SOCIO-ECONOMIC ATTRIBUTES AND FARM STRUCTURAL FACTORS INFLUENCING ADOPTION OF FARM MANAGEMENT PRACTICES IN SOUTHERN PART OF KADUNA STATE, NIGERIA

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ABSTRACT

This study analyzes the farmers' attributes and farm structural factors influencing adoption of farm management practices in Southern part of Kaduna State, Nigeria. Questionnaire was administered among purposively selected 286 respondents who were members of Fertilizers' Association in the study area. Descriptive statistics such as frequency count, and percentages was used to summarize the data. Also, Logit regression was used to examine the strength of the factors influencing farmers' adoption of farm management practices. Some (44%) of the farmers are between 60 and 74 years while 49.0% of the farmers has family size of 6-10 persons. Majority (94.4%) had some level of education. More than 50% of the farmers cultivate between 1 and 3 hectares of land. Majority (74.8%) of the farmlands are located on relatively flat plains. Almost all (94.8%) the farmers grow annual crops on their primary plots. Some farmers (58.8%) have farm plots located from 1½ to 2 km from their homestead**.** The Logit regression results shows that age of farmer positively and significantly influence the adoption of intermittent short fallow, surface irrigation and mixed cropping practice at P<0.05. Education attainment of farmers and type of crop grown were found to have positive and significant influence on only mixed cropping practice respectively. Household size has positive and significant influence on the adoption of minimum tillage/mulching, animal manure and mixed cropping. Distance of plot from homestead has positive and significant influence on the adoption of minimum tillage/mulching, mixed cropping and a negative influence on surface irrigation practice. Level of soil fertility varies. The study concludes that some farmers' attributes and the farm structural factors had positive influence on the adoption of management practices. The study recommends that agricultural extension workers be proactive in sensitizing farmers on the relationship between these attributes for better crop yield.

Key words: Farm factors, Management practices, Socio-economic, Southern Kaduna

INTRODUCTION

Farm management practices as stated by Terr Africa Partnership (TAP, 2006) are land use methods that enable users of the land to get the best out of the potential of the land, while sustaining the optimal functionality of the resources contained on the land. Lawal, Adekola, Olabisi and Dayo (2014) defined farm management practices as alternative practices of

conserving the potential of the land for increased production and the income level of farmers. In addition, Agricultural Sustainability Institute (ASI, 2016) emphasized that the use of cover crops, organic compost, animal manures, reducing tillage, avoiding traffic on wet soils, and maintaining soil cover with plants residue remains the best strategies meant to protect, sustain and enhance the productivity of soil for expected high crop yield. Thus, sustainability implies maintenance and enhancement of soil quality through judicious land usage and appropriate soil management practices (Lawal et al., 2014).

With this in mind, adoption of the farm management practices including minimum tillage, organic compost/animal manure, crop residue/mulch, green manure, legumes/cereals rotation among others is a panacea to sustainability of the soil fertility and improved crop production. The adoption of farm management practices could be influenced either positively or negatively by numerous factors including demographic; and socio-economic attributes of farmers as well as farm structural factors. The degree to which these factors influence the adoption of different farm management practices widely depends on the type of the farm management practices adopted. Soibam and Uttam (2019) stressed that farmers' decision of farm management type is influenced by numerous factors including age of the farmer, educational attainment, financial capability, size of farm land, availability of resources of man power and inputs, and extension contacts. It is an established fact, that there exist very efficient and appropriate farm management practices which if adopted and implemented in agricultural production processes, have the propensity to sustain and improve the soil fertility status of agricultural lands, and could enhance higher crop production.

The subsistent farmers are confronted with a lot of constraints in incorporating many of the farm management practices which eventually affect improved yield (Adekoya, 1997). Global Environmental Facility (GEF, 2016) however, attributed these constraints to insufficient capital, abject poverty on the part of rural farmers, and lack of self-confidence to make adjustment, lack of financial inducements, land tenure dichotomy, poor soil fertility status, labour constraint and poor infrastructure among others. Studies by Okoye (1998), Marshall (2004), and Rezvanfar, Samlae and Faham (2009) have also shown that socioeconomic characteristics including age, educational background, family size and farm size influence farmers' adoption of farm management practices. Clay, Reardon and Kangasniemi (1998) reported that educational attainment is insignificant to the adoption of farm management practices. However, Shiferaw and Holden (1998) established a negative correlation between family size and farm management practices.

Studies by Demeke (2000) and Teklewold (2004) as cited by Lawal et al. (2014) show that farm size has been positively linked to the adoption of farm management practices. The reverse is the case where Deininger et al. (2003) as cited by Lawal et al. (2014) reported a negative relationship between farm size and some farm management practices such as tree planting. Ayalew, Dercon and Gautam (2005) opined that where land tenure is insecure, chances of sustainable farm management practices are slim. Okoye (1998) and Clay (1998) as cited by Rezvanfar et al. (2009) in their studies observed that assessment of the years in farming, education be it specific or general, social participation such as membership in local organization, farm tenure be it owning or renting, shows positive significance with the adoption of conservation practices.

