SOCIO-ECONOMIC DETERMINANTS OF ORGANIC MANURING PRACTICES BY FARMERS IN SOUTHERN AGRICULTURAL ZONE, NASARAWA STATE, NIGERIA

ABSTRACT

The study analyzed the socio-economic determinants of organic manuring practices by farmers in Southern Agricultural Zone of Nasarawa state, Nigeria. The specific objectives were to: describe the socio-economic characteristics of respondents in the area; identify the type of organic manure used by the respondents; determine the effect of socio-economic characteristics on the use of organic manure. A multi-stage sampling technique was used in the selection of samples for the study. Fifteen farmers from each of the six selected villages were purposively selected on the basis of their use of organic manure for a total of 90 respondents for the study. Data were obtained from primary sources. The primary source was by personal interview and discussion using structured questionnaire. Descriptive statistics and multiple linear regression model was used to analyze data collected for this research. The first, second and fourth objectives were achieved using simple descriptive statistics such as frequency, percent and mean, while the third objective was achieved using multiple linear regression analysis. The study revealed that majority or 61.1% of the respondents were in the age bracket of 20-39 years old, *which indicates that they were young and active who could engage in organic manure practices. The result on the type of organic manure indicated that cattle dung and green manure representing 48.9% and 38.9% were the major source of manure used by the respondents. The result of socio-economic determinant further revealed that about 69% of the variation in use of organic manure, while the significant determinants were age and membership of cooperative society both at 10% and 5% respectively. Therefore, the study recommend that Enlightenment campaigns should be done through change agents to sensitize farmers in the study area about the benefit of using organic manure for crop production as this will improve farmer's attitude towards the adoption of sustainable land management practices.*

Keywords: Socioeconomic Determinants, Organic Manuring, Farmers, Southern Agricultural Zone, Nasarawa State.

INTRODUCTION

In the past when land was more abundant, traditional bush fallow had many advantages in preserving land productivity and maintaining agro-ecological environment (Eboh, 1990). Today scarcity of land has led to intensified use of land leading to nutrient depletion. Despite her plentiful resources and oil wealth, poverty is widespread in Nigeria. The situation has worsened since the late 1990s, to the extent that the country is now considered the 20th poorest country in the world (IFAD, 2000). Feeding the rapidly growing population of Africa and Nigeria in particular has become a major development concern (FAO, 1990). Over 70% of Nigeria population is classified as poor, with 35% living in absolute poverty (IFAD, 2000). Poverty is especially severe in rural areas where social services and infrastructure are limited, with unstable income being a primary factor militating against their welfare (Enete and Achike, 2008). The great majorities of those who live in rural areas are poor and depend on agriculture for food and income.

To meet the food and raw material demand of the growing population, agriculture must be approached on a sustainable basis (FAO, 2003). Sustainable development according to the Bruntland Commission is development that meets the needs of the present generation without compromising the ability of the future generation to meet their own needs (WCED, 1987). The struggle for food supply to catch up with massive

population growth which is in a geometric pattern requires a consistently adequate level of soil fertility achieved in a sustainable way (Heckman, 2005).

One important consideration in dealing with wastes is to treat it as an important resource (Mercado, 2006). With the unlimited and available sources of biodegradable waste from metropolitan cities coupled with the unstoppable rise in prices of fossil-based fertilizers, organic manure production from municipal solid waste becomes a promising enterprise (Aganon, Roxas, and Dacumos, 1999) in (Mercado, 2006). By converting biodegradable waste to organic manure for crop production, a lot would have been saved to our foreign reserves due to reduction in fertilizer importation (Aganon *et el.*, 1999) in Mercado 2006. Fertilizers are in general any material added to the soil to enhance its productivity. Any substance that contains one or more essential plant nutrient element has the potential to be used as a fertilizer (Kim, 1998). Fertilizers are broadly classified either as organic or inorganic. According to (USDA, 2002), a natural occurring organic fertilizer has to be derived from either plant or animal materials containing one or more elements (other than carbon. hydrogen and oxygen) that are essential for plant growth. Inorganic fertilizers on the other hand are chemically industrial synthesized fertilizers.

