VOL 14 (JUNE, 2020)

The Nigerian Journal of Rural Extension and Development

ISSN 0795-7432

THE NIGERIAN JOURNAL OF RURAL EXTENSION AND DEVELOPMENT (NJRED)

Aims and Scope

The Nigerian Journal of Rural Extension and Development (NJRED), a referred journal, is an annual publication of the Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria. The journal is intended to encourage systematic and continuous publication of practical ideas and empirical research work in the area of Rural Extension and Development as it relates to Rural Development, Women in Development. Agriculture and Extension Education, Rural Sociology, Livelihood, Mass and Extension Communication, Health and Nutrition Extension, Home Economics, Adult Education and Multi-disciplinary Rural Extension issues.

In addition, the Journal publishes book reviews and research and research –in-brief articles.

The Review Process

NJRED employs a two-tier review system.

First, the editor reviews each submission to determine its suitability for further peer review by the NJRED Manuscript Review Committee. If the submission is judged as unsuitable, the editor either rejects the submission or highlights weaknesses and proffers revision suggestions to the author(s).

Second, submission judged suitable for further review is sent to 2 reviewers for in-depth assessment based on a blind review process. The reviewers focus on contribution to knowledge and appropriateness of methodology alongside writing style.

All correspondence to: njredunibadan@yahoo.com

Note to Contributors

Mission of Manuscripts

Articles must be original research work which should not have been submitted for publication elsewhere. Formatting of articles is to be done using MS Word (any version) with tables and figures well formatted, heading and other illustrations clearly distinguishable.

Articles submitted should be provided with a short abstract of about 250 words at the beginning of the text, reporting concisely the main results and important conclusions. At least 3 keywords are required at the base of the abstract. The cover sheet should contain:

a. Title of the article
b. Author (s), name (s), indicating correspondence author with e-mail address
c. The first page of the manuscript should contain the title of the article.

List of references for each work cited should be given at the end of the text, in alphabetical order using the APA style of referencing, that is, surname of author (s), initials, year of publication in parenthesis, title of paper, name of journal (underlined or italicized) or book, volume, and first and last pages of the reference.

Tables and figures must be numbered, self explanatory and appropriately referred to in the body of paper. All measurements must be in metric system with currency conversions stated.

Only e-copies of manuscripts are acceptable and the journal assumes no responsibility for loss of manuscripts or accompanying materials in the mails. Authors are advised to retain copies of their submission.

Author(s) of accepted manuscript will receive a pdf and hard copy of the journal volume in which their article appears. Authors will be required to pay a set of fees to off-set the cost of publication, which are **Reviewing fee = ₦5,000** and **Page charge = ₦20,000**.

Annual Subscription*

Overseas	**Surface Mail**	**Airmail**
Institution/Organisations	$100 $50	$120 $60
Individuals		
Student	$20	$30
Africa		
Institutions /Organisations	₦10,000.00	

E-Copies of paper are to be sent preferably by e-mail to: njredunibadan@yahoo.com

TABLE OF CONTENTS

Urbanisation, land market and livelihood among farming households in peri-urban Ibadan, Oyo State, Southwest Nigeria

Alawode, O. O. and Olayemi, I. O.
Department of Agricultural Economics, University of Ibadan, Nigeria
Correspondence contact details: busolaferanmi@gmail.com; oo.alawode@ui.edu.ng

ABSTRACT

This study examined the relationship between urbanization, land market participation and livelihood income of farming households in peri-urban Ibadan, Oyo state, southwest Nigeria. Multistage sampling procedure was used in selecting 202 respondents. Primary data were obtained from farming households through the use of structured questionnaire. Descriptive statistics, Principal Component Analysis, Land Market Index (LMI), Tobit regression model and multiple Regression model at p-0.05 were used in data analysis. The average urbanicity index was 0.48 showing that the area was truly peri-urban with 36.1% of the households highly urbanized and 26.7% semi-urbanized. Majority (72.8%) of the respondents were males with 45.6% in the high urban category and 70.9% of the females in low urban category. Majority (86.6%) were married, with 39.6% in the high urban category, while 80% of the widowed respondents were in the low urban category. The mean household size was 7(±3.34) persons. Majority (75.7%) had formal education with 69.4% of those without formal education in the low urban category. While all respondents were involved in crop farming, some combined it with livestock farming (3.5%), marketing (1.0%), petty goods trading (3.0%) and artisanship (5.9%). The mean livelihood income was ₦32,602.72 (±₦30,888.81). An average LMI of 0.41 indicates that 41% of the total land holdings were acquired through land market. Nativity status (-0.567), total land size (0.391), and urbanicity index (-0.549) had significant effects on households' participation in land market. Also, participation in non-farm activities (0.070), livestock farming (0.191), total land size (0.106) and LMI (-0.092) had significant effects on households' livelihood income. The extent of land market participation influenced livelihood income negatively showing the implicit effect of urbanization such that households now see other non-land based livelihood activities as more economically rewarding. Also, a positive coefficient means with time, urbanization can be a variable significantly affecting livelihood income, though not presently significant on household livelihood income, is definitely one to look out for. Policy effort aimed at making native and non-native farmers to acquire land with ease will be a potent tool in increasing farm size, which in turn should help increase households' livelihood income.

Keywords: Urbanicity index, Land market index, Livelihood income, Peri-urban.

INTRODUCTION

Agriculture, especially as practiced in developing countries such as Nigeria, has always been dependent on land. According to Lasun (2006), land is an important asset to farmers and to any nation seeking to achieve self-sufficiency in food, as well as physical development, improvement of living standards of its citizens, the manufacture of goods, and the establishment of institutions to support the basic needs of modern communities. As pointed out by Ukaejiofo (2009), land is the key factor for economic growth and development of every nation; the source for shelter in the urban areas and livelihood in the rural areas.

Kobe *et al.* (2017) explained that land is an indisputable source of wealth and employment even though land ownership and urbanization (given the continually increasing population) make it difficult to really access the full potential of this asset. It was reported by World Bank (2016) that agricultural land in Nigeria covers 531,765sq.km in the early 1960s, and stands at 708,000 sq. km in 2013, and this is increasingly less sufficient to meet up demand for it. Therefore, research has focused on the issues of land reform, land policies, and land market participation.

Land has been conventionally considered as one of the three basic factors of production (with labour and capital). This implies that in an exchange economy, land must be capable of being "traded", that is, bought and sold, rented, and used as collateral for obtaining capital. Based on this, Shearer *et al.* (1991) submitted that there is a "market" for land as for the other two factors of production (labour and capital), and the value of land in the market should be determined by the combination of relative scarcity and monetary productivity. Therefore, any land transfer process that is done on transaction basis or in which money is exchanged can be referred to as land market. According to Mahoney *et al.* (2007), land markets are regulated through land tenure and systems of land administration. The basic role of any land market is to allow for permanent or temporary transfers of land between potential land users.

As a global phenomenon, urbanization cuts across countries even though there are differences in factors which led to settlements acquiring urban status in different countries (Kline *et al.,* 2004). Urbanization, as described by Sada (1999), is the process by which a population and the development of infrastructure become concentrated in cities. Also, Bryan (2002) explained that urbanization entails more specialization in labour, increased food supply and city industrial specialization. As the cities grow, their structure becomes complex and their functions become diversified. City functions include commercial, administrative and manufacturing, and other functions that have been relegated to the background in developing countries.