The understanding of constraints to farmers' usage of effective management practices, would increase farmers acceptance of sustainable farm management practices and this will reveal areas of farmers shortfall and work on those that need improvement in order to sustain crop production. Gumi and Aliero (2012) reiterated that improved crop production will offer promising hope and increase the Gross Domestic Product (GDP) of Nigeria thereby making her to be one of the leading economies in the world. In Southern Kaduna State however, there is the need to sustain the adoption of modern agricultural technologies, and soil management practices if they are not actually being adopted and implemented on a continuous bases for example the use of minimum tillage, organic compost/animal manure, crop residue/mulch, legumes/cereals rotation among others that has actually revolutionized crop production and sustenance of the land potentials in many countries of the world. There is paucity of information on farm management practices adoption and the influence of farmers attributes and farm structural factors influencing there adoption for the sustainability of farm lands in some Local Government Areas (LGAs) of Southern Kaduna. Even if such research have been conducted by scholars over the years, they might have not been properly documented and publicized, therefore the need to have a review and updating to address the contemporary issues in this particular environment.

In the light of the above, creating awareness and embracing sustainable farm management practices on a continuous bases by all farmers in some of these LGAs in Southern Kaduna, and equally knowing and tackling the factors influencing the adoption of farm management practices will be the best decision taking toward boosting agricultural productivity and sustenance of soil fertility status of agricultural farmlands in this region. The objectives were to; examine the socio-economic and farm structural attributes of farmers determine factors influencing the adoption of farm management practices, and perception of farmers on the level of soil fertility.

THE STUDY AREA

Southern Kaduna lies within the Guinea Savanna Agro-ecological Zone of Nigeria, covering approximately 24,536 km^2. The study lies between Latitudes 9° 00' and 10° 45'N of the Equator and Longitudes 7° l0' and 8° 45'E of the Greenwich Meridian. The area shares boundaries with Niger State in the West, Federal Capital Territory (FCT) and Plateau State to the South and South-east (Figure 1). The main type of soil is the Ferruginous Tropical soil which according to Abaje, Ishaya and Usman (2010), is related to the climate, vegetation, lithology and the topography of the area. The Ferruginous Tropical soils are associated with the Tropical Grassland (Savanna Vegetation). The soils in the study area as observed and reported by Eroarome (2005), are generally low in organic matter, total nitrogen, and available phosphorus. To supplement the nutrient deficiency of the soils in the region requires soil management such as zero or no tillage, minimum tillage, mulching and suitable crop rotation among others.
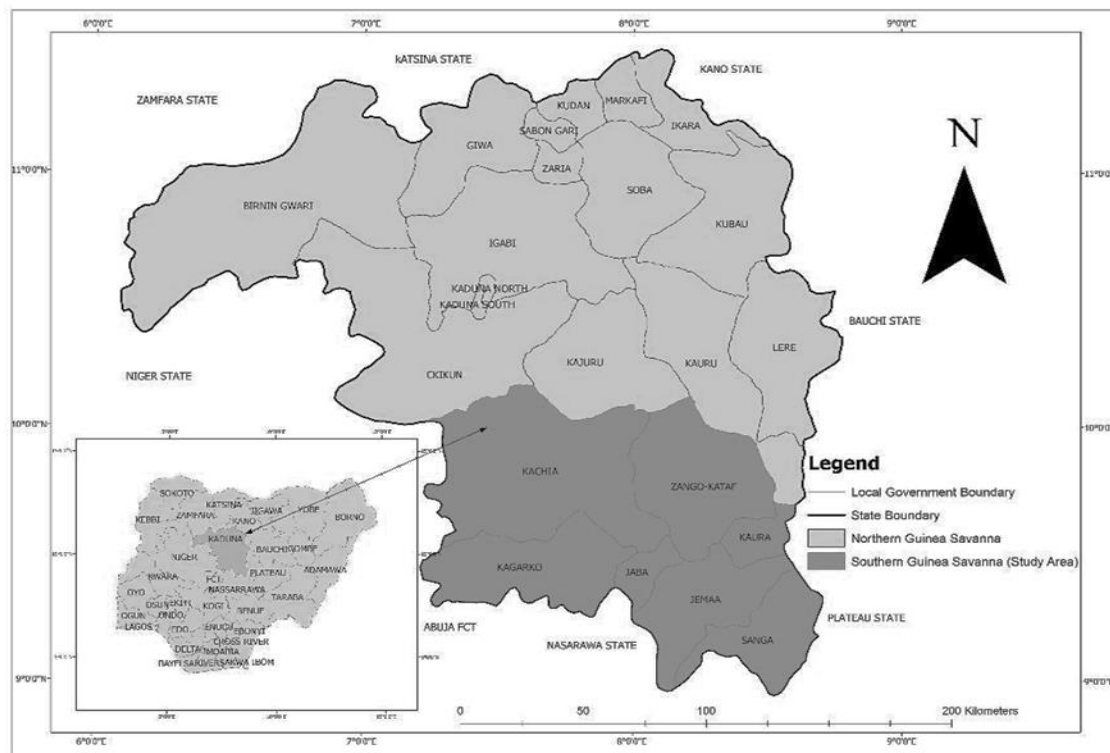
Figure 1: Kaduna State showing the Study Area
Source: Ministry of Land and Survey, Kaduna (2017)

