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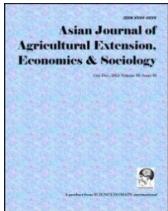
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## **Factors Influencing the Use of Organic Manure by Female Vegetable Farmers in Cross River State, Nigeria**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author KKN designed the study and wrote the first draft of the manuscript. Author OWI collected the data, analyzed and interpreted the data and wrote the second draft of the manuscript. Authors IUU and OTU managed the literature searches, identified the study site and distributed the questionnaires. All authors read and approved the final manuscript.*

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### **ABSTRACT**

The study investigated the factors influencing the use of poultry droppings by female farmers in Anantiga vegetable site, Calabar-South Local Government area of Cross River State, Nigeria. A two stage sampling technique was used to select sixty female vegetable farmers for the study. Primary data were gathered through the use of a structured questionnaire and an oral interview schedule. Descriptive statistics and Likert scale rating techniques were used to analyze the data. The findings of the study showed that, about 75%, being the majority of the farmers were educated, 68.33% rented the farm land used for cultivation of vegetable, 95% of the farmers have never been visited by extension agent, and 88.33% of the farmers were low income farmers, earning between ₦1,000 and ₦14,999 monthly. The following factors: farmers not being aware of the potentials of using organic manure, inadequate access to organic manure materials, low output price of

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vegetables, poverty, negative attitude of government, consumer's preference, and poor organization/cooperation of farmer significantly influenced the use of poultry droppings in the study area. The study recommends among others that sustained enlightenment campaigns and enactment of policies that meet the needs and also support organic vegetable farming in the study area.

**Keywords:** *Organic farming; organic manure; poultry dung; determinants; likert scale; telfairia.*

## 1. INTRODUCTION

The long history of African food insecurity has worried concerned minds. To avert this prevailing hunger situation in Africa, especially in the sub Saharan region, food production must be increased to meet up with the teeming population. This could be achieved through expansion of land area or improving the yields of crops on cultivated land area [1,2]. As a result of population pressure on land, expansion is difficult; moreover, after cropping for some years, soil depletion sets in, resulting in low crop productivity. According to [3,4], population pressure exacerbates and intensifies land degradation and this has resulted in the use of different intensification technologies by farmers to improve yields. Soil is usually degraded due to its constant use and there is the need to replenish it either by the use of organic fertilizer or inorganic fertilizer [5]. Chemical fertilizers often produce plants products at a fast rate and in large quantities, but over time they become less effective and eventually pollute the land with some unwanted chemicals resulting in increased soil depletion [6]. [7] observed that the rapid decline of plant nutrients, low organic matter content and poor physical condition of the soil constitute strong limitation to crop production. Consequently, attention is gradually shifting towards organic manure as soil amendment material for crop production [8,9].

In Nigeria, crop production is mostly practiced on subsistence scale and most farmers are poor, and as a result they are faced with several constraints in the use of fertilizers. Some of the constraints include among others: constant increasing price of fertilizers, unavailability or late arrival of fertilizers, cultural barriers, insufficient quantities of fertilizers, political interference in distribution, no soil test, poor fertilizer recommendation or lack of appropriate information on correct usage, lack of incentives and unintended subsidies [10-12]. Recognizing the myriad of deficiencies inherent in the use of fertilizer in developing countries, many agricultural based agencies have advocated the use of organic manures as alternatives to

inorganic fertilizer [12]. Many studies have identified the increasing use of organic manure in vegetable cultivation in Nigeria [13,10]. The commonly used organic manures by vegetable farmers in the country are: cow dung, goat droppings, pig and poultry dropping. Poultry dropping (poultry litter) seems to be the most preferred among them probably due to its relative affordability and availability on demand. Poultry manure is the organic waste material from poultry consisting of a mixture of poultry excreta, spilled feed, bird's feathers, and material (wood shavings or sawdust) used as bedding in poultry operations.

