farmers. There was significant difference at 1.0 percent level of significance in the price per basket for both genders. This could be as a result of late arrival of female tomato farmers produce to the market, which might have affected the appearance of their tomato fruits with high level of perishability. The male tomato farmers might have access to better plant varieties than their female counterparts through the extension workers. The total revenue of ₦98,463.04 and ₦60,261.87 were realized for both male and female tomato farmers respectively. There is significant difference at one percent level of significance in the total revenue realized by both genders. The gross margin ₦67,083.64 and ₦34,325.38 were realized by both male and female tomato farmers with significant difference. This implies that male tomato farmers in the study area managed their crops more effectively and probably more efficiently than female tomato farmers who were faced with multiple activities at home, on the farm and other occupation. In view of this value of gross margin, generally, tomato production in the study area was highly profitable for both male and female tomato farmers. The return on money invested was ₦ 1.99k and ₦1.67k for male and female tomato farmers respectively. This implies that for every one naira invested by male tomato farmers in tomato production, ₦ 1.99k was realized, in like manner, for every one naira invested by female tomato farmers in tomato production, ₦ 1.67k was realized. Similarly, Sani and Haruna (2010) reported that the costs and returns analysis of vegetable crop production was economically viable.

Constraints faced by tomato farmers

According to this study, tomato farmers were faced with diverse problems in the study area. A major problem identified by male (69.9%) and female (94.6%) tomato farmers in the study area was inadequate capital (Table 4). Access to credit in farming plays an important role in

Table 4. Constraints faced by tomato farmers.

Constraints	Male		Female	
	Frequency (*)	Percentage	Frequency (*)	Percentage
Inadequate Capital	58	69.9	35	94.6
Lack of improved planting seeds	67	80.7	34	91.9
Lack of contact with extension services	61	73.5	28	75.7
Lack of knowledge about weather forecasting	58	69.9	23	62.2
High cost of labour	48	57.8	33	89.2
High cost of transportation	48	57.8	32	86.5
Use of local tools for farm operations	53	63.9	27	73.0
High Pest and disease infestation	55	66.3	23	62.2
Low market price	53	63.9	22	59.5
High perishability of the commodity	45	54.2	26	70.0
Inadequate herbicides/pesticides	49	59.0	21	56.8
Inadequate market facilities	41	49.4	21	56.8
Lack of Storage facilities	37	44.6	24	64.9
Excessive rainfall	40	48.2	16	43.2
Lack of Grading facility	38	45.8	13	35.1
Poor soil fertility	43	51.8	8	21.6
Health challenges	39	47.0	11	29.7

*Multiple response allowed.
Source: Field survey, 2019.

increasing productivity. Tomato farmers in the study area do not have adequate access to fund to expand the scale of tomato production. Production costs such as cost of purchasing and other related costs were mainly funded from individual savings. Lack of improved planting seeds was another problem identified by both male (80.7%) and female (91.9%) tomato farmers in the study area. This is in line with the findings of Adegbite et al. (2010), who discovered the problem of lack of seed quality research such as protein, oil, carbohydrate and anti-nutritional factors. Lack of contact with extension services was a problem identified by both male (73.5%) and female (75.7%) tomato farmers in the study area. Poor extension services confirm the report by Tiwani (2010) that one of the major constraints of farmers was poor access to extension services. Inadequate extension contact can restrict farmers from becoming aware and subsequently adopting new innovation. Farmers who have contact with extension agents often tend to adopt new technological practices faster and use the information to build up their standard of living, while those who have less contact with extension agent are less likely to adopt new technological practices and this could be due to the fact that farmers are conservative to certain ways of doing things due to their primitive knowledge and the tendency to adopt the innovation becomes difficult. Lack of knowledge about weather forecasting was another problem identified by both male (69.9%) and female (62.2%) tomato farmers in the study area. This finding agrees with Ozor and Nnaji (2010) who stated that poor climate change information and farmers lack of access to weather forecast technologies were major barriers to climate change adaptation among farming household in Nigeria.

High cost of labour (57.8% for male) and (89.2% for female) implies that female tomato farmers, due to their multiple responsibilities of child bearing, child caring, regular household chores among others have to pay more for hired labour for their farming activities. High cost of transportation (57.8%) (86.5%) and use of local tools for farm operations (63.9%) (73.0%) were serious problems identified by both male and female tomato farmers in the study area. However, female tomato farmers encountered more problems in these regards than their male counterparts. Most female tomato farmers have no personal means of conveying their tomato fruits from farm gates to the markets, they depend on commercial means of transportation unlike most male tomato farmers who personally owned motorcycles and probably vehicles for easy transportation at reduced costs. According to the results, female tomato farmers are more primitive in the use of simple farm tools than male tomato farmers. Fasina et al. (2005), reported that one of the serious problems affecting agricultural productivity in the tropical and developing countries like Nigeria is the effective use of local tools. High pest and disease infestation (66.3%) (62.2%), low market price (63.9%) (59.5%) and high perishability of the commodity (54.2%) (70.0%) were problems identified by both male and female tomato farmers, respectively in the study area.

Prevalence of pests and diseases such as late blight, nematodes and cutworms were the most important pests and diseases reported by nearly one half of the respondents.

Female tomato farmers were more sensitive to the infestation of diseases and pests and probably carried out effective control before notable crop damages were recorded, which reflected in their ability to accrue higher market price than their male counterparts. In Nigeria, tomato has more disease and insect problems because the crop is prone to pests and diseases infestation, where soils have become exhausted by the need to produce more food for increasing populations and where fertilizers are hardly available and expensive for farmers. Ray et al. (2015) revealed that all forms of agriculture are threatened when resistance develop in plant pests. Adegbite et al. (2010), pointed out that as the cultivation area for tomato expands, pest and disease problems increase in severity. However, female tomato farmers recorded high perishability than male tomato farmers due to untimely arrival of tomato fruits to the market places because of lack of means of transportation. However, inadequate market facilities (56.8%) and lack of storage facilities (64.9%) were problems identified by the female tomato farmers in the study area. This may be due to the fact that most women in the study area do not own a house where they can store their produce. This implies that female tomato farmers spend more on storage cost than their male counterpart. Due to the perishable nature of tomato, farmers agreed that lack of storage facilities is a serious problem. Thus, adequate markets and storage facilities are needed to reduce losses and physical damages to the produce. This finding agrees with Usman and Bakari (2013) who confirmed poor storage facilities as the most serious problem encountered in the marketing of vegetable.

Conclusion and Recommendations

The findings of this study showed that majority of the farmers were within the active productive age bracket which is instrumental to their effectiveness in tomato production. Male and female farmers played prominent roles in tomato production with high number of male farmers. Tomato production was profitable to both male and female farmers in the study area. Inadequate capital, lack of contact with extension services, high cost of labour, high pest and disease infestation, high perishability of tomato fruits and others were the problems faced by the respondents in the study area. Female tomato farmers should be encouraged to cultivate improved crop varieties with strong seed coat and longer shelf life. The female tomato farmers could pool their resources together to purchase motorcycles or vehicles for easy movement of their produce from the farm gates to market places in order to reduce high perishability of tomato fruits. Also, female tomato farmers should endeavor to use farm machinery and herbicides to solve the problems of inadequate labour supply and use of simple farm tools respectively, which do not encourage large scale production. The male tomato farmers should control pests and diseases infestation, package their tomato fruits to make them more attractive to consumers in order to earn higher market price.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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