MATERIALS AND METHODS

Southern part of Kaduna is made up of 11 LGAs out of which five Southernmost LGAs were purposively selected for the study namely Kaura, Kagarko, Kachia, Zango Kataf and Jema'a. In each LGA, one settlement was purposively chosen. The reason is because of homogeneity of agricultural practices, similarity in agro-ecological conditions, and similarity in socioeconomic variables. A total of 1137 farmers were identified through the Fertilizer Farmers Association Groups during 2016/2017 farming season this is to make sure that credible, authentic and up to date information is generated from these farmers who have been in the business of farming for quite a long time. The study used the Table of determining sample size by (Cohen et al, 2011) to arrive at 286 sample size with 95% confidence level. Similarly, the 286 farmers were randomly selected from association number list in each of the five settlements (Table 1). The questionnaire was administered on each sampled farmer on a de facto method. The primary data were from structured interview guide which among others elicited information on; the socio-economic attributes of farmers, farm structural factors influencing farmers' choice of farm management practices and level of soil fertility.

Table 1: Selected Local Government Areas and Settlements

Local Government Areas	Selected Settlements	Farmers	Sample size
Kachia	Kurmi sara	244	61
Kagarko	Katugal	240	60
Zango Kataf	Madakiya	155	40
Kaura	Zankam	222	55
Jema'a	Mailafiya	278	70
Total	**05**	**1137**	**286**

Source: Field Survey, 2016

Percentages were used to present and summarize the data gathered on each category of response gotten on the socio-economic attributes of farmers. Percentages and a chart were also used to present and summarize the farmers' structural factors and level of soil fertility status of farm lands respectively. Similarly, Logit regression model was used to determine the demographic and socio-economic attributes influencing farmers' choice of farm management practices. Following Gujarati (1988), the model is specified as follows:

$$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \dots + \varepsilon \equiv X\beta + \varepsilon$$

Where: Y = Farm management practices (intermittent short fallow, minimum tillage/mulching, animal manure, mixed cropping, surface irrigation),
X = a vector of random explanatory variables which include:
X_1 = Age of farmer (years), X_2 = Household size, X_3 = Education of the farmer (1= attended school and 0 = otherwise, X_4 = ownership of plot (1=owned and 0 = otherwise), X_5 = Variable for plot location (1 = gentle slope and 0 = relatively flat plain), X_6 = Variable for plot slope (1 = steep and 0 = valley), X_7 = Type of crops grown on plot (1 = annuals, 0 = perennials), X_8 = Distance of plot from homestead (kilometers),
e = random error term,
β_1 - β_{16} = coefficients to be estimated.

RESULTS AND DISCUSSION

Socioeconomic Attributes of the Farmers

Socio-economic attributes of farmers in the study area include, sex, family size, age, marital status, educational qualification and monthly income. The result presented in Table 2 shows that more males (91.3%) than females (8.7%) actively participate in the farming. This result conforms with the cultural setting in the study area where male head of households who are breadwinners of the families have more access to land than female house holders. Although on the event of death of male breadwinner, the wife becomes the head of household and takes over the farming business.

Table 2: Socio-Economic Attributes of Farmers (n=286)

Characteristics	Response	Frequency	Percentage	Mean	STD
Sex	Male	261	91.3		
	Female	25	8.7		
Family size	1-5	84	29.4	9.22	0.21
	6-10	140	49.0		
	11-15	36	12.6		
	16-20	16	5.6		
	21-25	4	1.4		
	26-30	6	2.1		
Age (years)	15-29	7	2.4	54.36	34.21
	30-44	10	3.5		
	45-59	88	30.8		
	60-74	125	43.7		
	> 74	56	19.6		
Marital status	Single	13	4.6		
	Married	262	91.6		
	Divorced	2	.7		
	Widowed	9	3.1		
Educational qualification	No formal education	16	5.6		
	Primary school	34	11.9		
	Secondary school	40	14.0		
	Tertiary Education	196	68.5		
Monthly income	< ₦10 000	87	30.4	₦19,372	22.50
	₦10 000-N20 000	52	18.2		
	₦20 000-N30 000	50	17.5		
	₦30 000-N40 000	27	9.4		
	>₦40 000	70	24.5		

Source: Field Survey, 2017

Some (44%) of the farmers are between 60 and 74 years while 34.1% fall within age of 30 and 54 years, indicating that farming activities in the study areas involves more of older generation who are mostly retirees from either public or private sector. Although, the mean age is 54 years and this is expected to have an effect on the existing labour and efficiency of the labour because age has a direct bearing on the availability of labour (Balogun & Akinyemi, 2017). Age can also influence the ease at which farm management practices are adopted. Adebayo and Onu (1999) asserted that age is one of the socioeconomic attributes which affect the level of farmers' productivity and technical efficiency in farm management. The implication of this energetic age range is that, able-bodied manpower would be accessible for production, and the possibility of improved level of yield resulting to high income.

