

Mixed method survey of vegetable farming and rural farmers' livelihood in Enugu State, Nigeria

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Abstract

Studies on the role of agriculture on the improvement of livelihood of farmers have primarily focused on staple crops. Increased awareness on the importance of vegetables in urban and rural areas in Nigeria has led to a rise in demand of vegetables. In both rural and urban communities, smallholder farmers are responding to this demand by increasing vegetable production and thereby creating economic opportunity for themselves. The purpose of this paper is to assess the role of vegetable farming on rural farmers' livelihood and the support systems available for rural vegetable farmers in Enugu state, Nigeria. This study adopted a mixed-methods design. Quantitative data collection involved the use of questionnaires (n=1118) and qualitative data collection methods comprised in-depth interviews and focus group discussions (n=33). The study revealed that even with limited institutional support, vegetable farming has led to an improvement of rural farmers' livelihood. The findings indicated that through vegetable farming, rural farmers increased on-farm income and were able to establish other businesses. Also, vegetable farming increased food security of farmers' households. The study also revealed that community based organisations (CBOs) are the major source of credit for the rural farmers and there is preponderance of farmer to farmer transfer of seeds, technology and information. Therefore, agricultural interventions should also be targeted towards strengthening the vegetable sector.

Keywords: Rural farming, food and nutritional security, socio-economic empowerment, support systems, community based organisation

1 Introduction

About half of the world's population reside in rural areas and a greater number of them depend on agriculture for life sustenance (Alston & Pardey, 2014). In Nigeria, like in other countries in sub-Saharan Africa (SSA), agriculture provides significant employment opportunities and contributes to socio-economic empowerment and well-being of the rural population (Abro *et al.*, 2014). The high rate of malnutrition and the necessity to provide for nutritional needs of people has made agriculture a very important sector (Christiaensen *et al.*, 2011). Although alleviating hunger requires provision of food with sufficient energy content, tackling malnutrition requires the production, provision and consumption of fruits and vegetables that contain the nutrients needed for a balanced diet. Across the world, many plant species that are cultivated for food are neglected and under-

utilised despite having a crucial role in food security, nutrition and income generation of the rural poor (Bammite *et al.*, 2018). Pingali (2015) observes that agricultural policies are still heavily biased towards staple grain productivity improvement and this has led to slow response to the persistent problem of malnutrition and child stunting, as well as the emerging challenges of obesity. Most countries still interpret food security as staple grain sufficiency and this has constrained the ability of agricultural policies to achieve positive nutritional outcome (Pingali, 2015). Global investment in agricultural research and development to overcome the problems of hunger and poverty remains focused on a very small number of crops, most of which are carbohydrate-rich staples such as rice, potatoes, wheat, maize, cassava and yam, to the neglect of vegetable crops which tackle mineral and vitamin deficiencies associated with malnutrition (Keatinge *et al.*, 2011; Ebert, 2020). Vegetables appear to be among the neglected crops despite that a good number

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of farmers are engaged in vegetable production (Obalola & Tanko, 2016; Schreinemachers *et al.*, 2018).

In rural communities in Southeast Nigeria, there appears to be influx of rural farmers into vegetable farming, and vegetable farming is becoming one of the major commercial activities in this zone. Vegetable crops produced in the past for subsistence purposes have been introduced into a commercial-oriented farming system, like yellow pepper, red pepper, garden egg, tomatoes, okra and different leafy vegetables. Frequently cited main reasons behind this development are the increased market demand for the crops, changes in technology and farming processes, rapid population growth, and the increasing need of income to take care of daily needs and finance essential services such as health care and education (Paolisso & Regmi, 1993; Bhandari & Ghimire, 2016). Schreinemachers *et al.* (2018) state that growing populations and increased awareness on the importance of vegetables in urban and rural areas have led to a rise in demand for vegetables. In both rural and urban communities, smallholder farmers are responding to this increased demand by increasing vegetable production thereby creating economic opportunities for themselves (Schreinemachers *et al.*, 2018; Bhatta & Doppler, 2010).

Engaging in commercial vegetable farming by Nigerian rural farmers could be seen as an opportunity to increase quality of life in rural communities as reported in other countries. It provides opportunity for rural farmers to increase their earning capacity, have access to varied food items, have supplementary means for health care and educational services, and other social amenities (Ghimire *et al.*, 2018; Gurung *et al.*, 2016; Ojiewo *et al.*, 2013; Holmer, 2011). Rural communities will also benefit if a significant percentage of their population are empowered through vegetable farming as this may increase commercialisation of the rural sector (Weinberger & Lumpkin, 2007). Despite the reported evidence of positive effects of vegetable farming on poverty reduction and food security, little attention has been paid to the importance of vegetable crop farming in Nigeria. Vegetable crops are being neglected and are not often mentioned as possible income-generating farm crop in Nigeria (Adeboye, 2003; Oyedele & Adenegan, 2017). Ebert (2020) asserts that production statistics usually do not list indigenous or traditional vegetables as these are often produced in home or family gardens or collected from the wild for family consumption.

Studies on vegetable crop sector in Nigeria have focused on other issues such as the chemical and nutritional contents of vegetables, as well as pests and diseases that attack vegetable crops (Agwu *et al.*, 2018; Maga *et al.*, 2013; Aregheore, 2012; Olaposi & Adunni, 2010; Taiga, *et al.*, 2008).