One of these relegated functions is agricultural function. According to Hammond (2002), agriculture is still active in cities of developing countries; the cities are described as agro-villas. Although, the greater proportion of city dwellers engage in non-agricultural activities, the people at outskirts of cities (the peri-urban interface) practice much agriculture. The development and growth of modern urban centres in Nigeria during the colonial era were based on administrative and commercial motives. During this era, the greater proportion of Nigerian population was dependent on agriculture. The development and enlargement of urban centres in Nigeria have been tremendous since her independence in 1960; followed by the oil boom in the 1970s. In the history of Nigeria, this period was that of great industrial and infrastructural development (Anene, 2008).

As defined by Orum (2005), urbanization is a process whereby large number of people congregates and settles in an area; which leads to developing social institutions such as government and business to support the people. Also, Saiyangoku (2011) explained that urbanization can be a result of industrial revolution leading to large manufacturing centres which bring about job opportunities, with ease of transportation and migration. Urbanization brings about positive effects such as reduction in transport costs, better distribution of natural resources, better exchange of ideas, better opportunities to urban dwellers in terms of social amenities (which are lacking in the countryside), access to education to facilitate the disappearing of social and obnoxious taboos and sanctions, and to eradicate social evils through the diffusion of urban culture to rural areas.

On the other hand, urbanization can cause environmental pollution (land, water and air), easy spread of communicable diseases, overcrowding, which can lead to unemployment and under-employment, and severe shortage of housing and transportation leading to commuting problems. McGranaham *et al.* (2010) considered urbanization as often having negative effects on agriculture due to loss of agricultural land to urban expansion. Also, instead of youths to be gainfully employed on farms, they roam the streets, towns and cities in search of white-collar jobs.

The rate of urbanization in Nigeria is increasing, with her population projected to be 190.9 million in 2017; 49.3% of this being urban population at 4.82% annual rate of urbanization (United Nations, 2017). Peri-urban areas in Nigeria, like in other parts of developing world, are large settlements at the fringe of urban areas which are often not considered as part of overall urban development plans. They are often characterized by poor infrastructural development such as poor road network, limited access to water supply, poor electricity supply and inadequate access to improved sanitation facilities, among others. The areas are usually densely populated with the inhabitants engaging in different activities as means of livelihood.

Livelihood, in its simple sense, is the means by which households meet their basic needs; food and non-food (shelter, health and clothing). Livelihoods involve the capabilities and activities of people to earn a living as well as food, income and assets (Chambers and Conway, 1992). Assets are not only natural or biological assets (land, livestock and other common property resources), but also include social assets (social networks, empowerment, family ties and participation). Chambers (1997) identified three aspects to understanding livelihoods; the first being people and their livelihood capabilities, referring to basic functions that households can perform in order to generate livelihoods. An example might be growing and harvesting crops or producing certain goods to earn income so as to buy food. The second aspect is where assets refer to goods or commodities commanded by the households to secure the food or to attain livelihoods. Thirdly, assets can be further categorized into tangible and intangible assets; tangible assets refer to those assets that households can see such as cash savings, land, water, and farm equipment. Intangible assets include those assets which provide material and social means for a household to earn a living (Chambers, 1997).

Land is a very important asset for livelihood, therefore, having access to land is very crucial in order to eradicate poverty and food insecurity among rural households. Inadequate rights and insecure access to land often result in unending poverty, and are significant barriers to rural development and the alleviation of food poverty. Secure access to land is often a safe source of shelter, food and income in times of hardship, and a

family land may be the last resort in the instance of disaster (FAO, 2006), thereby reducing vulnerability to shocks.

Ibadan, historically acknowledged as a traditional city, which is the largest in sub-Saharan Africa, has grown rapidly from a modest population of 70,000 inhabitants in 1856 to a cosmopolitan and densely populated city (Gbadegesin, 1991). According to Adelekan (2010), the rapid development and spatial expansion of the city became pronounced in the wake of Nigeria's oil boom period of the 1970s. The influx of large population of migrants associated with the period resulted in the transformation of the predominantly indigenous city to a multi-cultural and multi-ethnic urban settlement. Ibadan is among West African cities that are increasing by more than 100,000 inhabitants annually, a reflection of the combined effects of natural increase and net-migration (United Nations, 2014). The 2006 National Population Census estimated the metropolis to be inhabited by 1.34 million people while the total population of greater Ibadan (Urban and Peri-Urban) was 2.55 million. The rapid rate of urbanization and the attendant socioeconomic problems has resulted in the proliferation of diverse risks within the urban environment.

Urban growth is largely associated with the process of peri-urbanization. The peri-urban developments were principally residential zones. During the period 1991 to 2006, on the average, population growth rate per year in the Ibadan metropolis was 0.5 percent while the growth rate for the peri-urban areas was an average of 4.8 percent a year, over the same period (Adelekan *et al.*, 2014). According to them, the national economic development of the 1970s had significant influence in the urbanization of the city. Since then, Ibadan has become large, sprawling with no discernible pattern of development. Unplanned urban expansion and development of peripheral informal settlements developed mainly along major transportation routes (Fourchard, 2003). This includes the rapidly expanding areas of the city, extending eastwards from the suburbs (largely occupied by immigrants) to the west and north of the core area which have developed with the slum characteristic of the core areas (Chokor, 1986).

The continuous increase in population, coupled with non-agricultural uses competing for land use, has a resultant effect of reducing the returns to land in terms of output; this would further expose the rural households in the country to even poorer economic conditions thereby impacting on the living standard and a change in livelihood strategies (Bamire and Fabiyi, 2002). The end result is a wide gap in resource availability among the poor households which culminates into a worsening livelihood and welfare situation as farms, which are most times the singular source of income, are converted to residential areas or are even abandoned due to the migration of capable farmhands to the cities.

This study examined the relationship between urbanization, land market participation and livelihood income of farming households in peri-urban Ibadan, southwest Nigeria. To achieve this, the following questions are answered in this study:

i. What is the present state of urbanization in the area?
ii. What types of livelihood activities are found among farming households?
iii. What levels of livelihood income are obtained by the farming households?
iv. What is the level of land market participation among the farming households?
v. What factors determine land market participation among the farming households?
vi. Is there relationship between urbanization, land market participation and livelihood of farming households in the area?

METHODOLOGY

The study was conducted in peri-urban Ibadan, Oyo state, southwest Nigeria. Ibadan is the capital city of Oyo state. It has a total population of 2,550,593 while the average population density was 828 persons per km^2 (National Population Commission, 2006). It has 11 local government areas (LGAs); five of the LGAs are within the metopolis; Ibadan North, Ibadan North East, Ibadan North West, Ibadan South, Ibadan South East, while the remaining six are at the peri-urban interface; Akinyele, Lagelu, Egbeda, Ona Ara, Oluyole, and Ido local governments. Ibadan's total land area is 3123 km, of which about 15 percent is urban and the remaining 85 percent is classified as peri-urban.