The fragility and high susceptibility of the soils in Nigeria to degradation and loss of nutrients make augmentation through the use of fertilizers necessary to obtain reasonable yield (Alimi, Ajewole Awosola and Idowu, 2006). Although, various soil conservation practices under different categories of farming systems have evolved over time (such as crop rotation, alley farming, composting, agro forestry etc); it is essential for countries to promote policy measures that will enable farmers to make use of their natural advantages (DFID, 2002). The damage to the soil, high cost and scarcity of industrial fertilizer have necessitated the use of alternative soil fertility regeneration strategies. The traditional soil fertility management practices are also no longer affordable due to plot size shrinkage emanating from high population density. This has an impact on resource productivity and poverty, thus farmers seek solution in organic based soil fertility amendment. It is very important to note that the utilization of public organic waste in crop production will minimize environmental hazards posed by the careless disposal of the wastes in every nook and cranny of the city. The incorporation of organic manure use into soil management may not only maximize output but may also reduce cost of soil maintenance and could be environmentally friendlier (DFID, 2002). The excessive use of inorganic fertilizer where available is a threat to environmental quality (Olayide, Oguntowora, Essang & Idachaba, 1981).

Objective of the Study

The objectives are to describe the socio-economic characteristics of respondents in the area; identify the type of organic manure used by the respondents; determine the effect of socio-economic characteristics on the use of organic manure; and to identify the constraints of organic manure practices.

METHODOLOGY

Description of the study Area

The study was conducted in Southern Agricultural Zone of Nasarawa State, Nigeria. The State has three (3) ADP Zones; namely; Southern, Central, Western Agricultural zones. The State is composed of thirteen (13) Local government Area namely; Akwanga, Awe, Doma, Karu, Keana, Keffi, Kokona, Lafia, Nasarawa Toto, Nasarawa-Eggon, Obi, and Wamba. The State has a total human population of 1,863,275 with a projected population of 2,579,208 for 2017 applying the projected growth of 3% per annum (NPC, 2006). The State, lies between latitude 7^0 and 9^0 North and Longitude 7^0 and 10^0 East. The State shares common boundaries with Plateau State and Taraba State in the East, Benue State in the South, Kaduna State in the

North, Kogi State and FCT in the West (NSMI, 2007). The crops grown in the study area are mainly maize, rice, groundnut, yam, sorghum, sweet potato, cassava, pumpkin, pigeon pea among others.

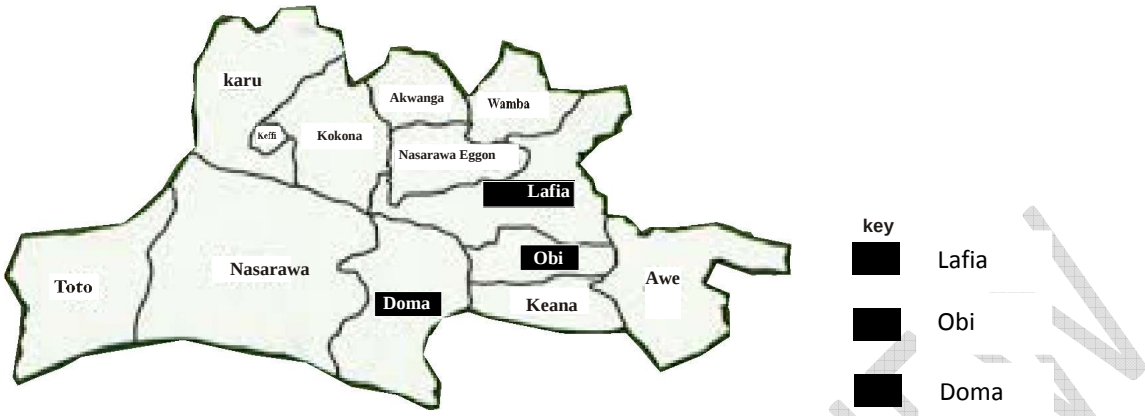

Fig. 1: Map of Nasarawa State showing the study area:

SAMPLE SIZE AND TECHNIQUES

A multi-stage sampling technique was used in the selection of samples for the study. First, three (3) districts were selected out of five (5) districts from the Southern zone. Two (2) Villages each were selected out of three (3) districts of the Southern zone to make up six (6) villages. Out of the six (6) selected villages, fifteen (15) respondents were purposively selected on the basis of their use of organic manure, to make up ninety (90) respondents (farmers) for the study.