Other studies (e.g., Obinaju & Asa, 2015; Obalola & Tanko 2016; Ibitoye *et al.*, 2015) focused on the cost analysis of resource use in vegetable farming. Onwubuya *et al.* (2009) studied the processing and preservation techniques of vegetables. The contribution of vegetable farming to the improvement of rural livelihood remains an understudied area in Nigeria and other developing countries irrespective of the potential contributions of this crop sector to food security and poverty reduction in these regions. Little attention is also paid to support systems available for rural vegetable farmers to increase their production capacity. Therefore, this study examined the role of vegetable farming on the livelihood of vegetable farmers in rural communities in southeast Nigeria. The study also examined the impact of vegetable farming on food security, which refers to physical or economic access to food and required micronutrients enough for every member of the household both in quality and in quantity at every point in time. Finally, the study assessed the support systems available to rural vegetable farmers.

2 Materials and Methods

2.1 Study area

This study was conducted in Enugu North senatorial district in Enugu State, being one of the five states in the South-east Zone of Nigeria (Suppl. Fig. 1¹). This state has a climate marked with two major seasons: rainy season and dry season. The rainy season begins in March/April and lasts until October/November, with annual rainfall varying from 1,400 to 2,000 mm. The dry season lasts from November to March. The state is blessed with rich agricultural land and covers about 8,022.95 km². Enugu State had a population of 3,257,298 in 2006 and 4,411,119 in 2016 (National Population Commission, 2006; National Bureau of statistics, 2017). About 85 % of the labour force in rural communities consist of small scale farmers, growing staple crops as cassava, rice, yam, maize, cocoyam, and different vegetables and fruits (Ike, 2011; Ozor & Nnaji, 2011; Agbo, 2015).

2.2 Sampling and data collection methods

The data used in this study were obtained through a cross-sectional, mixed method survey of vegetable farmers in rural communities in three local government areas (LGAs): Nsukka, Uzo-Uwani and Igbo-Etiti executed between September 2019 and February 2020. These LGAs were purposively selected because of the preponderance

¹This figure is available online on the landing page <https://doi.org/10.17170/kobra-202112035147>

of vegetable farming in the area. In each of these three LGAs, six communities which are known for vegetable farming were purposively selected. These communities include Ede Oballa, Lejja, Obimo, Nsukka, Okwutu and Opi in Nsukka. Opanda, Nkpologu, Nimbo, Adani, Ukpabi and Abii communities in Uzo-Uwani and Diogbe, Ozara, Umunko, Ohodo, Ekwegbe and Ochima in Igbo-Etiti.

In each community snowball sampling was used to select the study participants. The inclusion criteria were rural vegetable framers who engage in both subsistence and commercial vegetable farming, aged > 18, who have had not less than three years of experience in vegetable farming, and had consented to be part of the study. In this way 1,118 questionnaires (386 from Nsukka, 381 from Uzo-Uwani, and 351 from Igbo-Etiti) were distributed. Out of the 18 communities, 9 participated in the qualitative study. Overall, a total of 9 focus group discussions (FGDs) and 24 in-depth interviews (IDIs) were conducted. Each FGD constituted of 10 participants and included both male and female participants in the same FGD since the issues discussed were not gender sensitive. In all, 114 vegetable farmers participated in the qualitative study.

Data were collected through the use of a pre-tested structured questionnaire, and an in-depth interview guide and focus group discussion guide. The language of communication was the Igbo language, being the local dialect and one of the popular languages spoken in Nigeria. The venue and time for the interviews and FGDs were scheduled by the participants. The researcher moderated the interviews and FGDs while the research assistants were in charge of audio recording.

2.3 Data analysis

Quantitative and qualitative methods of data analyses were employed. The data from the questionnaires were processed and analysed using the Statistical Packages for the Social Sciences (SPSS) version 20. Descriptive statistics such as percentages and bar charts were used to reduce the raw data into manageable proportions.

Thematic analysis approach was adopted for the qualitative data analysis. This approach is frequently used in qualitative research (Braun & Clarke, 2006). The data were later transcribed verbatim. Transcripts were read several times and after this, data were coded manually and similar codes were grouped into themes and sub-themes. The coding was done bearing in mind the research objectives. Verbatim quotes were used to report findings and this ensured that participants' experiences were vividly represented. Triangulation approach was adopted for mixing of qualitative and quantitative data.

3 Results

3.1 Demographic characteristics of participants

Table 1 shows that more women engage in vegetable farming than men. The majority of the farmers are Christians. About 60% of the farmers have more than 13 year experience in vegetable farming.

Table 1: Demographic characteristics of participants (in percentage).

	quantitative study (n=1118)	qualitative study (n=114)	Overall
<i>Sex</i>			
Male	35.5	36.8	35.6
Female	64.5	63.2	64.4
<i>Marital status</i>			
Single	21.4	15.7	20.9
Married	62.3	65.8	62.7
Widowed	13.4	16.7	13.7
Divorced/separated	2.9	1.8	2.7
<i>Age in years (mean)</i>	47.9	43.2	
<i>Educational qualification</i>			
No formal Education	16.7	15.8	16.6
1–6 years	27.1	42.9	28.6
7–12 years	31.9	32.5	31.9
13 years and above	24.3	8.8	22.9
<i>Religion</i>			
Christianity	98.6	97.7	98.5
African traditional religion	0.6	0.0	0.5
No religion	0.8	2.6	1.0
<i>Years of experience in vegetable production</i>			
3–7 years	17.3	49.1	20.2
8–12 years	18.6	30.7	19.7
13–17 years	37.9	15.8	35.9
18 years and above	26.2	4.4	224.2

3.2 Vegetables cultivated

Table 2 shows that far more farmers in Igbo-Etiti LGA cultivate leafy vegetables as compared to the two other LGAs. In Nsukka and Uzo-Uwani LGA more farmers cultivate pepper than other vegetables.