Primary data were collected through a cross section survey. Structured questionnaire was used to obtain information on socioeconomic characteristics of the farming households, land ownership, land acquisition methods and land market participation characteristics, urban function characteristics (adapted from Okoruwa and Ikudayisi, 2018), and livelihood activities.

Multi-stage sampling procedure was used to select respondents. The first stage was the random selection of 3 local governments out of the 6 peri-urban local governments around Ibadan: Akinyele, Egbeda and Lagelu. The second stage was the

purposive selection of agricultural settlements or villages where large numbers of farmers reside. Seventy copies of questionnaire were administered in 7 villages in each selected local governments, making a total of 210 respondents. However, due to invalid and incomplete responses, only 202 copies were adequate for the analysis.

Data were analyzed using descriptive statistics, Principal Component Analysis, Land market index (LMI) and econometric tools; ordinary least square regression and Tobit regression model.

Descriptive statistics such as frequencies, percentages and means were used to analyze the socio-economic characteristics of the farmers, livelihood income, types of land acquisition and plots involved in land market, and the results were presented using frequency distribution tables**.**

Principal Component Analysis for Urbanicity Index

Principal component analysis (PCA) was used to construct urbanicity index for the farmers in the study area. The index also describes the extent to which the farmers' communities are urbanized (Liao *et al.*, 2016; Zhou and Awokuse, 2014). Due to the multifaceted nature of urbanization, the aspects of urbanization used in this study are those that affect livelihood which include economy, infrastructure, education, health and social services.

The PCA creates non-correlated linear combinations of the variables with maximal variance. The development of the index enables easy handling of several highly correlated urban characteristics variables and improves statistical efficiency. Using several single and disaggregated measures separately to reflect a single underlying concept such as urbanicity index introduces the risk of collinearity which PCA overcomes and improves statistical efficiency.

For a set of p correlated variables, Principal Component Analysis creates uncorrelated components where each component is a linear weighted combination of the initial variables as expressed in equation 1, with X_1, X_2, … X_p, representing the urban Indicators

$$PC_1 = a_{11}X_1 + a_{12}X_2 + \ldots + a_{1p}X_p \quad \ldots.\ 1$$

Where a_{11} represents the weight for the X_1 principal component. The coefficient of the first principal component a_{11}, a_{12}, a_{1p} are chosen in such a way that the variance of PC_1 is maximized subject to the constraint that the sum of factor loadings must sum up to one as expressed in the equation 2.

$$a_{11}^2 + a_{12}^2 + a_{1p}^2 = 1 \quad \ldots.\ 2$$

The first principal component generated from the extracted factor scores gives the index which was further reclassified into three categories of urbanization: low, medium and high urban areas. The PCA is structured by a set of equations where the urban indicators are related to a set of latent factors expressed as:

$$a1x = b11 \times A1x + b12 \times A2x + \cdots + b1N \times ANx$$
$$x = 1, \ldots X$$

$$aNx - bN1 \times A1x + vN2 \times A2x + \cdots + bNN \times ANx$$

Where, the set of N variables, a*1x to a*Nx, represents the access to *N* urban indicators by each household *x*. These variables are normalized by its mean and standard deviation, where the *A*s are the components and the *b*s are the weights on each component for each variable. These selected variables are expressed as linear combinations of a set of underlying components for each household *x* with maximum variance. The final set of estimates is produced by scaling the *bn*s so the sum of their squares sums to the total variance, with the scoring factor from the model recovered by inverting the system from equation (1), and this yields a set of estimates for each of the N principal components given by:

$$A1j = b11a1x + b12a2x + \ldots + b1NaNx$$

$$x = 1, \ldots X$$

$$ANj = bN1a1x + bN2a2x + \ldots + bNNaNx$$

The first principal component, expressed in terms of the original (unnormalized) variables, is therefore an index for each household based on the expression

$$A1j = b11 \times (a*1x - a*1)/(s*1) + \ldots$$
$$\ldots + b1N \times (a*Nx - a*N)/(s*N$$

The index so developed was used to disaggregate household urbanization level within peri-urban settings that is being location specific as opined by Cockx *et al.* (2017).

Land Market Index

Land market index (LMI) was used to assess the extent to which the farmers participated in land

market. The index reveals the proportion of farm plots acquired through land market to the total farm size cultivated by the farming households and it is defined as;

LMI_i =

Area of land obtained through land market by household *I* / Total area of land held by the household *i*

The LMI ranges from 0 to 1 ($0 \leq LMI \leq 1$)

Where LMI = 1 if all plots of land held by the farmer are acquired through transaction-based method

LMI = 0 if none of the plots of land is acquired through transaction-based method.

Tobit Regression Model for Determinants of Land Market participation

Identification of factors determining the extent of land market participation among farming households was estimated through the Tobit regression model. The model assumes a threshold value of zero, that is, the value assigned for non-participants in land transactions. For the remaining respondents, the variable takes on a wide range of values above the limit.

The fitted model was specified as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \beta_{12} X_{12} + ui$$

Where dependent variable Y_i = land market participation index ($0 \leq LMI \leq 1$)

X_1 = Sex (Male =1, Female = 0)

X_2 = Nativity Status (Native = 1, Non-native = 0)

X_3 = Age of household head (years)

X_4 = Household size (number)

X_5 = Marital Status (1= Married, otherwise =0)

X_6 = Years of formal education

X_7 = Non-farm work (Yes = 1, No= 0)

X_8 = Household monthly income (Naira)

X_9 = Urbanicity index ($0 \leq UI \leq 1$)

X_{10} = Total farm size (hectares)

X_{11} = Number of Farm plots

X_{12} = Access to credit (Yes = 1, No = 0)

u_i = Error term

Ordinary Least Square Model

Ordinary Least Squares (OLS) regression was used to determine the effect of land market participation and urbanization on livelihood income of the households.

The model is given as:

$$Y = \beta_0 + \sum_{i=1}^{0} \beta_i X_i + \varepsilon_i$$

Where Y represents the dependent variable (livelihood income),

β_0 represents the intercept,

β_i represents the coefficients of the independent variables,

X_{is} are the independent variables, and

ε_i is the error term.

The fitted model was therefore specified as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \beta_{12} X_{12} + u_i$$

$X_1 - X_{12}$ are the independent variables

Dependent variable:

Y_i= Monthly income (in Naira)

Independent variables:

X_1= Sex of respondent. (1=male, otherwise=0)

X_2= Nativity status (1=native, 0= non-native)

X_3= Age (years)

X_4= Household size (number of persons)

X_5= Years of formal education

X_6= Non-farm activities (Yes = 1, otherwise=0)

X_7= Access to credit (Yes = 1, otherwise=0)

X_8= Livestock farming (Yes = 1, otherwise=0)

X_9= Number of farm plots

X_{10}= Total farm size (hectares)

X_{11} = Land Market Index ($0 \leq LMI \leq 1$)

X_{12} = Urbanicity Index ($0 \leq UI \leq 1$)

u_i= Error term

RESULTS AND DISCUSSIONS

State of Urbanisation in Farming Households

In estimating an index that would best describe the state of urbanization of households in the study area, domains that could affect the urbanization process such as public services, society and lifestyle were broken down and variables drawn from them. The selection and classification were guided by the results of the Eigen values as shown in Table 1. The rule of thumb is that components

with Eigen values above 1 are to be considered in the components analysis. As shown in Table 1, out of 18 components, 6 had values above 1. Therefore, the urban function characteristics were grouped under the 6 components or domains.