Vegetable crops are usually described as the tender edible shoots, leaves, fruits and roots of plants that are eaten whole or partly raw or cooked as a supplement to starchy food [13]. Currently, there are no restrictions on the use of poultry manure for vegetable crop cultivation. Vegetable production is popular in Nigeria because of its short gestation period, easily affordable, nutritive value and high gross margins [10]. These crops are consumed in relatively small quantities as a side dish with the staple food. In recent times, there has been a tremendous interest and increase in vegetable crop production in the country. In the South-South region of Nigeria, prominent vegetable crops include water leaf (*Talinum triangulare*), fluted pumpkin (*Telfairia occidentalis*), Cucumber (*Cucumis sativus*), green (*Amaranthus spp*) and okra (*Abelmoschus esculentus*). In this region of the country, fluted pumpkin has become the most popular cultivated vegetable crop [13]. The crop is cultivated on upland during rainy season and in wetland or *fadama* area during dry season. It is the most preferred homestead crop among the Ibibios and Efiks in the region. The green succulent leaves are used to prepare the most popular traditional delicacy of the Ibibios and Efiks called "Edikan Ikong".

Several empirical research studies have been conducted to investigate the factors affecting the adoption of organic farming practices. Kassie et al. [14] investigated the factors influencing

farmers' decisions to adopt sustainable agricultural production practices, with particular focus on conservation tillage and compost in Ethiopia. The results from a multinomial logit analysis showed that poverty, access to information, gender of household head, labour, formal education, and secure land tenure system; affected the choice of farmers' decision in the adoption of organic farming practices in Ethiopia. Sarker et al. [15] investigated the influences on decisions by Bangladeshi farmers regarding whether to adopt organic farming practices. Logistic regression result showed that perception of organic farming, household access to extension services, number of family labourers and household income were significantly associated with decisions to adopt organic farming practices. Omotesho, Fakayode and Tariya [16] investigated organic materials used in Nigeria's agriculture. The results shows that organic materials used by farmers were sourced from cattle, goats, sheep and poultry droppings. The quantity of organic material used was 12,513.0 kg per hectare at a cost of N15, 015.6 (US dollar \$103.5). Major constraints in the use of organic materials by farmers include poor transport facilities and cutworm (*Agrotis spp*) infestations of the organic materials. Factors revealed to influence the quantity of organic materials used by farmers were the cost of organic materials and the quantity of chemical fertilizers used by the farmers. Adebayo and Oladele [17] investigated the use and non-use of organic agriculture practices in South West Nigeria with a view of identifying factors influencing the adoption of these practices. The findings of this study showed that organic agriculture practices mostly used are minimum tillage (80.9%), crop rotation (80.7%), green manure (60.9%) and sanitation (69.8%) whereas organic fertilizer (68.9%), animal manure (71.3%) and mulching (79.6%) were rarely used by the respondents. The results of the probit regression reveal that farming experience, farm size, dependants, membership of organization, subsidy and information showed a significantly positive relationship with adoption of organic farming practices in the study area. Akpan et al. [18] examined the determinants of vegetable farmer's decision to use poultry litter in the southern region of Nigeria. Using logistic regression, the result revealed that age, education, farm size, previous year's harvest, farming practice adopted, farming experience, soil management practice, farm income, off farm income and household expenditure were important determinants of the fluted pumpkin

farmers' decision to use poultry litter in the study area.

Considering the pollution level of most mineral fertilizers and insufficient ability to sustain this technology in the country. There is a need to look within Nigeria and promote as well as improve our indigenous farm practices among farmers. Therefore this study is carried out to fill this gap. This paper will be investigating the factors that influence the use of poultry manure by fluted pumpkin (*Telfairia occidentalis*) farmers in Calabar-South Local Government Area of Cross River State, Nigeria. The identification of these factors would help to address the constraints faced by vegetable farmers in the study area.