Table 2: Vegetable species cultivated in each local government area (LGA) in percentage.

Vegetable crops	LGA			Overall
	Nsukka	Igbo Etiti	Uzo Uwani	
Okra	20.2	8.5	23.9	17.8
Tomatoes	54.4	50.7	59.6	55.0
Pepper	75.4	29.6	73.0	60.2
Garden egg	70.5	25.6	68.2	55.6
Cucumber	22.8	14.2	27.0	21.6
Water melon	17.1	10.3	20.7	16.2
Leafy vegetables	35.8	92.0	63.0	62.8

3.3 Reasons for engaging in vegetable farming.

The participants were generally involved in staple farming mainly for subsistence purposes but are also engaged in

commercial vegetable farming. They were asked to evaluate how involvement in commercial vegetable farming has influenced their general livelihood if compared to their involvement in staple crop farming. The results presented in Fig. 1 are their reasons for choosing vegetable farming over farming of staple crops such as yam, cassava, and cocoa yam. The participants had opportunity to provide multiple responses and each bar represents the percentage of participants who selected the particular option against those who did not select the option. Also the FGD provided detailed information on the farmers' reasons for engaging in vegetable farming. All participants were of the view that as vegetables grow and mature within a few months there is a quick return on investment.

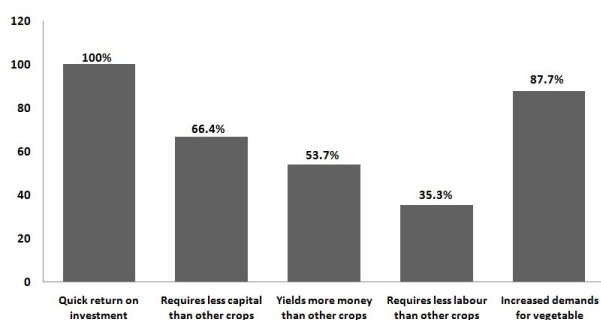


Fig. 1: Respondents' view on the reasons why farmers engage in vegetable farming ($n = 1118$).

Many farmers in our community engage in vegetable farming because of the quick recovery on investment. You get what you invested in the farming within three months of the farming unlike in other crops like cassava or rice, where you have to wait for seven months or in most cases one year and above before you start harvesting. Vegetables grow and mature faster than other crops and can be cultivated even two or three times in a year on the same plot of land unlike the other crops (IDI, Male, Uzo-Uwani LGA).

Some of the women argued that their main reason for engaging in vegetable production was the fact that their husbands do not interfere with this business unlike in staple crop farming.

For me, I engage in vegetable farming because my husband do not interfere in the business unlike when we sell cassava or cocoa yam. If it were cassava or cocoa yam, he would first calculate the number of baskets that I am taking to market and tell me the amount expected from the sales. After selling those crops I would give account of what I sold and the expenses I made and tender the remaining amount to him. But for vegetable crops, I am in total control of the sales and the income generated from the sales (FGD, Female, Igbo-Etiti LGA).

3.4 Ways of selling vegetables

The data on the farmers' selling point are presented in table 4. Most respondents explained that the choice of selling point for their vegetables depends on the season. At the peak of harvest, majority of the farmers sell their produce to retailers who come from other states to buy vegetables in the major markets in Enugu State (Akwata Market in the city of Enugu and Ikpa market in Nsukka; Fig. 2). When only few produce can be sold, most farmers do sell at local community markets. Some also explained that their choice of market also depend on cost of taxation. In some markets, one will have to pay to occupy a space but in some others, one is allowed to occupy a space at no cost.

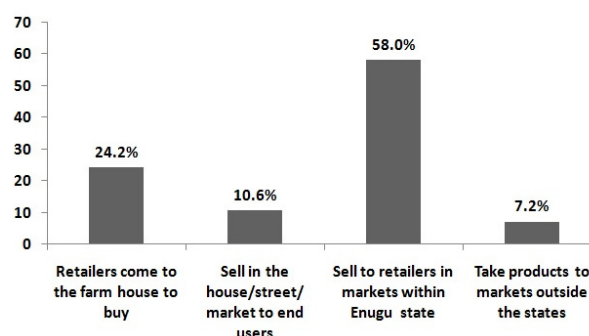


Fig. 2: Respondents' view on the ways through which they sell vegetables (in percentage; $n = 1118$).

Here in Opanda, during the peak of harvest, we sell mostly to retailers who come from Bayelsa, Abia, Imo, Cross River, Rivers and other states. But as time goes on, when the quantity we harvest went down and our customers from other states stopped coming, some of us began to sell at the community market, while others sell to retailers in other markets like Ikpa market in Nsukka or Akwata market in Enugu (IDI, male, Uzo-Uwani LGA).

In Lejja Community In Nsukka LGA, the farmers explained that they could only sell their vegetables in their community markets because they are banned from taking their produce outside their community. We are banned from taking our vegetables away from this community. We can only sell our vegetable here in Lejja. This order was given by the traditional ruler and all the village heads in the community. Their reason is that the market is newly established and they want it to develop to a certain standard. They believe that by restricting the farmers from selling in other markets, people will come and buy from their farmers and thereby become aware that the market exist. Whoever disobeys this order is meant to pay a fine. Because of the fine, we obey the rules (IDI, female Nsukka LGA).