Table 1: Table of Eigen Values

Components	Eigenvalue	Difference	Proportion	Cumulative
Component 1	5.401	3.290	0.300	0.300
Component 2	2.112	0.391	0.117	0.417
Component 3	1.720	0.475	0.096	0.513
Component 4	1.245	0.172	0.069	0.582
Component 5	1.073	0.036	0.060	0.642
Component 6	1.037	0.179	0.058	0.699
Component 7	0.858	0.033	0.048	0.747
Component 8	0.825	0.030	0.046	0.793
Component 9	0.795	0.150	0.044	0.837
Component 10	0.645	0.064	0.036	0.873
Component 11	0.582	0.132	0.032	0.905
Component 12	0.449	0.114	0.025	0.930
Component 13	0.335	0.023	0.019	0.949
Component 14	0.313	0.087	0.017	0.966
Component 15	0.226	0.057	0.013	0.979
Component 16	0.169	0.055	0.009	0.988
Component 17	0.114	0.012	0.006	0.994
Component 18	0.102	.	0.006	1.000

Source: Data Analysis, 2019

Description of urban function characteristics used in the estimation of Urbanicity Index

The description of the indicators of urban function characteristics used in the estimation of the extent of urbanization are shown in Table 2.

Communication

Access to media services such as owning a television, a radio set, a mobile phone and/or having access to internet services constituted the communication component. From the results, it was seen that majority (96.5%) of the respondents owned mobile telecommunication device showing a high level of that technology adoption in the area and presence of mobile telecommunication networks. Also, majority (83.2%) owned radio set showing the need for contact with the happenings in the society and more than half (61.9%) had television set. Meanwhile, less than one-quarter (22.8%) of the respondents had access to internet services which shows that the presence of internet enabled device is relatively low compared to fully urbanized areas.

Health

Availability and accessibility of healthcare facilities to the households are important because healthcare is a social and public service which usually is available in urban areas as compared to its paucity in rural areas. Majority (87.5%) of the respondents claimed to have access to healthcare facilities while only 53.5% claimed a proximity of less than 5 kilometers to their place of abode. Healthcare facilities should be close enough so as to cater for emergencies and other health related contingencies.

Housing

The housing component had more variables compared to other components, since the index deals with what each household possesses and not just the locational characteristics of the study area as concerning urbanization. Of the 9 variables suggested for the analysis, 8 were used for the PCA with the exception of the respondents' response to usage of firewood as a cooking energy source. Access to potable water, having a water closet, using liquefied petroleum gas as cooking energy and having electricity supply of at least 12 hours daily should usually characterize a household as being urbanized. In the results, less than one-quarter (23.3%, 24.8%, 23.8% and 19.8%) of the respondents gave positive responses to these questions respectively. Majority (92.1%) of the households still utilized firewood as source of energy, obviously in conjunction with other sources such as kerosene (69.6%). In terms of disposal of human waste, 54.5% and 40.1% of the respondents said they used pit latrines and bush disposal respectively with just about one-quarter (24.8%) using water closets.

Education

The variable used to represent this indicator was the proximity of basic education structures (schools) to the households at a distance of not more than 5 kilometers. More than half (58.4%) had schools close to their homes.

Markets

Just above one-quarter (27.7%) of the respondents had open markets, retail shops, supermarkets, shopping malls or fast-food outlets close to their homes.

Transportation

Type of road and means of transportation constituted the transportation component with less than half (44.6%) agreeing that there were good motorable roads close to their houses, 14.9% owned cars, 10.4% owned bicycles while 31.7% claimed to own motorcycles. All the 4 variables were found to be useful in the factor analysis.

Table 2: Description of urban Function Characteristics Used in the Estimation of Urbanicity Index

Urban indicators	Variables Used	Frequency (n=202)
Communication	Do you own a Radio set	168 (83.2)
	Do you have a Television	125 (61.9)
	Do you own a mobile phone?	195 (96.5)
	Do you have access to internet services	46 (22.8)
Health	Are there healthcare facilities close to your house?	108 (53.5)
	Do you have access to healthcare facilities?	177 (87.5)
Housing	Do you have access to potable water?	47 (23.3)
	Do you have a water closet?	50 (24.8)
	Do you use a pit latrine?	110 (54.5)
	Do you do bush disposal?	81 (40.1)
	Do you have access to cooking energy Firewood?	186 (92.1)
	Cooking gas	48 (23.8)
	Kerosene	141 (69.8)
	Do you have access to electricity?	96 (47.5)
	Is the supply very good?	40 (19.8)
Education	Are there schools close to your house?	118 (58.4)
Markets	Are there open markets, retail shops, supermarkets, shopping malls or fast food outlets close to you?	56 (27.7)
Transportation	Are there good motorable roads close to your house	90 (44.6)
	Do you own a car?	30 (14.9)
	Bicycle?	21 (10.4)
	Motorcycle?	64 (31.7)

Source: Field Survey, 2019
Figures in parentheses are percentages

Extent of urbanization of Households

Using the urbanicity index generated by the Principal Component Analysis (PCA), the households were categorized and the results are presented in Table 3. The results show that the mean urbanicity index was 0.48 (±0.28). This is in line with the results of Okoruwa and Ikudayisi (2018), who in their study found an average urbanicity index of 0.46 in households in southwestern Nigeria. This shows that the area under study can be classified generally as a Peri-Urban region, since the index ranges from 0 (completely rural) to 1 (completely urban). The urbanicity index was further broken down into terciles and classified as; low (0 – 0.33), medium (0.33 – 0.66) and high (0.66 – 1) urban categories. This was in line with Mehaina *et al.* (2016) who used the comprehensive urban level index to classify settlements in Egypt. Invariably, this classification can be generalized and labelled as rural, semi-urban and urban categories. The grouping shows that a higher percentage (37.1%) of households were in the low urban or rural category, 26.8% of the households were semi-urbanized while 36.1% were found to be highly urbanized.

The test for robustness for PCA as an index construction method revealed a Kaiser-Meyer-Olkin (KMO) value of 0.8006 which was significant at 1% and shows that the variables selected were adequate in explaining urbanicity index (the rule of thumb is that the value should be greater than 0.6). The Factor Analysis Explained Variance (FAEV) value of 0.6993 implies that the selected indicators described almost 70% of the urbanicity level in the study area, and the Cronbach alpha value of 0.8372 shows the reliability of variables in index construction (reliability

coefficient of 0.70 or higher is considered acceptable as the rule of thumb). Also, the Bartlett's test of sphericity using a 95% level of significance ($\alpha = 0.05$) shows a p-value of 0.000 which is obviously less than 0.05 implying that the PCA was valid. Therefore, at $p < \alpha$, we do not reject the alternate hypothesis that there may be statistically significant interrelationship between variables. This test of robustness was adapted from the works of Mehaina *et al.* (2016) who reported the use of this test for comprehensive Urbanization Level Index (CULI). The test results show that the PCA was reliable in developing the index.