Majority (91.6%) of the respondents are married and just a few (8.4%) were female farmers who are mainly divorcees and widows and one single male. The married household heads within ages 45-74 years participate actively in agriculture than those of other categories of people because they have greater family responsibility than the other age groups. Some (49%) of the farmers have family size of 6-10 persons while 29.4% have 1-5persons in their households and 27.3% have family size from the range of 11 to 30 persons. The average household size of the farmers in the study area is 9 persons. From the result, the respondents' large family size is above the National average size of 5 persons and the Kaduna State average size of approximately 6 persons per family (National Bureau of Statistics (NBS, 2007). This fairly large household size is of advantage to farm labour and as observed by Ajani (2005) that a large household size signifies

availability of family farm labour. An average family size of 9 persons conforms to a similar finding by Oloyede et al. (2014), and contrary to the findings of Otitoju and Arene (2010), who reported that majority of the medium-scale soybean farmers in Benue State, Nigeria had average family size of about 7 persons.

Furthermore, the result on educational status of the respondents shows that 5.6% of the farmers in the area had no formal education, while 94.4% had some level of education at various levels. Farmers' level of education has been found to be a vital component in technology and innovation adoption in agriculture and can also influence their involvement in agricultural practices and development programmes (Alabi & Aruna, 2006; Fawole & Fasina, 2005). Largely, respondents' with tertiary education (68.5%) constitute the civil servants who engaged in part-time farming in the area. This is expected in line with a priori expectation, to have significant impact on productivity, income earning opportunities and ability of farmers to effectively adopt better management practices.

Majority (84.3%) of the farmers considered farming as their major occupation although, 15.7% of the farmers engage in other income-earning activities when not on the farm. These have also influenced the monthly income of farmers with 48.7% earning less than ₦20,000 when combined with proceed from their farms and their other businesses. Similarly, 26.9% and 24.5% earned between ₦20,000-30,000 and above ₦40,000 respectively for those who are civil servants. The average monthly income of farmers is ₦19,372 which is very low considering the cost of maintaining a family in Nigeria.

Structural Factors of Farms

The size of farm cultivated by a household determines to a large extent how other farm resources are combined for efficient production**.** The farm size of farmers presented in Table 3 shows that more than 50% of the farmers cultivate between 1 and 3 hectares of land and just 8% of the farmers has more than 5 hectares of land. The result shows that the mean size of farms farmer is approximately 3.52 hectares. The result therefore implies that, majority of the farmers in the study area cultivate a little more than the average farm size of 1 hectare cultivated by most Nigerian farmers. Labour productivity holds the key to a rapid development of the agricultural economic sector, affects farm productivity and improves crop production (Adebayo, 2006). The result presented in Table 3 on the types of labour used show that 78.7% of the respondents used hired labour in their farms. While 55.9% of the farmers use family labour, and only 12.6% adopts communal labour. Abdulrahman (1983) as cited by Taphee (2015) stated that, farmers hire labour when they assume that increment in cost will result in higher earnings and usually when scale of operation is large.

Considerable proportion (41.6%) of the farmers have been engaging in farming for about 21 to 30 years. while 36.3% have been farmers for between 5 to 10 years. The mean farming experience of respondents is 24 years. This implies that farmers in the study area have acquired enough experience in their traditional farming methods and modern farm management practices thus, adoption of new innovations will pose little or no problem. Tashikalma, Sani and Giroh (2014) reported that farmers with more years of farming experience manage the farm better compared to farmers with few years of farming experience. In the same vein, Asumugha and

Ujoku (2007) as cited by Taphee (2015) asserted that faming experience has the potential to influence decision making in relation to risk aversion in farm business.

Table 3: Structural Factors of Farm

Characteristics	Frequency(n=286)	Percentages	Mean	STD
Farm size (ha)				
> 1	49	17.1	3.52	2.19
1.1-2	55	19.2		
2.1-3	50	17.5		
3.1-4	60	21.0		
4.1-5	49	17.1		
< 5.1	23	8.0		
Type of labour[mr]				
Hired labour	225	78.7		
Family	160	55.9		
Communal	36	12.6		
Duration of farming (years)				
> 5	41	14.3		
6-10	63	22.0	24.05	14.30
11-15	26	9.1		
16-20	37	12.9		
21-25	32	11.2		
26-30	87	30.4		
Plot location				
steep	6	2.1		
Valley	18	6.3		
Gentle	48	16.8		
Plain	214	74.8		
Types of crop grown[mr]				
Annual Crop	271	94.8		
Perennial crop	66	23.1		
Distance of plot from homestead (km)				
< 1/2km	47	16.4	3.08	2.18
1-2 km	124	43.4		
3-4 km	115	40.2		
Land ownership[mr]				
Land owned	174	60.8		
Land rented	45	15.7		
Land borrowed	82	28.7		
Land Communal	37	12.9		
Nature of the farmlands (Soil Fertility)				
Good	87	30.4		
Poor	199	69.6		