Data collection and analysis:

Data was obtained from primary sources. The primary source was by oral interview and discussion using structured questionnaire. Descriptive statistics and multiple linear regression model was used to analyze data collected for this research. Objective (i),(ii), and (iv) was achieved using simple descriptive statistics such as frequency, means and percentages while objective (iii) was achieved using multiple linear regression model.

Model Specification

1. Descriptive statistics

Arithmetic mean will be computed according the following formulae;

$$\bar{X} = \sum \frac{x_i}{N} = \frac{X_1 + X_2 + X_3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots X_n}{N} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where

$\bar{X}$ - Mean

$\sum X_i$ = summation of the sample

N = Total number of observations

Σ= Summation

Xi = Individual observation

N = Total number of observations

Percentage is mathematically expressed as:

$$Percentage\ (\%) = \frac{X}{N} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

% = Percentage

X = Individual observation
N= Total observation

2. **The multiple linear regression model is expressed implicitly as:**

Y_i = Use of organic manure
β= Regression coefficient
X_i = is a vector of explanatory variables
X_1 = age (years in marriage)
X_2 = gender (dummy: 1 = male and 0 = female)
X_3 = size of farm (Ha)
X_4 = years of formal education
X_5 = member of cooperatives (yes = 1, No = 0)
X_6 = access to credit
X_7 = household size (Number)
α = constant term
U = error term

3. **RESULTS AND DISCUSSION**

Socio-Economic Characteristics of the farmers

From the field survey, it was observed that various socio-economic characteristics of the respondents affect organic manure practice by farmers at varying levels. Such socio-economic characteristics considered were age, gender, household size, marital status, Educational level, farm size, access to credit and source of credit by farmers to the practice of organic manure.

Age Distribution of the Respondents

Age plays an important role in agricultural production. The farming activities from pre-planting operation through planting to post-planting operations require a lot of labour. Rural-urban migration had indeed obstructed active participation of youths in agriculture (FAO, 1993). Although, the practice of organic farming in the study area involving both old and young farmers in production, there was a popular age bracket (20-39) that practice organic manuring. The frequency distribution of the respondents according to age is presented in Table 1.

Table 1: Frequency Distribution of Respondents by Age

Age Range (years)	Frequency	Percentage
<20	5	5.6
20-29	27	30.0
30-39	28	31.1
40-49	18	20.0
50-59	8	8.9
60-69	4	4.4
Total	90	100

Source: Field survey, 2018

Distribution of Respondents by Gender

The table indicated that majority of the farmers (72.2%) were males. This was so because organic farming is practiced by the men. FAO (2003) indicates that in the rural area where most of the world's hungry people live, men produce most of the food consumed locally. The research also showed that female farmers (27.8%) were mostly part-time farmers

Table 2: Gender Distribution of the Respondents

Gender	Frequency	Percentage
Female	25	27.8
Male	65	72.2
Total	90	100

Source: Field survey, 2018

Frequency Distribution of Respondents by Marital Status

The table shows that majority 76.7% of the respondents were married. This is line with apriori expectation that families people engage in enterprises that have quick returns for the upkeep of their families. Focus group discussion revealed that many families were able to send their children to higher institutions by depending on farming. Singles were few 18.9% in the field as majority of them were in the urban areas searching for white collar jobs. Also 2.2% shows widow/widower, for reasons that as single parents, they hardly afford the resources (financial and labour) required for production

Table 3: Frequency Distribution of Respondents by Marital status

Variables	Frequency	Percentage
Single	17	18.9
Married	69	76.7
Widow	2	2.2
Widower	2	2.2
Total	90	100

Source: Field survey, 2018

Distribution of Respondents by family size

The Table indicated that 62.2% of the respondents had a family size 1 – 5 persons; this was followed by those who had family size of 6-10 with 36.7%. This showed that these farmers can partly satisfy their labour needs and depend less on hired labourers. Families whose numbers exceeded ten (10) were very few 1.1%, showing that people were very much conscious of the interaction between population growth and scarce resources.