Table 3: Extent of Urbanization of Households

Urban Category	Frequency	Percentage
Low	75	37.1
Medium	54	26.8
High	73	36.1
Total	202	100.0
Mean Urbanicity Index	0.48 ± 0.278	
KMO	0.8006***	
Bartlett test	1754.251***	
Df = 153	Sig = 0.000	
FAEV	0.6993	
Cronbach Alpha	0.8372	

Source: Data Analysis, 2019
*** *Significant at 1%*

Socioeconomic distribution of respondents by Urbanicity Index categories

Table 4 shows the distribution of the respondents' socioeconomic characteristics by their urban categories. From the results, 72.8% of the respondents were males. This agrees with the findings of Otitoju (2018) who found that majority of crop farmers in Southern Nigeria are male. When further classified into the various urban categories, 45.6% of the males were found to be in the high urban category while the largest percentage (70.9%) of females were found to be in the low urban category. The reason for this might be that male farmers are generally known to be fast adopters of innovations and in the case, urban lifestyles, as compared to their female counterparts. Also, some rural farmers, while in the urban areas in search of inputs to use on their farms, tend to be exposed to some urban lifestyles and therefore adopt some of those key variables that constitute a high household urbanicity index.

More than half (53%) of the respondents were between the age range of 51 and 70 years. Also, 40.6% of the respondents were between the age of 31 and 50 years while 5.0% of the respondents were found to be 30 years and below. The mean age of 52.5±12.4 shows that respondents in the study were in their middle age and of the working class (independent). Also from the results, it was seen that respondents between the age of 51 and 70 years were found more (41.1%) in the rural category while those between the age of 31 and 50 years were found more (47.6%) in the high urban category. The reason for this might be because most respondents between the age of 51 and 70 years tend to be indifferent about acquiring some of these key variables affecting the urbanicity index, while those between the age of 31 and 50 years who are still in their active years are more exposed to these innovations and are therefore more inclined to possess these indicators.

Majority (86.6%) of the respondents were married with 39.4% in the high urban category. The respondents who were not married (1.0%) were in the medium urban category. Majority (80%) of widowed respondents were found in the low urban category. This may be due to their relocation back to the hinterlands after the passing away of their partners (usually the household head who is a male). The high percentage of married respondents might, asides the cultural reasons, be because of the labour source mainly found in most rural areas which is either family labour or both family and hired labour. They will therefore prefer to get married rather than remain single as this would mean having more hands on the farm. However, the more the household size, the more vulnerable they are to poverty. Results show that there were more married people in the rural and urban categories.

Half (50.0%) of the respondents had household sizes between the range of 6 and 10 with 39.6% in the high urban category, while respondents with household size less than 5 were 37.6% with more than half (56.6%) of this proportion in the low urban categories, respectively. Also, 12.5% of the respondents had household sizes ranging between 11 and 15 persons. The mean household size of 6.7

±3.3 persons shows that most of the respondents had large household sizes, which is one of the characteristics of rural and peri-urban areas. This is in line with the result obtained by Elisha *et al.* (2017) in which majority of the cocoa farmers sampled by them had household sizes between 5 and 10. thus indicating a large family in the study area and also meaning that the farmers had cheap source of labour from their large household sizes. This will however increase the per capita expenditure of the household making investment in properties a bit more difficult. Meanwhile, households with less than 5 members were found to be more in the rural areas while those that are between 6 and 10 were found to be more in the urban categories.

The largest proportion (35.1%) of the respondents, as shown by the results, are those with secondary education, while those who had primary school education were 30.7%. Respondents with no formal education were 22.5% while those with tertiary education were 9.9%. Most (69.4%) of those without formal education were in the low urban category while 45.0% of those with tertiary education were in the high urban category. Since most of the respondents had one form of education or the other, education should propel economic motivation and also widen their social and economic horizon which will make them have greater receptivity to new ideas. This also explains the highest proportion of those without formal education in the low urban category. Also, 36.6% of the respondents sampled were migrants with 39.2% in the low urban category. The greater proportion (63.4%) of the respondents were natives with 39.8% in the high urban categories.

Only 32.2% of the respondents claimed to have access to formal sources of credit. This agrees with the work of Tsue *et al.* (2014), who found that credit access is a major constraint to farmers. Credit is considered as an important source of investment and helps to improve livelihood strategies of households. Households who have better access to credit can have better investment in preferred livelihood strategies. When disaggregated against the urban categories of the respondents, it was shown that 48.2% of respondents without access to credit were in the low urban category, while 56.9% of those respondents with access to credit were found in the high urban category. The reason for this might be because there are more institutions that provides credit for the farmers in urban areas when compared to the rural areas. It might also be because collateral is usually demanded from people who want to borrow money from credit institutions. Such collaterals might be easier to get by the respondents in the high urban category, because of this, they will have more access to credit facilities when compared to their counterparts in the low urban/rural category.

Table 4: Socioeconomic Distribution of Households by Urban Categories

Variables	Low urban category	Medium urban category	High urban category	Total (n=202)
Sex				
Female	39(70.9)	10(18.2)	6(10.9)	55(27.2)
Male	36(24.5)	44(29.9)	67(45.6)	147(72.8)
Age (Years)				
≤30	0(0.0)	9(90.0)	1(10.0)	10(5.0)
31 – 50	28(34.1)	15(18.3)	39(47.6)	82(40.6)
51 – 70	44(41.1)	30(28.0)	33(30.8)	107(53.0)
>70	3(1.5)	0(0.0)	0(0.0)	3(1.5)
Mean 52.5(±12.4)				
Marital Status				
Never Married	0(0.0)	2(100.0)	0(0.0)	2(1.0)
Married	55(31.4)	51(29.1)	69(39.4)	175(86.6)
Widowed	20(80.0)	1(4.0)	4(16.0)	25(12.4)
Household Size				
≤5	43(56.6)	13(17.1)	20(26.3)	76(37.6)
6-10	29(28.7)	32(31.7)	40(39.6)	101(50.0)
11-15	3(12.0)	9(36.0)	13(52.0)	25(12.4)
Mean 6.7 (±3.3)				
Educational Status				
Primary	23(37.1)	16(25.8)	23(37.1)	62(30.7)
Secondary	14(19.7)	22(31.0)	35(49.3)	71(35.1)
Tertiary	4(20.0)	7(35.0)	9(45.0)	20(9.9)
Non-formal Education	34(69.4)	9(18.4)	6(12.2)	49(24.3)
Nativity Status				
Non-Native	29(39.2)	23(31.1)	22(29.7)	74(36.6)

Variables	Low urban category	Medium urban category	High urban category	Total (n=202)
Native	46(35.9)	31(24.2)	51(39.8)	128(63.4)
Access To Credit				
No	66(48.2)	35(25.5)	36(26.3)	137(67.8)
Yes	9(13.8)	19(29.2)	37(56.9)	65(32.2)
Total	**75(37.1)**	**54(26.7)**	**73(36.1)**	**202(100.0)**

Source: Field Survey, 2019

Figures in parentheses are percentages

Livelihood activities and income generation by farming households

The results of the various livelihood activities engaged in by respondents in the study area are presented in Table 5. All the respondents were involved in one form of crop farming or the other with some combining crop cultivation with other activities such as rearing of livestock and commercial activities such as petty goods trading, marketing and artisanship. The descriptive analysis shows that 85.6% of the respondents cultivated crops only while 5.9% combined crop farming with one form of artisanship such as carpentry, masonry and general repairs, and 3.5% reared livestock in conjunction with cultivating crops, 3.0% engaged in petty trading while still raising crops, 1.0% combined marketing activities with crop farming and 1.0% combined crop farming with livestock farming and marketing. The results may suggest that the farmers understood the increase in market demand for crop produce.