Source: Field Survey, 2017, [mr] = Multiple response

The result on location of farm land shows that majority (74.8%) of the farmlands are located on the plains compared with 16.8 % and 6.3% farmlands located on gentle slopes and valley respectively. The study also revealed that 94.8% of farmers grow annual crops (maize, sorghum, millet, cowpea, rice, yams and groundnut among others) on their primary plots and only 23.1% grow perennial crops (ginger, and cassava) alongside annuals crops. The most important grains cultivated in Northern Nigeria include millet, maize, rice and sorghum due largely to suitable soil and climatic conditions (Yusuf and Yusuf, 2008).

Farm plot as appraised in this study refers to a separate contiguous parcel of land used for the planting of a crop or crops combination. Due to different land ownership pattern, respondents have farm plots at different locations. A substantial number of farmers (58.8%) have farm plots located from 1½ to 2 km from their homestead while 42.2% have their farmlands as far as 3 to 4 km. The mean distance of plots from homestead is 3.08 km. Further probing reveals that the present settlements of most of the farmers are some distance away from their fore-fathers ancestral homes and the need to go back and claim these farmlands.

Similarly, land availability is very important to the livelihood of peasant's farmers. The land tenure system in rural setting determines to a large extent how the land can be used. In the study area, different ownership pattern characterized the land as shown in Table 3. Majority of the farmers reported that their farmland (60.8%) were inherited from their parents, this is followed by those that claimed to borrow (28.7%) and or rent (15.7%). Borrowing and or renting of lands in some sampled communities such as Zankam, and Mailafiya is a common practice mostly by settlers who found themselves in these communities either as civil servants, artisans or students. Although, 12.9% of farmers indicated that they obtain farmlands owned by the community, this practice of communal ownership of land is not too common in the study area because every parcel of land in the study area has specific individual owner.

Factors Influencing the Adoption of Management Practices

The Logit model was employed to hypothesize the factors influencing the adoption of farm management practices. The result is presented in Table 5.

Table 5: Factors Influencing Farmers' Choice of Farm Management Practices

Model	Variables	Intermittent short fallow	Minimum tillage and mulching	Animal Manure	Mixed cropping	Surface irrigation
X_1	Age of farmer (years)	0.04(0.02)**	-0.04(0.01)**	0.01(0.01)	0.03 (0.02)**	0.02(3.41)**
X_2	Household size	-0.20(0.06)**	0.06(0.03)**	0.07(0.03)**	0.13 (0.08)**	-0.11(0.05)**
X_3	Education of the farmer	-0.37(1.30)**ns**	1.40(1.25)**ns**	1.73(1.24)	2.31 (1.67)**	-0.42(1.34)
X_4	Ownership of plot	-1.59(0.34)**	-0.47(0.27)**	-1.46(0.30)**	2.49 (0.48)**	-0.13(0.46)
X_5	Type of crops grown on plot	-0.62(0.55)**ns**	-0.32(0.54)**ns**	-1.22(0.68)	1.55 (0.63)**	0.50(1.09)
X_6	Distance of plot from homestead	-0.15(0.12)**ns**	0.19(0.10)**	0.15(0.10)	0.96 (0.18)**	-0.26(0.17)**
X_7	Plot location	1.35(0.65)**	0.45(0.65)**ns**	1.95(0.88)**	-0.39 (0.86)	-0.45(1.10)
	Constant	0.20(1.55)	0.48(1.53)	-0.91(1.59)	-70.52 (20.10)	-5.26(2.23)
	Log Likelihood	**-126.09834**	**-183.90675**	**-169.9232**	**-82.920377**	**-86.834117**
	chi^2(10)	**50.89**	**23.86**	**44.29**	**101.55**	**17.91**
	Prob>chi^2	**0.0000**	**0.0012**	**0.0000**	**0.0000**	**0.0124**

Source: Field Survey, 2017   Key: **significant at 0.05%   ns= not significant

The result of the model revealed that adoption of farm management practices was influenced by several variables. Age of farmer positively and significantly influence the adoption of intermittent short fallow (0.04), surface irrigation (0.02) and mixed cropping practice (0.03) at p<0.05. This implies that both young and old farmers had a higher probability of adopting the farm practices in this region. This is probably due to the benefits that accrue from these management practices. Lawal et al. (2014) in their study also observed that age had both positive and negative correlation in the adoption of conservation practices. Families are a veritable source

of labour for farm operations and adoption of farm management practices that are labour intensive. This is often of great advantage to farm productivity.