## 2. MATERIALS AND METHODS

### 2.1 Description of Study Area

Cross River State occupies an area of about 22,342.176 square kilometers [19]. It is located on Latitude 5° 25' N and longitude 25° 0' E. The soils of Cross River State are Ultisol and Alfisol but predominantly Ultisol, suitable for pineapple production. Cross River State is bounded on the North by Benue State, South by Bight of Bonny, and in the East by Ebonyi and Abia States, while in the West by Republic of Cameroun [20]. About 2,888,966 people inhabit the area, of which the Efiks, Ejaghams and Bekwarras are the major ethnic groups [21]. Cross River State has the largest rainforest covering about 7,290 square kilometers. It is described as one of Africa's largest remaining virgin forest harboring as many as five million species of animals, insects and plants. The state is located within the evergreen rainforest zone. There are two distinct climate seasons in the area, rainy season, from March to October and dry season from November to February. The annual rainfall varies from 2,942mm to 3,424mm. The average temperature is about 28 °C. Cross River State is characterized by the presence of numerous ecological and zoogeographically important high gradient streams, rapids and waterfalls. Fishing and subsistence agriculture are the main occupations of the people. Crops grown in the locality include rice, maize, yam, cassava, pineapple, plantain, banana, oil palm, rubber and cocoa among others [21].

### 2.2 Sampling Technique and Sampling Size

A two stage sampling technique was used in selecting the respondents (fluted pumpkin

farmers). The first stage involves the use of purposive sampling technique to select Anantigha vegetable site, new airport in Calabar-South LGA of Cross River State. This was done because much of the vegetable farmers are located in Calabar-South LGA. The second stage involves the use of random sampling technique to select 90 female vegetable (fluted pumpkin) farmers in the study area. Out of 90 female vegetable farmers selected for this study, 60 supplied complete data used in the analysis. Structured questionnaires and oral interview was used to collect the primary data used for this analysis. This study was conducted in 2013 cropping season.

### 2.3 Analytical Technique

Descriptive statistics such as frequency count and percentage was used to analyze the socio-economic and demographic characteristics of the respondents, while Likert Scale was used to analyze the factors affecting the adoption of organic farming practices by vegetable farmers in the study area.

The questionnaires were divided into two sections. The first section contained the following information: age, marital status, educational level, years of farming experience, land tenure system practice, extension visit, and monthly income in Naira. The second section which was design in a likert scale, contained the constraints affecting the adoption of organic farming practices by vegetable farmers. These were: lack of awareness(LOA), inadequate information/knowledge(IIK), inadequate access to materials specially organic manures(IAM), insecure land tenure(ILT), low output price(LOP), consumer preference(CPR), poverty(PVT), pest and disease outbreak(PDO), poor organization/cooperation(POC), and negative attitude of government(NAG). These constraints were arranged using a four point likert scale; 4 for Strongly Agree (SA), 3 for Agree (A), 2 for Disagree (D) and 1 for Strongly Disagree (SD).

### 3. RESULTS AND DISCUSSION

Table 1 shows the results of the socio-economic characteristics of vegetable farmers. About 11.67% of the farmers were less than 21 years and majority (about 66.67%) was within the age range of 21- 50 years. Within this age distribution, the respondents are expected to be active on the farm and more responsive to agricultural extension programmes. According to

Omotesho et al. [16], as farmers' age varies, they can become more or less risk averse in adopting a new agricultural technology. Age is significantly associated with the adoption of certain farm innovations. Young farmers are expected to be more flexible in their decision to adopt new practices that would improve their farm production and welfare. Only 21.67% of the farmers were not married while 40% of the farmers were married. However, 18.33% and 20.0% of the farmers were either divorced or had lost their husband (widow). This showed that most female vegetable farmers in the study area were the bread winners of their household. About 45% of the farmers had gone through either primary or secondary education; 15% had gotten one form of vocational training or the other; and 15% of the farmers had not gotten any formal education. This showed that majority (75%) of the farmers in the study area were educated. The educational status of vegetable farmers will enable them to acquire knowledge and skill and this will help to increase their productivity and reduce food insecurity. About 58.26% of the farming population in the study area had been into farming for more than eleven years. The time period that farmers are engaged in any activity to a large extent could give an indication of the extent of practical knowledge she has gained in the activity. As shown in Table 1, most respondents had been involved in farming for between 11 and 20 years, implying that these farmers are well knowledgeable on farming activities [16]. According to Barry et al. [22], greater years of farming experience increases the possibility of adoption.