Table 5: Livelihood activities among respondents

Variables	Frequency n=202	%
Crop Farming only	173	85.6
Crop combined with;		
Livestock farming	7	3.5
Marketing	2	1.0
Trading	6	3.0
Artisanship	12	5.9
Livestock farming and Marketing	2	1.0

Source: Field Survey, 2019

The total monthly incomes generated by the farming households from the various livelihood activities are presented in Table 6. From the results, 41.1% of the respondents generated between ₦10,000 and ₦30,000 monthly, and 30.2% generated between ₦30,000 and ₦50,000. This is in line with the results of Agboola (2017), who in her study found that 48.5% of farming households in Oyo State generated monthly income between ₦10,000 and ₦50,000.

However, 8.4%, 2.5% and 2.0% of the total respondents generated ₦50,000-₦70,000, ₦110,000-₦130,000 and ₦90,000-₦110,000 monthly, respectively. The remaining 15.3% and 0.5% of the respondents earned less than ₦10,000 and more than ₦130,000 monthly, respectively.

Table 6: Income generated by Respondents from Livelihood Activities

Livelihood income (₦/Month)	Frequency	Percent
<10,000	31	15.3
10,000 – 30,000	83	41.1
30,001 – 50,000	61	30.2
50,001 – 70,000	17	8.4
70,001 – 90,000	0	0.0
90,001 - 110,000	4	2.0
110,001 - 130,000	5	2.5
>130,000	1	0.5
Total	202	100.0
Minimum = 3,333.3		
Maximum = 291,666.7		
Mean Income = 32,602.72 (±30888.81)		

Source: Field Survey, 2019

When the livelihood income of the respondents was plotted against the urban categories, results in Table 7 show that very high proportion (74.2%) of respondents having income below ₦10,000 were found in the low urban category while the single respondent with an income above ₦130,000 was found in the high urban category. The results show that income differential is key in defining the urban category of a household, as indicated by the distribution. As income range increases, higher proportions of respondents fall in the semi and highly urbanized categories. This follows *a priori* expectations since monetary resource availability is important in the acquisition of those key variables determining urbanization of households (Table 2).

Table 7: Distribution of respondents' livelihood income by urban category

Livelihood Income (₦/Month)	Low Urban Category	Medium Urban Category	High Urban Category	Total
<10,000	23(74.2)	8(25.8)	0(0.0)	31(15.3)
10,000 - 30,000	38(45.8)	25(30.1)	20(24.1)	83(41.1)
30,001 - 50,000	7(11.5)	12(19.7)	42(68.9)	61(30.2)
50,001 - 70,000	4(23.5)	4(23.5)	9(52.9)	17(8.4)
70,001 – 90,000	0(0.0)	0(0.0)	0(0.0)	0(0.0)
90,001 - 110,000	1(25.0)	2(50.0)	1(25.0)	4(2.0)
110,001 - 130,000	2(40.0)	3(60.0)	0(0.0)	5(2.5)
>130,000	0(0.0)	0(0.0)	1(100.0)	1(100.0)
Total	75(37.1)	54(26.7)	73(36.1)	202(100.0)

Source: Field Survey, 2019
Figures in parentheses are percentages

Participation of households in Land Market and determinants of their participation

Extent of participation of farming households in Land Market

The land market indices of households in the study area are presented in Table 8. The results show that 54.0% of the households had an index of 0.00 implying that none of their landholdings was acquired through land market processes such as purchase, lease or rent. On the other hand, 5.4% had an index ranging between 0.251 and 0.50 meaning about a quarter to half of their land holdings was acquired through land market. However, 33.2% acquired their entire land holding through land market. The average land market index of the study area was 0.41(±0.461), meaning 41.0% of the total land held by the respondents were acquired through land market, showing that land market is very active in the peri-urban area.

Table 8: Land Market Index of Respondents

Land Market index	Frequency (n=202)	Percent
0.00	109	54.0
0.01-0.25	0	0.0
0.251-0.50	11	5.4
0.501- 0.75	13	6.4
0.751-0.99	2	1.0
1.00	67	33.2
Total	202	100
Mean	0.41(±0.461)	

Source: Data Analysis, 2019

When land market index was further classified into the different urban categories as shown in Table 9, of the total number of respondents who did not participate in market-based transactions, 41.3% were found in the low urban category, while 77.6% of those that acquired all their land holdings through transactional means were in the medium and high urban categories. This may indicate that these respondents have the financial clout to actually offer money in exchange for their land ownership or holdings as shown by their positive responses to those key variables that determined urbanisation outlined in Table 2.

Table 9: Distribution of Land Market Index by Urban category

Land Market Index	Low urban category	Medium urban category	High urban category	Total
0.00	45(41.3)	23(21.1)	41(37.6)	109(54.0)
0.01-0.25	0(0.0)	0(0.0)	0(0.0)	0(0.0)
0.26-0.50	9(81.8)	1(9.1)	1(9.1)	11(5.4)
0.51- 0.75	5(38.5)	4(30.8)	4(30.8)	13(6.4)
0.76-0.99	1(50.0)	0(0.0)	1(50.0)	2(1.0)
1.00	15(22.4)	26(38.8)	26(38.8)	67(33.2)
Total	75(37.1)	54(26.7)	73(36.1)	202(100.0)

Source: Data Analysis, 2019

Figures in parentheses are percentages

Factors determining participation of farmers in Land Market

The Tobit regression analysis results on factors determining participation of farmers in land market are presented in Table 10. To determine the factors affecting the participation of farmers in land market, 12 variables were used; sex, nativity status, age, household size, marital status, years of formal education, off-farm work, number of plots, monthly income, total farm size, urbanicity index and access to credit. Eight variables were however found to be significant; nativity status, household size, marital status, years of formal education, non-farm work, monthly income, total farm size, and the urbanicity index. The significant variables were found to either have positive or negative effect on the participation of farmers in land market among the households.

Nativity status

The nativity status of the respondents had a significant negative effect on land market participation with a marginal value of 0.5673 at 1% level. This indicates that being a native of a particular area reduces the extent of such individual's participation in land market since most indigenes tend to inherit their lands, hence, there is hardly any need to rent, lease or purchase land.

Household size

The effect of household size on participating in land market was found to be positive and significant at 1% level. This implies that an increase in household size would lead to an increase in the extent of land market participation among households by 7.5%. A larger household size symbolizes greater endowments in family labour available for land cultivation. Large family size is an indicator for availability of labour, provided that the majority of the family members are within the age range of active labour force. Availability of family labour might therefore propel the household head (whether native or non-native) to acquire more land (especially by transaction) due to the size of his household.