In this study, household size has positive and significant influence on the adoption of minimum tillage/mulching, organic fertilizer and mixed cropping but has negative influence on intermittent short fallow and surface irrigation. This suggests that households that make use of family labour tend to adopt labour intensive farm management practices. This is in concurrence with the findings of Kassie et al. (2009) as cited by Miheretu and Yimer (2017) that the probability of adopting conservation tillage in Ethiopia increased with the number of household members.

Education attainment of farmers was found to have positive and significant influence on only mixed cropping practice and not significant in the adoption of intermittent short fallow, minimum tillage/mulching and organic fertilizer probably because these practices do not need higher educational and technological know-how in their management. This is in conformity with the study of Lawal et al. (2014) that education attainment had both positive and negative correlation in the adoption of some conservation practices.

Land tenure or ownership security, according to Bewket (2007), is an important factor affecting farmers' farming decisions and that ownership of land is a major guaranty to changing cropping patterns and management practices. The result indicated that ownership of lands has both positive and negative influence on the adoption of intermittent short fallow, animal manure, mixed cropping practices and minimum tillage/mulching. Negative influence in the sense that, any unit decrease in land tenure ship will result in probability of none adoption of farm management practices. This implies that land tenure security encourages and provides incentives for investments in farm management practices.

The study of Akpokos (2004) reported that land tenure had positive and significant influence on adoption of conservation practices. In the same vain, types of crop grown have positive and significant influence on mixed cropping, intermittent short fallow and animal manure at P<0.05. Similarly, distance from homestead has a significant influence on the adoption of minimum tillage/mulching, animal manure and surface irrigation practice both positively and negatively. This implies that any unit increase in distance from homestead will result in 19%, 96% and 26% probability of adopting minimum tillage/mulching, animal manure and surface irrigation respectively.

Adoption of specific farm management practice by farmers in this study area shows positive relationship and significant influence between age, family size, land tenure, distance from homestead and plot location but has no significant relationship with education attainment and types of crop grown at 5%. It is imperative to note that education to a certain extent in this setting, does not influence adoption behavior of farmers to farm management practices because farmers with long years of farming experience has actually made some to be aware of the type of farming practices that yield much, given the necessary inputs notably appropriate soil conditioners.

Perception of Farmers on the Level of Soil Fertility

Farmers' perception of the nature of farm land whether good or poor in soil fertility was based on yearly yield of crops harvested with or without addition of soil conditioners. The result on nature of their farmlands is presented in Figure 2.
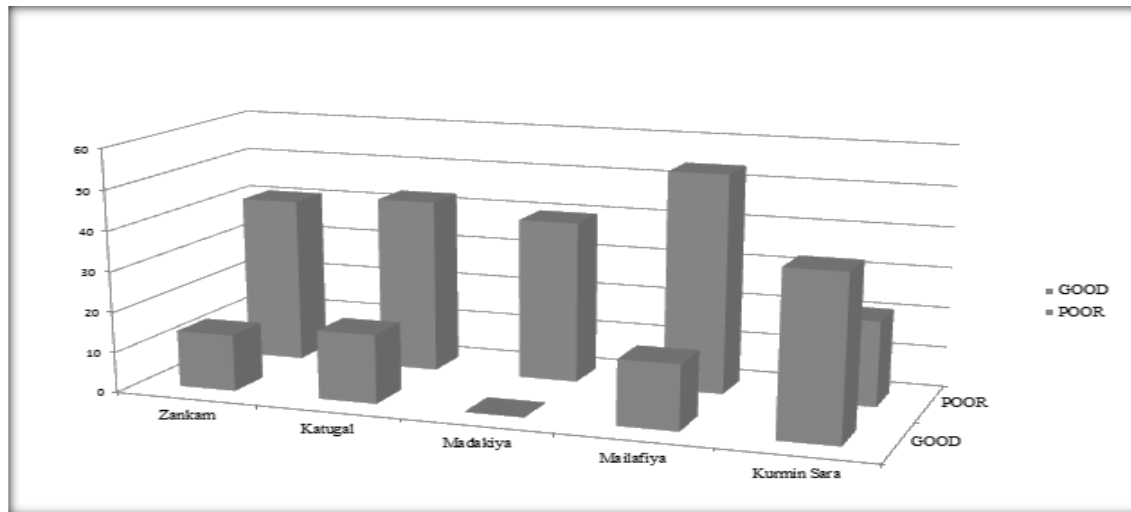
Figure 2: Perception on the Nature of Farmlands (Soil Fertility Status)
Source: Field Survey, 2017

Some (74.6%) of the farmers in Zankam attested to poor soil fertility because of poor crop yield compared to just 25.5% of the farmers who claimed that their soil is fertile due to high yield. However, some farmers were of the opinion that the fertility status of soil in the area depends on the management practices adopted in the preceding year which is often predicted based on the crop yield from the lands. In Katugal, the distribution was 28.3% to 71.7% with good and poor soil fertility respectively. None of the respondents in Madakiya rated their soil to be of good fertility due to the low crop yield from these farmlands. Furthermore, in Mailafiya respondents with good soil fertility were 22.9%, whereas respondents with poor soil fertility were 77.1%. On the other hand, respondents with good soil fertility in Kurmin Sara were 65.6% and those with poor soil fertility were 34.4%. Thus, only Kurmin Sara had a high number of farmers with good soil fertility.