3.5 Socio-economic benefits of vegetable farming

The qualitative data of table 3 revealed that farmers do get several benefits from vegetable farming - vegetable farming seems to be a “money making venture”. It also shows that having access to income through vegetable farming increases farmers’ chances of contributing to financial decisions made in their household.

Table 3: Respondents’ view on the impact of vegetable farming on their economic empowerment (in percentage; n=1118).

Impact	Mentioned (%)
Increase in income	91.8
Ability to solve daily financial problems	88.9
Ability to provide the basic needs of my household	85.8
Involvement in taking financial decision in my household	94.0
Ability to establish other non-farm business	28.2
Have become economically independent	61.0
Have been able to acquire personal properties	72.8

I have been engaging in vegetable farming for over 15 years and my household has been surviving through what I get from the farming. I can say that I have become economically independent. I am a widow with 3 teenagers, yet, I pick my household’s bills without seeking for help from anyone. Vegetable farming is a lucrative business (FGD, Female, Uzo-Uwani LGA).

From the money I make from vegetable farming, I pay my children’s school fees; pay for medical bills; and solve other family problems. I have trained two of my kids to university level through vegetable farming. I have passion for vegetable farming and I have surely benefitted a lot from it (FGD, Male, Nsukka LGA).

Vegetable farming has given me financial autonomy. When I was into yam farming with my husband, we were always struggling over the produce. He decided on the tubers to be sold and the ones to be eaten and also decided what to do with the money made from the sales. Now that I am into vegetable farming, I am fully in charge and I decide what to do with the money I realised from the sales (IDI, female, Igbo-Etiti LGA).

3.6 Impact of vegetable farming on food and nutritional security

The data on the impact of vegetable production on household food and nutritional security are presented in table’4.

The result revealed that there is improvement in the household nutrition due to the availability of vegetables and income to buy other food crops. Participants explained how vegetable farming has improved food security in their households. Availability of vegetables all-year round was reported in all the FGD in Uzo-Uwani LGA. This is because these farmers engage in irrigated farming. Other participants from other LGAs also affirmed the above information by stating that during dry season, farmers from Uzo-Uwani LGA supply vegetables to markets in other LGAs. Irrigated farming was possible for them because of the availability of rivers and streams. Other impacts of vegetable farming on food security included access to cash income to buy food.

Table 4: Respondents’ view on the impact of vegetable farming on the food and nutritional security of their household (in percentage; n=1118).

Impacts	Mentioned (%)
There is enough food for consumption in my household	78.6
There are enough vegetables for home consumption	93.2
My family’s diet has improved because we add vegetables to our meals	99.6
I have income to buy food for my household	83.8
None of my family members is suffering from any food deficiency disease	100

Vegetable farming has improved food security in my household. There are enough vegetables available for consumption from January to December and from the money I generate from the vegetables, I can easily buy other food items that I don’t have (IDI, Male, Uzo-Uwani LGA).

This farming has made having access to vegetables from January to December possible. I engage only in rain-fed farming and my vegetables finishes around November. When this happens, I will start buying from Uzo-Uwani farmers who engage in irrigated farming because their area is endowed with rivers and streams, making irrigated farming possible. I can’t do without vegetables because most of our delicacies are prepared with vegetables (IDI, Female Nsukka LGA).

3.7 Available support systems and different agricultural inputs received by the farmers

The study also tried to find out whether vegetable farmers have received support from government or other agencies, members of the community, community based organisations (CBOs), or corporative societies. The result shows that only

Table 5: Respondents' view on different sources of support they have benefitted from (in percentage; n=548).

Supporting personnel	Mentioned (%)
Government	21.5
Cooperate organisations	7.7
Cooperative societies	14.1
Community members	75.0
International organisations	0.0
Community based organisations	34.5

49.0% indicated that they have been supported while the rest indicated that they have received no support at all. The data presented in table 5 below represents the respondents' view on the sources of support available for farmers while the data presented in table 6 represents the respondents' view on the support they have received.

The data presented in table 5 show the different sources from which the farmers have received support. Community members and community based organisations remain the major sources of support for the vegetable farmers.

Table 6: Respondents' view on different supports they have received (in percentage; n=548)

Supports provided	Mentioned
Credit facilities	75.2
Land	71.4
Extension services	4.6
Mechanised tools	0.0
Fertilisers at subsidised rate	17.7
Improved seeds	6.7
Agro chemicals	0.0
Irrigation facilities	6.9

Many farmers indicated that they have been given access to land. The qualitative data revealed that the members of the community give farmers access to land at no cost or with little demand. Generally, in the studied communities, individuals have land titles through inheritance or outright purchase from those who have existing land titles. There are also community-owned lands that have not been allocated to any individual of which any member of the community can use for farming. There are also CBOs or groups who buy communal and individual lands as a way of investing their income. Farmers can make use of these pieces of land (only for farming purposes) in agreement with the owners which could be individual, community, CBOs or groups. Access to credit facility is another support received by a good number of the farmers. The qualitative data revealed that the major sources of credit to the farmers are CBOs. There is also evidence of farmer to farmer transfer of seeds, technology and information. Further, farmers prefer the farmer to farmer ex-

tension service to the services provided by the professional extension workers due to method of teaching. The qualitative data also revealed that some of the participants have received fertilisers from government.

I have been supported by the CBOs in my community. There is no bank in Uzo-Uwani LGA. This makes it difficult for us to assess bank credits. Our major source of credit is the informal credit provided by CBOs. I have lost count of the times I have taken such loans from the CBOs in my community (FGD, Female, Uzo-Uwani LGA).