Marital status

Marital status was found to be significant at 10% and had a positive relationship with participation in land market. This means that being married will lead to a 0.135 increase in land market participation. The reason for this might be because being a married man or woman increases responsibilities. The responsibilities of being married will therefore increase the likelihood of participating more in land market.

Years of formal education

Results show positive significant relationship between the years of formal education of farmers and their participation in land market at 1% level. This implies that as the level of education of a farmer increases, there is a greater likelihood (4.75%) for such farmer to participate in land market. Bizimana (2011) however opined that the effect of education on land market remains ambiguous, revealing that as a farm household acquires more education, the propensity to rent out may increase due to increased opportunity cost of farming, thus, the effect of education can be positive on the decision to rent out land in such an environment. On the other hand, where the knowledge obtained enhances the farmers' ability to obtain, process and utilize new information, he may choose to rent out less of his land and work on his farm efficiently.

Off-farm work

Engaging in off-farm work was found to have a negative relationship with land market participation at 5% significance level. This means that a unit increase in those farmers' off-farm work reduces the likelihood of participation in land market by

0.236. The reason for this might be because as the famers get more income from their off-farm works, they will prefer to keep channelling their resources and income into such businesses rather than acquiring more land for farming. Also, rather than acquiring more land for farming, they may prefer to rent out their land.

Monthly income

The household income was found to have significant negative effect (though negligible) on household land market participation at 5% level. The reason might be their involvement in non-farm activities which generate more income for them than the farm activities.

Urbanicity index

The urbanicity index of households had negative relationship with their land market participation which was significant at 5% level. This means the more urbanized the household is, the less their participation in land market. This relationship could be due to steady urbanization which causes increase in the value of land in the area, which might make households to be reluctant to let go of their land holdings therefore holding on to what they presently own. Likewise, the increase in land prices would mean less and less households would be able to acquire more land.

Total Land size

There exists a positive significant relationship between the total land size and households' participation in land market at 1% level. This intuitively implies that households with larger landholdings who understand the need for expansion and have the required resources are likely to participate in land market. Also, the households with large land holdings would likely participate in land market in the aspects of rent outs or sales, since the region is one where urbanization is creeping upon. With the attendant increase in the value of land holdings, household with large land endowments would be willing to exchange ownership for cash.

Table 10: Tobit results on the factors determining participation of farmers in land market

Land Market Index	Coefficient	Standard Error	P Value	Marginal effect
Sex	-0.1391376	0.1736259	0.424	-0.1391
Nativity Status	-0.5673446	0.1228379	0.000	-0.5673***
Age	-0.0089919	0.0066374	0.177	-0.009
Household Size	0.0748033	0.0206186	0.000	0.0748***
Marital Status	0.1349597	0.0716368	0.061	0.1352*
Years of Formal Education	0.0474648	0.0123387	0.000	0.0475***
Non-farm Work	-0.2359424	0.0985287	0.018	-0.2359**
Monthly Income	-6.47E-06	2.72E-06	0.018	-0.0001**
Urbanicity Index	-0.5493973	0.2259946	0.016	-0.5494**
Total Land Size	0.3907461	0.0583788	0.000	0.3907***
Number Of Farm Plots	0.0786641	0.081562	0.336	0.0787
Access To Credit	0.0940469	0.1355285	0.489	0.0943
Constant	0.1239615	0.397513	0.756	0.1243
Sigma	0.5510212	0.0387832		
Number of observations = 202	F (12, 190) = 14.13		Prob > F = 0.0000	
Log pseudo likelihood = -140.34561	Pseudo R^2 = 0.3435			

Source: Data Analysis, 2019

Note: the symbols ***, **, * represent significance at 1%, 5% and 10% respectively

Effects of Land Market Participation and Urbanization on Livelihood Income of Respondents

Ordinary Least Square method was used to analyze the effect of land market participation and urbanization on livelihood income of the respondents. An R-square value of 0.5614 showed that 56% of the variations observed in the dependent variable can be explained by the explanatory variables in the model. Also, 12 variables were used for the analysis of this objective but 6 variables were found to either have positive or negative significant relationship with the livelihood income of the respondents. Results are presented in Table 11.

Land market index

This was found to have negative significant effect (at 1% level) on livelihood income of the households in the study area, implying that households that do not participate in land market tend to have more income than non-participants. This is contrary to the results of Edriss and Garedow (2014) who established that participation in land rent significantly improved the productivity of land poor and/or landless households. This may

be due to the implicit effect of urbanization such that households now see other non-land based livelihood activities as more economically rewarding than engaging in farming which is still primarily land based.

Urbanicity index

Urbanicity index, though not significant, had positive relationship with the livelihood income of the households. This might be because as the respondent's area keep getting urbanized, there will be a unit increase in the livelihood income of the farmers. This may be due to an increase in commercial activities in the area, especially the commercial transportation and petty retail goods business. Tapping into such opportunities might be reflected in form of improved livelihood income among them.

Other socio-economic characteristics

Sex

The sex of respondents was found to be significant at 1%. This means that being a male will increase livelihood income by 13.2% when compared to being a female. The reason for this might be because of the necessity of the male in making sure that he caters for his household members and meet up with his responsibilities.

Household size

Another significant variable was the respondents' household size. It was significant at 1%. The positive coefficient shows that a unit increase in the household size of the respondents will increase the livelihood income of the respondent by 1.6%. The reason for this result might be because there are some people in the household that might be supporting the household head to help contribute to the income of the family.

Non-farm work

Respondent's involvement in non-farm activities had a positive relationship on his livelihood income by a factor of 0.0697 which was significant at 5%. This follows *a-priori* expectation that a person's involvement in diverse livelihood activities should significantly improve his/her livelihood income since he is getting income not only from farming, but also from other means.

Livestock farming

Livestock farming had positive relationship on the livelihood income of the respondents and this was significant at 5%. This suggests that households that were involved in livestock activities were able to generate more money that improved their monthly income. In addition to crop production, engagement in livestock farming increases livelihood income by 19.1% as compared to those who were not engaged in it.

Total land size

The total land size of household had a positive effect on respondent's livelihood income. This was significant at 1%. As respondent's land size increases, livelihood income increases by 10.6%. This is in line with *a priori* expectation as increase in land size cultivated should translate to higher level of production which will go a long way in enhancing the income of the farming households.

Table 11: Multiple regression result showing the effect of land market participation and urbanization on livelihood income of the respondents

Livelihood	Coefficient	Standard Error	P Value	Marginal Effect
Land Market Index	-0.092275	0.04309	0.034	-0.092**
Urbanicity Index	0.040243	0.07156	0.575	0.040
Sex	0.132015	0.04580	0.004	0.132***
Nativity Status	-0.015532	0.03970	0.696	-0.016
Age	-0.002171	0.00167	0.194	-0.002
Household Size	0.016084	0.00555	0.004	0.016***
Years of Formal Education	0.002321	0.00383	0.545	0.002
Non-farm Work	0.069690	0.03166	0.029	0.070**
Access to Credit	-0.034671	0.04233	0.414	-0.035
Livestock Farming	0.190982	0.08830	0.032	0.191**
Number of Farm Plots	-0.033602	0.02262	0.139	-0.034
Total Land Size	0.106011	0.01118	0.000	0.106***
Constant	0.113382	0.10946	0.302	0.113

Number of observations = 202
F (12, 189) = 20.16
Prob > F = 0.0000
R-squared = 0.5614
Root MSE = 0.21096
Source: Data Analysis, 2019
*Note: the symbols ***, **, * represent significance at 1%, 5% and 10% respectively*

CONCLUSION AND RECOMMENDATION

The socio-economic characteristics of households in the peri-urban area differ across the three urban categories; low urban, semi-urban and high urban. Non-market based land transaction is still prominent among households in the low-urban category while land market participation is more among households in the semi urban and high urban categories. Urbanization influences land market participation negatively due to urban functions which are able to increase land values. Also, land market participation affects the livelihood income of households negatively due to the implicit effect of urbanization such that households now see other non-land based livelihood activities as more economically rewarding than engaging in farming which is still primarily land based. However, positive urbanization effect on livelihood income through non-farm work brought about by urban functions, though not presently significant on household livelihood income, is definitely one to look out for.