Table 4: Frequency Distribution of Respondents by family size

Household size	Frequency	Percentage
6-10	33	36.7
11-15	1	1.1
Total	90	100

Source: Field survey, 2018

Distribution of Respondents by Educational level

Table 5 shows that the respondents were literate 33.3%, 34.4%, and 15.6%, respectively falls between the range of primary, secondary and tertiary school levels who acquired various level of education. They were most likely to react positively to innovations to enhance their production. The result further reveals that only 16.7% of the respondents could not acquire one form of education or the other, which implies that fewer individual have low rate of adoption of innovation. This is in agreement with the findings of A.A Adeniran *et al.,* (2017) on perception of arable of crop farmers on usage of organic fertilizer in maize production who found out that only 4.2% do not have formal education.

Table 5 Frequency Distribution of Respondents by Educational level

Educational level	Frequency	Percentage
Primary	30	33.3
Secondary	31	34.4
Tertiary	14	15.6
Non formal	15	16.7
Total	90	100

Source: Field survey, 2018

Distribution of Respondents by farm size

The table shows that land as an input is fairly available in the study area as majority of farmers 36.7%, 57.8% and 5.6%, who had farm size of 1-2, 3-4, and 4-5 hectares of land respectively. This showed their interest in crop production and its level of returns to the farmers, which indicates the higher percentage of 57.8% of the respondents which is in consonance with the findings of (Ibrahim *et al.,* 2016) who found that larger proportion of the respondents, had 57% hectares of land on arable crop farming.

Table 6: Frequency of Respondents by farm size

Variables	Frequency	Percentage
1-2	33	36.7
3-4	52	57.8
4-5	5	5.6
Total	90	100

Source: Field survey, 2018

Frequency Distribution of Respondents on Access to credit

The result of respondents on access to credit as presented in table 7 revealed that large proportion of respondents representing 78.9% have no access to credit facility which shows the inability of the respondents to fully engage in crop production in the study area (Southern Agricultural zone of Nasarawa state). While 21.1% of the respondent said they have access to credit, this means that fewer individuals could access credit facility.

Table 7: Frequency Distribution of Respondents on Access to credit

Variables	Frequency	Percentage
No	71	78.9
Yes	19	21.1
Total	90	100

Source: Field survey, 2018

Frequency Distribution of Respondents on source of credit

In table.8 on respondent source of credit, the result reveals that 32.2% of the respondent said that their major source of credit is through money lenders while 28.9% said that their source of credit are through personal savings, friends and relatives, and (10%) are from commercial banks. This shows that only few respondents have access bank for credit due to interest or policy of the banking institutions guiding the release of loan to farmers.

Table 8: Frequency Distribution of Respondents by Source of Credit

Variables	Frequency	Percentage
Personal savings	26	28.9
Commercial bank	9	10.0
Money lenders	29	32.2
Friends/relatives	26	28.9
Total	90	100

Source: Field survey, 2018

Type of Organic Manure used by Respondents

The result presented in table 9, on the type of organic manure used by the respondents shows that larger proportion of the respondents use cattle dung and green manure as major source of organic manure indicating 48.9%, 38.9% respectively, which implies that cattle dung and green manure are readily available and cheap compared to poultry droppings, and the least 1.1% use vermi-compost as manure. This might be due to lack of awareness on the usefulness and importance of vermi-compost on crop production in the study area.