The only thing that some of us here have gained from government is the fertiliser subsidy. About four years ago it was announced at the church that government officials have brought fertilisers in the local government secretariat for farmers to buy at subsidized rate. Although some of us went there and were able to get at least one bag of fertiliser each, not all the farmers were able to buy because some of the officials bought the bags of the fertilisers at the subsidized rate to sell these at the normal market price (IDI, female, Nsukka LGA).

Community members help us a lot. If you ask most of us about access to land, the majority will tell you that land is not their problem, and when you ask further you will realise that the land they farm on do not belong to them but was given to them by community members, most often at no cost. I have been in this business for fifteen years and 70 % of the land I use, neither belong to me nor my family, but to other community members. I have never paid for the land, especially the lands owned by individuals. For those owned by CBOs or groups in the community, the only thing they demand is that every year, you present 20 litres of palm wine and cola nuts to them and remind them that you are still using the land. If not, they may give the land to another farmer (FGD, female, Nsukka LGA).

We learn a lot from each other. The experienced farmers in our community are always willing to teach others. I have learnt a lot from fellow farmers and I have also taught others. We don't hope on the extension workers because they hardly come and even when they come, they are not practical in their teaching like the experienced farmers. Anytime they come, they stay either in the church premises or village square. They would stay there and say all they have to say and leave. They have never taken us to a farm to show practical examples of their teachings (FGD, Female, ULGA).

4 Discussion

The perception of vegetable farming as a means of poverty reduction and also as a means of increasing food and nutritional security at both household and community level was

also found in literature (Neven *et al.*, 2009; Rao & Quim, 2011). The positive outcomes of the commercialisation of vegetable crops have also been reported in Senegal (Maertens & Swinnen, 2009), Ghana (Afari-Sefa, 2007; Afari-Sefa *et al.*, 2012), Zimbabwe (Henson & Reardon 2005), and Kenya (Muriithi & Matz, 2015).

Increase in income was indicated as a major impact of vegetable farming. The increase in income has helped the farmers to provide the basic needs of their family and solve their daily financial problems. Access to income made the farmers become economically independent and also gave them the opportunity to partake in financial decisions in their household. This result is in line with previous findings (e.g., Neven *et al.* 2009; Rao & Quim, 2011; Maertens & Swinnen, 2009; Afari-Sefa, 2007; Muriithi & Matz, 2015) that linked engagement in agriculture and economic empowerment of farmers. Gurung *et al.* (2016) in their study of commercial vegetable farming and its role on poverty reduction in Nepal found that there is net increase in household income of the surveyed area from the sale of vegetables. This is also in line with the findings of Holmer (2011) who found a 20 % increase in monthly income among vegetable farmers in the Philippines.

The data also revealed that vegetable farming has helped farmers to establish other businesses. Some of the farmers indicated that they have established other businesses such as transport business, trading of food crops, and poultry farming from the money they realised from vegetable farming. This suggests that engagement in vegetable farming can help farmers to increase their income through investment in other businesses. This finding corroborates with an earlier study by Salami *et al.* (2010) who found for East Africa that agricultural growth induces non-farm growth. This finding also corroborate with Weinberger & Lumpkin (2007) who found that vegetable farming is profitable because it increases employment creation and income-generating opportunities, and increases investment in other non-farm sectors of the rural economic sector.

4.1 What are the effects of vegetable farming on the food security of the farmer's household?

The results suggest that vegetable farming improved food and nutritional security. The respondents indicated that their food and nutritional security improved. There is improvement in their diet due to availability of vegetables and their ability to buy other food crops. The findings are in line with Smith & Eyzaguirre (2007) who noted that there have been a growing awareness of the health benefits of vegetables and this has increased vegetable production and consumption. The study also revealed that vegetable farming contributes

to food security by providing the farmers with the money to buy other food crops. This finding is in line with Ojiewo *et al.*, (2013) who found that the income generated from vegetable sales enables the farmers to buy other staple crops thereby contributing to food security at the household level. Smith & Eyzaguirre (2007) note that there have been a growing awareness in recent years of the health-promoting and protecting properties of non-nutrient bioactive compounds found in vegetables. This has led to a rise in the demand of vegetables. In line with this submission the study reveals that a good number of the respondents moved into vegetable farming because of increased demand of vegetables in the study area.

4.2 What are the available support systems for vegetable farmers?

The major sources of support to the rural farmers are CBOs and members of the own community. CBOs remain their major source of credit while community farmers provide information about technology and other ideas relating to vegetable farming. Due to limited access to formal credit from commercial banks or other institutionalised credit forms, rural farmers explore alternative means of financing farming. Most rural communities in South-East Nigeria are characterised by community organisations such as youth forum, elders' forum, married women organisations, farmers' unions. These organisations are referred to as community based organisation (CBOs). Community based organisations involve a small group of about 10-30 persons (of men, women or both gender) living in the same geographical area, sometimes of the same age group and sometimes on the same job or economic class, and working together to improve their socio-economic status (Sandhu, 2016). Most times, CBOs are founded to promote savings and credit activities and empower members to be able to engage in socio-economic activities. There are many of such CBOs in the study area.

There is evidence of farmer to farmer transfer of ideas and technologies. This aligns with the submission of Kormawa *et al.* (2004) that with declining project support funds and dwindling state budgets, the public extension services have become even less efficient in delivering agricultural information and in transferring new technologies. Farmer to farmer traditional dissemination methods have become an alternative for the farmers. There were also land borrowing and transfer of seeds to relatives and friends. This is in agreement with Miller *et al.* (2004) who found that villages or CBO with strong interpersonal ties can provide shared support that professionals cannot provide. This is also in agreement with Lyon (2003) who opines that allowing communities to have

greater control of their livelihood and to determine their own priorities through community organising, can open opportunities for poverty reduction and community development.