Despite farmers' perception of their farms either as good or poor in fertility, several studies (Badiane and Delgado 1995; Kumwenda et al., 1996; Yusuf and Yusuf 2008) indicated that declining soil fertility is one of the major causes of declining agricultural productivity in Sub-Sahara Africa including Northern Nigeria. Similarly, Voortman, Sonneyeld and Keyzer (2003) and Zingore (2007) stressed that poor soil fertility is inherent in much of Sub Saharan Africa. Yusuf and Yusuf (2008) asserted that lack of economic motivation, the scarcity of markets to sell a surplus and the paucity of credit facilities are major constraints to improved soil fertility in Northern Nigeria.

CONCLUSION

This paper establishes that farming activities involve more of elderly men. A large proportion of the farmers have large family sizes that could be used as family labour for farming activities. Majority had some level of education which is a vital component in technology and innovation adoption in agriculture. Farmers in the study area have fairly large farm size compared to average farmers in many parts of the country. Majority of the farmlands are located on the plains. Almost all the farmers grow annual crops on their primary plots and few cultivate perennials crop alongside the annuals. Substantial numbers of farmers have farm plots located at close proximity from their homestead. Fertility status of soil in the area varies and depends on the management practices adopted in the preceding year which is often predicted based on the crop yield from the farmlands. The study establishes a positive and significant influence between farmers' age, family size, land ownership status, distance from homestead to farm location but has no positive significant influence with education attainment and types of crop grown.

It is pertinent that attention be accorded the choice of farming practice by farmers with special consideration to the likely factors that would bring about sustainability of the farm lands and improve in crop production. Extension workers if available in the LGAs should assist farmers on the choice of better farm management practices that will sustain soil fertility of farmlands and improve crop yield.

REFERENCES

Abaje, I. B., Ishaya, S. & Usman, S. U. (2010). Analysis of rainfall trends in Kafanchan, Kaduna State, Nigeria. *Research Journal of Environmental and Earth Sciences, 2*(2), 89-96.

Adekoya, A. E. (1997). *Analysis of farmers' participation in agroforestry in Oyo State.* Unpublished Doctoral Thesis, Department of Agricultural Extension Services, University of Ibadan. Ibadan.

Adebayo, E. F. & Onu, J. I. (1999). Economics of rice production in Yola North and South Local Government Areas. *Nigerian Journal of Tropical Agriculture,* 1, 15-20.

Adebayo, E.F. (2006) *Resource use efficiency and multiple production objectives of dairy pastoralists in Adamawa state, Nigeria.* Unpublished Doctoral Thesis, University of Ibadan. Ibadan

Agricultural Sustainability Institute. (2016). *What is sustainable agriculture*?

Ajani, O. I. Y. (2005). Determinants of food security of low-income households in the University of Ibadan. *Journal of Rural Economics and Development, 14*(2), 91-101.

Akpoko, J .G. (2004). Factors affecting adoption of recommended soil management practices for sustainable agriculture in Kaduna State, Nigeria. *Savanna, 19*(2), 21-32.

Alabi, R. A. & Aruna, M. B. (2006). Technical efficiency of family poultry production in Niger-Delta, Nigeria. *Journal of Central European Agriculture, 6*(4), 531-535.

Ayalew, D., Dercon, S. & Gautam, M. (2005). *Land tenure insecurity and investment in Ethiopian agriculture: Evidence from panel data*. Mimeo. Policy Research Working Paper, WPSA4363.

Awoyinka, Y. A., Akinwumi, J. A., Okoruwa, V. O. & Oni, O. A. (2009). Effects of livelihood strategies and sustainable land management practices on food crop production efficiency in South-West Nigeria. *Agricultural Journal, 4*(3), 135-143.

Badiane, O., & Delgado, C. L. (1995). *A 2020 vision for food, agriculture, and the environment in Sub-Saharan Africa.* Food, Agriculture, and the Environment Discussion Paper 4. Washington, DC: International Food Policy Research Institute.

Balogun, O. L., & Akinyemi, B. E. (2017). Land fragmentation effects on technical efficiency of cassava farmers in South-West geopolitical zone, Nigeria. *Journal of Cogent Social Sciences, 3*(1).

Bewket, W. (2007). Soil and water conservation intervention with conventional technologies in North-Western Highlands of Ethiopia: Acceptance and adoption by farmers. *Land Use Policy*, 24, 404–416.

Clay, D., Reardon, T., & Kangasniemi, J. (1998). Sustainable intensification in the Highland Tropics: Rwandan farmers' investments in land conservation and soil fertility, *Journal of Economic Development and Cultural Change*, *45*(2), 351-378.

Cohen, L. Manion, L. & Morrison K. (2011). *Research methods in education*. (7th ed.). Great Britain: Ashford Colour Press Ltd.