Table 9: Type of Organic Manure used by Respondents

Type of organic manure	Frequency	Percentage
Farmyard manure	8	8.8
Compost	4	4.4
Green manure	35	38.9
Poultry droppings	21	23.3
Cattle dung	44	48.9
Vemi-compost	1	1.1
Sheep/goat droppings	2	2.2
Household waste	16	17.8
Refuse dump	14	15.6

Source: Field survey, 2018 *multiple responses allowed

Determinants on the practice of organic manure

The result of the determinants on the use of organic manure among farmers is presented in Table 10. The result revealed that about 69% of the variation in the use of organic manure in the study area was explained by the variables included in the model. Result from the regression analysis indicates that age was positive and significant at 10% , which implies that age is vital in the use and practice of organic manure, as energy is required due to the labour required on the practice of organic manure, while membership of cooperative was negative but significant at 5%, which implies that membership of cooperative lead to less of use of organic manure practice by farmers as membership of cooperative demands attention of members; whereas sex, marital status, household size, education, farm size and access to credit were not significant.

Table: 10: Socio-Economic Determinants on the practice of organic manure.

Variable	Regression Coefficient	Standard Error	Significance	t-value
Constant	42.948	18.107		2.372
Sex	4.804	6.560		0.732 ^{NS}
Age	0.566	0.325		1.741***
Marital Status	2.961	4.296		0.689^{NS}
Household size	-1.583	1.532		-1.033^{NS}
Education	-0.061	0.720		-0.084 ^{NS}
Membership of co-optv.	-2.717	1.375		-1.976**
Farm size	-1.007	1.419		-0.709 ^{NS}
Access to credit	-3.663	6.691		0.547 ^{NS}
R^2= 0.69				

Source: Field survey, 2018

***= Significant at 10%, **= significant at 5%, *= significant at 1%**,** NS = Not significant

Y = Dependent variable (Quantity of manure use %)

Constraints

Table 11 shows the various constraints faced by the respondents indicating that 62.2% lack information on the correct usage of fertilizer; this is followed by 56.7% who face nutrient depletion in the soil, and 37.8% also complained that they face political interference in the distribution of fertilizer and high cost of transportation. Whereas, 8.8% face the problem of corruption in fertilizer distribution, this means that farmers have inadequate allocation of fertilizer.

Table 11: Constraints

Constraints	**Frequency**	**Percentage**
Lack of information on correct usage of fertilizer	56	62.2
Political Interference in Distribution of fertilizer	34	37.8
Nutrient Depletion	51	56.7
Unintended subsidies	14	15.6
Cultural barriers	12	13.3
Insufficient quantity of fertilizer	41	45.6
Increasing price of fertilizer	40	44.4
Corruption	8	8.8
High cost of transporting manure	34	37.8

Source: Field survey, 2018 *multiple responses allowed

CONCLUSION

Despite the relative advantages associated with the usage of organic manure. The study observed that various socio-economic characteristics of respondents affect organic manure practice by farmers. Such socio-economic characteristics considered were age, gender, household size, marital status, Educational level, farm size, access to credit among others. Descriptive statistics was used to satisfy objective i, ii, and iv which gives the percentages of the aforementioned socio-economic characteristics as thus; age 20-39%, gender 72.2%, 27.8%, marital status 76.7%, 18.9%, household size 62.2%, 36.7% and 1.1%, educational level 33.3%, 34.4% and 15.6%, farm size 36.7%, 52.8% and 5.6%, access to credit 78.9%, 21.1%. The result of the type of organic manure indicates that cattle dung and green manure representing 48.9% and 38.9% were the major organic fertilizers used by farmers. Some of the constraints faced by the farmers were lack of information 62.2%, nutrient depletion in the soil 56.7% and corruption 8.8%.

Recommendations

Based on the findings, the study therefore recommends the following; enlightenment campaign should be done through extension agents to sensitize farmers in the study area about the benefit of using organic manure for crop production as this will improve farmer's attitude towards the adoption of extension technology. . Produce in the farm should be sold through cooperatives organization formed by farmers. This will increase the output price of crops and therefore increasing farmers interest in the cooperative societies. . Government at all levels should create a working and sustainable policies that will encourage and promote the use of organic manure practice in the study area.

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