The demographic characteristic of the respondents are presented in Table 2. The results showed that only 11.67% of the farmers owned the land in which they planted vegetables; 20% of the farmers shared the farm land; and 68.33%, being the majority, rented the farm land. Ninety five percent (95%) of the farmers in the study area responded that extension agents have never visited their farm. To enhance better farm practice, there is need for extension agent to transfer new innovations about organic farming to farmers in the study area. The results of farmers' monthly income showed that majority of the farmers were low income farmers. Only 11.67% of the farmers had earned above ₦15,000 monthly from her farm while 88.33% of the farmers earn between ₦1,000 - ₦14,999 monthly. This showed that vegetable farming in the study area was practiced in a subsistence level.

**Table 1. Socio-economic characteristics of the respondents**

Variables	Frequency	Percentage
<b>Age</b>		
< 21	7	11.67
21 – 35	22	36.67
36 – 50	18	30.00
51 – 65	11	18.33
> 65	2	3.33
	<b>60</b>	<b>100</b>
<b>Marital Status</b>		
Single	13	21.67
Married	24	40.00
Divorce	11	18.33
Widow	12	20.00
	<b>60</b>	<b>100</b>
<b>Educational Level</b>		
Primary	15	25.00
Secondary	12	20.00
College	6	10.00
University	3	5.00
Vocational	9	15.00
None	15	25.00
	<b>60</b>	<b>100</b>
<b>Farming Experience</b>		
0 – 10	25	41.67
11 – 20	26	43.33
21 – 30	8	13.33
> 31	1	1.67
	<b>60</b>	<b>100</b>

Source: Field survey, 2013

Table 3 shows the result of factors affecting the adoption of organic farming practices by vegetable farmers in the study area. Ten factors or constraints were investigated in this study using a four point likert scale. The threshold mean of 3.49 was used to select those factors that had a significant effect on the use of organic manure (poultry droppings) by vegetable farmers in the study area. Factors whose mean were higher than or equal to the threshold mean were accepted to have a significant influence in the adoption of organic farming practices (organic manure) by vegetable farmers in the study area, while factors with lower means than 3.49 were rejected as having no significant influence. The following factors: inadequate information/knowledge, insecure land tenure system, and pest and disease outbreak did not significantly influence the use of organic manure by vegetable farmers in the study area. Lack of awareness (LOA) was ranked first as one of the most important factors that influenced the used of poultry droppings by vegetable farmers in the study area. This suggested that farmers in the study area were not aware of the potentials of

using organic manure as a substitute for inorganic manure. This may be as a result of farmers not having contact with agricultural extension services as shown in Table 2. Contact with extension services gives farmers access to information on innovations, advice on inputs and their use, and management of organic farming technologies [23]. In most cases,

**Table 2. Demographic characteristics of the respondents**

Variables	Frequency	Percentage
<b>Land Tenure</b>		
Land owner	7	11.67
Tenant	41	68.33
Share cropper	12	20.00
	<b>60</b>	<b>100</b>
<b>Extension Visit</b>		
Yes	3	5.00
No	57	95.00
	<b>60</b>	<b>100</b>
<b>Monthly Income(Naira)</b>		
1000- 4,999	26	43.33
5000 – 9,999	19	31.67
10,000 – 14,999	8	13.33
> 15, 000	7	11.67
	<b>60</b>	<b>100</b>

Source: Field Survey 2013

extension workers establish demonstration plots where farmers get hands-on learning and can experiment with new farm technologies. According to Place and Dewees [24], access to information on new technologies is crucial in creating awareness and attitudinal change towards technology adoption. Inadequate access to organic manure materials (IAM) was significant and ranked second as one of those factors that affected the use of poultry droppings. This implied that vegetable farmers in the study area lacked the funds to buy and transport these poultry droppings in sufficient quantity for use on their farms. Low output price (LOP) and poverty (PVT) were significant and ranked third. This showed that the vegetable produced by the farmers when sold at the farm gate attracted low price. This might be as a result of low level of processing technology used in the farming. Also vegetables are highly perishable goods; hence farmers tend to sell it as quickly as possible for any price to avoid lost. Poverty was another significant factor that influenced the use of organic manure in the study area because majority of the farmers were low income earners.