The study revealed that even when there is intervention for rural farmers such as supply of fertilisers at subsidized rate, only few farmers benefit. This could be attributed to corruption and poor administration. Adesina (2013) stated that because of the fraudulent and inefficient systems of supplying agricultural inputs to Nigerian farmers, the majority of the farmers do not benefit from agricultural interventions. He stated also that some of the fraudulent politicians divert the input to their personal gains. John *et al.* (2017) mentioned that in Oyo state, Nigeria, government has been paying lip service to the issue of assisting rural farmers and subsidy. Eke & Oghator (2011) observed that most rural development programmes in Nigeria has ended up on the pages of national newspapers and television announcements with the rural areas languishing in backwardness, stagnation, poverty, and misery.

The findings that only a few of the farmers benefit from some government interventions suggest the use of alternative strategies for delivering intervention to farmers rather than the top-down approach currently used by government. Chukwuemeka & Nzewi (2011) stated that any policy approach that exclude the beneficiaries from participating in the project design, planning and implementation hardly succeed. Ironkwe *et al.* (2020) added that a top-down approach results in the development of technologies that neither meet the farmers' needs nor address their production constraints. Research, Extension, Farmers, Input Linkage System (REFILS) an approach which starts and ends with the farmers has been recommended by many authors to be a better approach (Aliyu *et al.*, 2020, Ironkwe *et al.*, 2020; Unamma *et al.*, 2004). This approach integrates the efforts of research, extension and farmers in collaboration with input and marketing agencies in the identification of major agricultural production constraints to develop sustainable, technically feasible, economically viable, and socio-culturally acceptable alternative production technologies, which could meet the needs and capabilities of the resource poor farmers without destroying the natural resource base (Unamma *et al.*, 2004). Ironkwe *et al.* (2020) corroborates that involving all the actors in technology development and implementation especially those on the receiving end (farmers) is likely to assure the most efficient allocation of scarce resources and the early identification of inefficient or wasteful use of resources.

In all, the results suggest that vegetable farming has positive impact on farmer's livelihood. As both rural and urban population are becoming aware of the importance of vege-

tables, the number of farmers going into vegetable farming in the study area is increasing by the day. However, limited access to the necessary input such as seeds, credits, mechanised tool, and fertilisers has made farmers cultivate vegetables on a few hectares of land. This has implications for food security and poverty reduction. Achieving food security in rural and urban areas in developing countries depends on the productivity of farmers in all crop sectors. This means that vegetable farmers require support from government and non-governmental organisations in order to maximize their potentials and contributions to poverty reduction and food security. This idea resonates with that of empowerment theorists and advocates (Anim *et al.*, 2015; Friedmann, 1992; Kanter, 1993; Aliber & Hart, 2009) who advocate for empowerment of workers in order to motivate them, and, increase productivity and impact.

5 Conclusions

The findings show that vegetable farming has improved the food security of farmers' households. The findings also indicate that vegetable farming has positive economic impact on farmers in the study area. However, these vegetable farmers lack support from government and donors due to their long-lasting focus on staple crops. Solving the problem of food insecurity with only staple crops may not be attainable. Research should continue to explore issues in the vegetable crop sector focusing not only on nutritional contents of vegetable but most importantly on its role on food security and socio-economic empowerment. Collaboration between the local communities, government and donor agencies should be encouraged for successful agricultural interventions and policy implementation.

Although the current study involved a large sample of rural farmers, the respondents were selected from only three local government areas in one state in Nigeria. Therefore, there should be caution in generalising the findings of the study to all rural farmers in Nigeria.

Conflict of interest

The authors declare that there is no conflict of interest associated with this publication.

References

- Abro, Z. A., Alemu, B. A., & Hanjra, M. A. (2014). Policies for agricultural productivity growth and poverty reduction in rural Ethiopia. *World Development*, 59(2), 461–474.
- Adeboye, O. (2003). Problems of African indigenous leafy vegetables. *African Journal of Biotechnology*, 2, 138–142.