Eroarome, M. A. (2005). *Country pasture/forage resource profile Nigeria.*

Fawole, O. P. & Fasina, O. (2005). Factors predisposing farmers to organic fertilizer use in Oyo State, Nigeria. *Journal of Rural Economics and Development*, 4(2), 8-9.

Food and Agriculture Organisation. (2006). *Soil management.*

Global Environmental Facility (2016). *Sustainable land management and its relationship to global environmental benefits and food security*: A synthesis report for the GEF.

Gujarati, D. N. (1988). *Basic econometrics*, (2nd ed.). New York, NY: McGraw-Hill. pp. 98–102.

Gumi, A. M., & Aliero, A. A, (2012). Bio-approaches and technologies for improved crop production in Northern Nigeria: A Review. *Asian Journal of Crop Science,* 4, 122-126.

Jagger, P. & Pender, J. (2003). Impacts of programmes and organizations on the adoption of sustainable land management technologies in Uganda, *EPTD Discussion Paper*. International Food Policy Research Institutes (IFPRI), Washington, D. C.

Kumwenda, J. D. T., Waddington, S. R., Snapp, S. S., Jones, R. B., & Blackie. M. J. (1996). *Soil fertility management research for the maize cropping systems of smallholders in Southern Africa*: *A Review*. Natural Resources Group Paper 96-02. Mexico City: International Maize and Wheat Improvement Center (CIMMYT).

Lawal, A. M., Adekola, F. K., Olabisi, F. O., & Dayo, A. (2014). Assessment of land management   practices in food crops production among small scale farmers in Kwara State,   Nigeria. *International Journal of Agricultural Management and Development*, *4*(2), 105-106.

Miheretu, B. S. & Yimer, A. B. (2017). Determinants of farmers' adoption of land management practices in Gelana subwatershed of Northern Highlands of Ethiopia. *Journal of Ecological Processes,* 6, 19-29.

Ministry of Land and Survey (2017). Political *map of Kaduna State. Nigeria.*

National Bureau of Statistics. (2007). Nigeria bureau of statistics annual abstract of statistics. 2006 Population Census. Pp. 5-34.

Okoye, C. U. (1998). Comparative analysis of factors in the adoption of traditional and recommended soil erosion control practices in Nigeria. *Soil and Tillage Research,* 45, 251-263.

Oloyede, A. O., Muhammad-Lawal, A., Ayinde, O. E., & Omotesho, K. F. (2014). Analysis of soil management practices in cereal based production systems among small-scale farmers in Kwara State. *Journal of Production and Agricultural Technology, 10*(1), 164-174.

Otitoju, M. A. & Arene, C. J. (2010). Constraints and determinants of technical efficiency in medium-scale soybean production in Benue State, Nigeria. *African Journal of Agricultural Research,* 5(17), 227-2280.

Raufu, M. O., & Adetunji, M. O. (2012). Determinant of land management practices among crop farmers in South-Western Nigeria. *Global Journal of Science Frontier Research Agriculture and Biology, 12*(1) 8-14.

Rezvanfar, A., Samlee, A., & Faham, E. (2009). Analysis of factors affecting adoption of sustainable soil conservation practices among wheat growers. *World Applied Sciences Journal*, *6*(5), 644-651.

Soibam, L. S., & Uttam, K. S. (2019). Socio-economic and demographic factors influencing farmers' decision on home garden management practices and carbon storage in Mizoram, Northeast India. *International Journal of Ecology and Environmental Sciences, 45*(1), 59-69.

Sivakumar, M. V. K. (2011). *Climate and land degradation. In sustaining soil productivity in response to global climate change: Science, Policy, and Ethics*; Sauer, T. J., Norman, J. M., Sivakumar, M. V. K., Eds., John Wiley & Sons, Inc. Oxford, UK. pp. 141–154.

Taphee, B. G. (2015). *Resource productivity and efficiency of small-scale groundnut farmers in Taraba State, Nigeria* (Doctoral Dissertation, the University of Nigeria, Nsukka, Nigeria).

Tashikalma, A. K. Sani, R. M., Giroh, D. Y. (2014). Comparative profitability analysis of some selected rain fed and irrigated food crops in Adamawa State, Nigeria. *Global Journal of Pure and Applied Sciences,* 20, 77-87.

Terr Africa Partnership. (2006) *Regional sustainable land management* [Brochure]. Washington DC, USA.

Voortman, R. L., Sonneveld, B. G. & Keyzer, M. A. (2003). African land ecology: Opportunities and constraints for agricultural development. *A Journal of the Human Environment, 32*(5), 367-373.

Yusuf, A. A., & Yusuf, H. A. (2008). Evaluation of Strategies for Soil Fertility Improvement in Northern Nigeria and the Way Forward. *Journal of Agronomy*, 7, 15-24.

Zingore, S., Murwira, H. K., Delve R. J., & Giller, K. E. (2007). Soil type, management history and current resource allocation: Three dimensions regulating variability in crop productivity on African smallholder farms. *Field Crop Research, 101*(3), 296-305.