**Table 3. Constraints affecting adoption of organic farming practices by vegetable farmers**

Questions	4 SA	3 A	2 D	1 SD	Cum	Mean	Rank	Remark
LOA	52(208)	8(24)	0(0)	0(0)	232	3.87	1 <sup>st</sup>	Accepted
IIK	29(116)	27(81)	4(8)	0(0)	205	3.41	7 <sup>th</sup>	Rejected
IAM	45(180)	14(42)	1(2)	0(0)	224	3.73	2 <sup>nd</sup>	Accepted
ILT	30(120)	21(63)	9(18)	0(0)	201	3.35	9 <sup>th</sup>	Rejected
LOP	42(168)	18(54)	0(0)	0(0)	222	3.70	3 <sup>rd</sup>	Accepted
CPR	32(128)	28(84)	0(0)	1(1)	213	3.55	5 <sup>th</sup>	Accepted
PVT	44(176)	15(45)	0(0)	1(1)	222	3.70	3 <sup>rd</sup>	Accepted
PDO	27(108)	29(87)	3(6)	1(1)	202	3.37	8 <sup>th</sup>	Rejected
POC	32(128)	28(84)	0(0)	0(0)	212	3.53	6 <sup>th</sup>	Accepted
NAG	38(152)	21(63)	1(2)	0(0)	217	3.62	4 <sup>th</sup>	Accepted
Threshold mean value = 34.94/10 = <b>3.49</b>								

SA=Strongly Agree, A=Agree, D=Disagree, SD= Strongly Disagree

Source: Data Analysis, 2013

They could barely afford a three square meal not to talk of using the little money earned to buy or acquire organic manures. This result was in line with the findings of Kassie et al. [14] as they found out that poverty significantly limit the adoption of organic farming technology in Ethiopia. The negative attitude of government (NAG) and consumer preference (CPR) were also one of those factors that affected the use of poultry droppings in vegetable farming. The government had not paid close attention to the use of organic manure as an alternative for inorganic fertilizer. Consumers preferred to buy vegetable cultivated with organic manure than those cultivated with inorganic manure. The reason for this was that consumers complained that vegetable cultivated with organic manure were more nutritious and tasty than those cultivated with inorganic manure in the study area. Another factor that affected the use of organic manure in vegetable farming in the study area was poor organization/cooperation of farmers. This might be one of the reasons why farmers do not have adequate access to organic manure materials in the study area.

#### 4. CONCLUSION

The study investigated the factors influencing the use of organic manure (poultry droppings) by female vegetable farmers in Calabar-South Local Government Area of Cross River State, Nigeria. The result of the descriptive statistic showed that, 66.67% of the farmers were within the age range of 21-50 years. About 75%, being the majority of the farmers were educated, 68.33% rented the farm land used for cultivation of vegetable, 95% of the farmers have never been visited by extension agent, and 88.33% of the farmers were

low income farmers, earning between ₦1,000 and ₦14,999 monthly. The result of the Likert analysis showed that, the following factors had a significant influence on vegetable farmer's ability to use poultry droppings in the study area. The factors are: farmers were not aware of the potentials of using organic manure, inadequate access to organic manure materials, low output price of vegetables, poverty, negative attitude of government, consumer's preference, and poor organization/cooperation of farmers.

To improve upon the use of poultry manure and thus improve the profitability of vegetable farming in the study area, the following recommendations are offered:

1. Enlightenment campaigns should be done through extension agent to sensitize farmers in the study area about the potentials and benefit of using manure for vegetable farming as this will improve farmer's attitude towards the adoption of extension technology.
2. Farmers should form associations or unions that will organize and disseminate important information about organic manure in the study area. Members of this association can then form cooperatives where they can purchase and transport organic manure materials easily as a group rather than individually.
3. Vegetables produced in the farm should be sold through cooperative organization formed by farmers. This will increase the output price of vegetable and therefore increasing farmer's disposable income. This will lead to a reduction in the level of poverty among farmers in the study area.

4. The State Government should enact sustainable policies that will support and promote the use of organic manure in vegetable farms in the study area.
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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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