- Adesina, A. (2013). Information needs of small scale farmers in Africa: The Nigerian example. In: 36th Session of the IFAD Governing Council Consultative Group on Intern. Agric. Res. Available on www.worldbank.org/html/cgiar/newsletter/june97/9cnews.html. Accessed on 29 April, 2019.
- Afari-Sefa, V. (2007). The dynamics of horticultural export value chains on the livelihood of small farm households in Southern Ghana. *African J. of Agricultural Research*, 2(9), 435–440.
- Afari-Sefa, V., Tenkouano, A., Ojiewo, C. O., Keatinge, J. D. H., & Hughes, J. D. A. (2012). Vegetable breeding in Africa: Constraints, complexity and contributions toward achieving food and nutritional security. *Food Security*, 4(1), 115–127.
- Agwu, E. J., Odo, G. E., Ekeh, F., Attamah, G. N., Uwagbae, M., & Eze, C. (2018). A survey of the insect pests and farmers practices in the cropping of yellow pepper *Capsicum annum* Linnaeus in Enugu State of Eastern Nigeria. *African Journal of Agricultural Research*, 13(15), 742–752.
- Agbo, A. D. (2015). Enhancing information service delivery to farmers: A study of Enugu East senatorial zone of Nigeria. *Chinese Librarianship: An Intern. Electr. J.*, 32(40), 32–38.
- Aliber, M., & Hart, T. G. (2009). Should subsistence agriculture be supported as a strategy to address rural food insecurity?. *Agrekon*, 48(4), 434–458.
- Aliyu, M. K., Qasim, O. A., Bala, A., Al-Mustapha, A., & Haruna, A. (2020). Rural stagnation and the role of funding agencies in development of Nigeria: A review paper. *African Scholar Journal of Agriculture and Agricultural Technology*, 17(1), 14–31.
- Alston, J. M., & Pardey, P. G. (2014). Agriculture in the global economy. *Journal of Economic Perspectives*, 28(1), 21–46.
- Anim, F. D. K., Thaba, K., & Tshikororo, M. (2015). Resource use efficiency in vegetable production under irrigation: The case of Marutle agricultural cooperative in the Limpopo province of South Africa. *Journal of Human Ecology*, 50(1), 11–17.
- Aregheore, E. M. (2012). Nutritive value and inherent anti-nutritive factors in four indigenous edible leafy vegetables in human nutrition in Nigeria: a review. *Journal of Food Resources Science*, 1(1), 1–14.
- Bammite, D., Matthews, P. J., Dagnon, D. Y., Agbogan, A., Odah, K., Dansi, A., & Tozo, K. (2018). Constraints to production and preferred traits for taro (*Colocasia esculenta*) and new cocoyam (*Xanthosoma mafaffa*) in Togo, West Africa. *African J. of Food, Agriculture, Nutrition and Development*, 18(2), 13388–13405.
- Bhandari, P., & Ghimire, D. (2016). Rural agricultural change and individual out-migration. *Rural Sociology*, 81(4), 572–600.
- Bhatta, G. D., & Doppler, W. (2010) Socio-economic and environmental aspects of farming practices in the peri-urban hinterlands of Nepal. *Journal of Agricultural Environment*. 11(2), 26–39.
- Bradshaw, T. K. (2007). Theories of poverty and anti-poverty programs in community development. *Community Development*, 38(1), 7–25.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology* 3(2),77–101.
- Christiaensen, L., Demery, L., & Kuhl, J. (2011). The evolving role of agriculture in poverty reduction: An empirical perspective. *Journal of Development Economics*, 96(2), 239–254.
- Chukwuemeka, E., & Nzewi, H. (2011). An empirical study of World Bank agricultural development programme in Nigeria. *American Journal of Social and Management Sciences* 2(1), 176–187.
- Ebert, A. W. (2020). The role of vegetable genetic resources in nutrition security and vegetable breeding. *Plants*, 9(6), 1–20.
- Eke, O., & Oghator, E. (2011). Effective Mobilization of Resources for Sustainable Rural development In Nigeria. *Nigeria Journal of Administrative Science*, 9(1), 142–156.
- Friedmann, J. (1992). *Empowerment: The politics of alternative development*. Cambridge, Massachusetts: Blackwell.
- Ghimire, D., Lamsal, G., Paudel, B., Khatri, S., & Bhusal, B. (2018). Analysis of trend in area, production and yield of major vegetables of Nepal. *Trends in Horticulture*, 1(2), 1–11.
- Gurung, B., Thapa, R. B., Gautam, D. M., Karki, K. B., & Regmi, P. P. (2016). Commercial vegetable farming: An approach for poverty reduction in Nepal. *Agronomy J. of Nepal*, 4, 92–106.
- Henson, S., & Reardon, T. (2005). Private agri-food standards: Implications for food policy And the agri-food system. *Food Policy*, 30(2005), 13.
- Holmer, R. J. (2011). Vegetable gardens benefit the urban poor in the Philippines. *Appropriate Technology*, 38(2), 49–51.
- Ibitoye, S. J., Shaibu, U. M., & Omole, B. (2015). Analysis of resource use efficiency in tomato (*Solanum Lycopersicum*) production in Kogi state, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*, 6(4), 220–229.
- Ike, P. C. (2011). Resource use and technical efficiency of small scale poultry farmers in Enugu State, Nigeria: A stochastic frontier analysis. *International Journal of poultry Science*, 10(11), 895–898.
- Ironkwe, A. G., Nwakor, F. N., & Onuegbu-Johnson, F. N. (2020). Issues and prospects of gricultural technology development and dissemination systems in Nigeria. *Journal of Community & Communication Research*, 5(1), 75–83.
- John, O. A., Adelani, B. S., Abolade, J., Opeyemi, A. A., Adeyemi, B. I., Bolanle, S., & Olalekan, O. B. (2017). Challenges of Oyo State Agricultural Development Program (OYSADEP) For Rural Farmers in Oyo State, Southwestern Nigeria. *Science Letters*, 5(1), 8–12.
- Kanter, R. M. (1993). *Men and women of the corporation* (2nd ed.). New York: Basic Books.
- Keatinge, J. D. H., Yang, R. Y., Hughes, J. D. A., Easdown, W. J., & Holmer, R. (2011). The Importance of vegetables in ensuring both food and nutritional security in attainment of the Millennium Development Goals. *Food Security*, 3(4), 491–501.

- Kormawa, P. M., Ezedinma, C. I., & Singh, B. B. (2004). Factors influencing farmer-to-farmer transfer of an improved cowpea variety in Kano State, Nigeria. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 105(1), 1–13.
- Lyon, F. (2003). Community groups and livelihoods in remote rural areas of Ghana: How small-scale farmers sustain collective action. *Community Development Journal*, 38(4), 323–331.
- Maertens, M., & Swinnen, J. (2009). Trade, standards, and poverty: Evidence from Senegal. *World Development*, 37(9), 161–178.
- Maga, T. J., Uguru, M. I., & Ogbonna, P. E. (2013). Variability and association studies on yield and yield characters in aromatic Nsukka yellow pepper (*Capsicum annum L.*). *International Journal of Plant Breeding*, 7(2), 90–95.
- Miller, M. L., Mastuera, M., Chao, M., & Sadowski, K. (2004). *Pathways out of poverty: Early lessons of the family independence initiative*. Oakland: Family Independence Initiative.
- Muriithi, B. W., & Matz, J. A. (2015). Welfare effects of vegetable commercialisation: Evidence from smallholder producers in Kenya. *Food Policy*, 50, 80–91.
- National Bureau of Statistics (2017). Demographic statistics bulletin: Population Projection (2012–2016). Nigeria states and federal Ministries, Departments and Agencies (MDA)
- National Population Commission (2006). *Population of Enugu state*. Enugu: NPC.
- Neven, D., Odera, M. M., Reardon, T., & Wang, H. (2009). Kenyan supermarkets, emerging middle-class horticultural farmers, and employment impacts on the rural Poor. *World Development*, 37(11), 1802–1811.
- Obalola, T. O., & Tanko, L. (2016). Comparative economic analysis of irrigated and rain-fed spinach (*Amaranthus cruentus*) production in Minna Metropolis, Niger State, Nigeria. *Agrosearch*, 16(1), 87–94.
- Obinaju, I. C., & Asa, U. A. (2015). Economic analysis of vegetable (*Telfairia occidentalis* hook) production among farming households in Ibiono Ibom local government area of Akwa Ibom state, Nigeria. *European Journal of Agriculture and Forestry Research*, 3(4), 17–24.
- Ojiewo, C., Tenkouano, A., Hughes, J. D. A., & Keatinge, J. D. H. (2013). Diversifying diets: using indigenous vegetables to improve profitability, nutrition and health in Africa. In Fanzo, J., Hunter D., Borelli T., & Mattei, F. (Eds), *Diversifying Food and Diets: using agricultural biodiversity to improve nutrition and health*. New York: Biodiversity International.
- Olaposi, A. R., & Adunni, A. O. (2010). Chemical composition of three traditional vegetables in Nigeria. *Pakistan Journal of Nutrition*, 9(9), 858–860.
- Onwubuya, E. A., Okporie, E. O., & Nenna, M. G. (2009). Nsukka yellow pepper processing and preservation techniques among women farmers in Enugu State. *African Journal of Agricultural Research*, 4(9), 859–863.
- Oyedele, O. A., & Adenegan, K. O. (2017). Impact of the production of underutilized vegetables on the livelihood of farmers in Southwestern Nigeria. *International Journal of Social Economics*. 44(12), 1669–1682.
- Ozor, N., & Nnaji, C. (2011). The role of extension in agricultural adaptation to climate change in Enugu State, Nigeria. *Journal of Agricultural Extension and Rural Development*, 3(3), 42–50.
- Paolisso, M. J. & Regmi, S. C. (1993). Gender and commercialisation of subsistence agriculture in Nepal. *International Center for Research on Women (ICRW)*: Washington D.C., USA and New Era, Kathmandu, Nepal.
- Pingali, P. (2015). Agricultural policy and nutrition outcomes: Getting beyond the preoccupation with staple grains. *Food Security*, 7(3), 583–591.
- Rao, E. J., & Qaim, M. (2011). Supermarkets, farm household income, and poverty: Insights from Kenya. *World Development*, 39(5), 784–796.
- Salami, A., Kamara, A. B., & Brixiova, Z. (2010). *Smallholder agriculture in East Africa: Trends, constraints and opportunities*. Tunis: African Development Bank.
- Sandhu, K. (2016). Women Empowerment through Self Help Groups. *Indian Research Journal of Extension Education*, 15(4), 29–34.
- Schreinemachers, P., Simmons, E. B., & Wopereis, M. C. (2018). Tapping the economic and nutritional power of vegetables. *Global Food Security*, 16, 36–45.
- Smith, I. F., & Eyzaguirre, P. (2007). African leafy vegetables: their role in the World Health Organisation's global fruit and vegetables initiative. *African Journal of Food, Agriculture, Nutrition and Development*, 3, 1–8.
- Snoxell, S., & Lyne, M. (2019). Constraints to commercialisation of smallholder agriculture in Tanintharyi division, Myanmar. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 120(2), 219–227.
- Taiga, A., Suleiman, M. N., Aina, D. O., Sule, W. F., & Alege, G. O. (2008). Proximate analysis of some dry season vegetables in Anyigba, Kogi State, Nigeria. *African Journal of Biotechnology*, 7(10), 1588–1590.
- Umeh, J. C., Ani, F., Ate, P. I., & Umeh, E. U. (2016). Productivity gains of the World Bank assisted Fadama II project: The Nigerian federal capital territory experience. *Journal of Advanced Agricultural Technologies*, 3(3), 180–185.
- Unamma, R.P.A., Onwudike, O. C., Uwaegbute, A. C., Edeoga, H. O. & Nwosu, A. C. (2004). Linkage strategy for sustainable agriculture in Nigeria. Research-Extension-Farmer-Input-Linkage System (REFILS). Micheal Okpara University of Agriculture, Umudike.
- Weinberger, K. & Lumpkin, T. A. (2007). Diversification into horticulture and poverty reduction: a research agenda. *World Development*, 35(8), 1464–1480.