Urbanicity index significantly influences household participation in land markets negatively. Policy effort aimed at making native and non-native farmers to acquire land with ease will be a potent tool in increasing farm size, which in turn should help increase households' livelihood income. This, however, calls for a more in-depth integration between the various arms of government and the ministries involved. Reforms aimed at increasing tenure security would necessarily impact on the functioning of land markets as this will assist in productive land distribution.

Engagement in livestock farming has a significant positive relationship with farming households' livelihood income. Therefore, with the continued shortage in the supply of animal protein in the country, crop farming households in these peri-urban areas should be encouraged to participate more in this aspect of agriculture. Incentives and extension services should help improve this area.

Engagement in other non-farm livelihood activities has a significant positive relationship with farming households' livelihood income. Therefore, farming households in these peri-urban areas should be encouraged and educated to participate more in viable non-farm activities to increase their livelihood income

REFERENCES

Adelekan, I. O. (2010). Urbanization and Extreme Weather: Vulnerability of indigenous populations to windstorms in Ibadan, Nigeria. Department of Geography, University of Ibadan, Nigeria. 65pp

Adelekan, I., Olajide-Taiwo, L., Ayorinde, A., Ajayi, D. and Babajide, S. (2014). Building Urban resilience: Assessing Urban and Peri-urban Agriculture in Ibadan, Nigeria. [*Padgham, J. and J. Jabbour (eds.)]*. United Nations Environment Programme (UNEP), Nairobi, Kenya.

Agboola, O. M. (2017). Rural Land Market, Livelihood and Welfare among Households in Oyo State. *An Unpublished MSc. Thesis* submitted To the Department of Agricultural Economics, University Of Ibadan. Pp 31-33.

Anene, J. O. (2008) "The Establishment and Consolidation of Imperial Government in Nigerian cities", Paper presented at the conference organized by Nigerian Institute for Social and Economic Research (NISER) Ibadan.

Bamire, A. S. and Fabiyi Y. L. (2002). Adoption pattern of fertilizer technology among farmers in the ecological zones of South-Western Nigeria: A Tobit analysis. *Australian Journal of Agricultural Research*. 53:901-910.

Bizimana, C. (2011): "Determinants of land rental markets: Theory and econometric evidence from rural Rwanda" *Journal of Development and Agricultural Economics.* 3(4): 183-189.

Bryan, R. (2002) Cities of Peasants, Edward Arnold, London, Pp. 9.

Chambers, R. (1997). Whose Reality Counts: Putting the First the Last. Immediate Technology Publications, Southampton, London, UK.

Chambers, R. and Conway, G. R. (1992). Sustainable Rural Livelihoods. Practical Concepts for the 21st Century, Discussion Paper. Institute of Development Studies

Chokor, B. A. (1986). "City profile – Ibadan", Cities 3, pp 106-116

Cockx, L., Colen, L. and De Weerdta, J. (2017). From Corn to Popcorn? Urbanization and

Food Consumption in sub-Saharan Africa: Evidence from Rural-Urban Migrants in Tanzania.

Food and Agricultural Organization, FAO (2006). The State of Food Insecurity in the World. Food and Agriculture Organization of the United Nations. Viale delle Terme di Caracalla, 00153 Rome, Italy.

Fourchard, L. (2003). Urban slums reports: The case of Ibadan, Nigeria. *IFRA. University of Ibadan, Ibadan, Nigeria*.

Gbadegesin, A. S. (1991), Farming in the Urban Environment of a Developing Nation: A Case Study from Ibadan in Nigeria. *The Environmentalist,* 11(2): 102-111.

Hammond, S. V. (2002). Can city and farm coexist? The agricultural buffer experience in California. Great Valley Center Agricultural Transactions Program. Available on-line at: http://66.42.64.231/publications/agpubs/buffer study.pdf.

Kline, J. D., Alig, R. J., Lichtenstein, M. (2004). Urbanization on the US landscape: looking ahead in the 21st century. *Landscape Urban Plann*ing, 69: 219–234.

Kobe, I., Ojediran, O., Fakayode, B., Ajibade, B., Belewu, Y. and Daudu, K. (2017). Economic Assessment of Agricultural Land Market in Rural Nigeria: Pattern and Drivers. *Journal of Land and Rural Studies* 6(1) 50–66

Lasun, M. O. (2006). Land reform-experience from Nigeria: Promoting land administration and good governance: 5th FIG Regional Conference. Accra, Ghana.

Liao, C., Tan, Y., Wu, C., Wang, S., Yu, C., and Cao, W. (2016). City Level of Income and Urbanization and Availability of Food Stores and Food Service Places in China. Plos ONE 11(3): e0148745. Doi: 10.1371/journal.pone.0148745

Mahoney, A., Eicken, H. and Shapiro, L. (2007). Determinants of Land markets: Why are they required and how will they develop? *Journal of Development and Agricultural Economics* 3(4):183-189.

McGranaham, G., Satterthwaite, D., and Tacoli, C. (2010). Urbanization and Its Implication for Food and Farming. *Journals of philosophical transactions B.* United States national library of medicine, national institution of health. Retrieved from www.ncbi.nlm.nih.gov/pmc/articles/pmc2935117/

Mehaina, M., El-Bastawissi, L. and Ayad, H. (2016). The comprehensive urbanization level index (CULI) as a new approach to reclassifying urban and rural settlements in Egypt. *WIT Transactions on Ecology and The Environment*, 204, WIT Press. doi:10.2495/SC160261.

National Population Commission, 2006. Report of Nigeria's National Population Commission on the 2006 Census. Population and Development Review, 33(1): 206-210.

Okoruwa, V. O. and Ikudayisi, A. (2018). Urbanization and Food Security: Empirical Evidence from Households in Urban Southwest Nigeria. 2018 Conference, July 28-August 2, 2018, Vancouver, British Columbia 277053, International Association of Agricultural Economists.

Orum, A. (2005). Urbanization. In Ritzer G. (Ed.), E*ncyclopedia of social theory*. Pp.853-859. Thousand Oaks, CA: *SAGE publications*, Inc. https://doi.org/10.4135/9781412952552.n318

Sada, P. U. (1999) "The rural urban fringe of Lagos: population and Landuse. Southern Nigeria, 1891 – 1904", London, Pp.305 – 6 *The Nigerian Journal of Economics and special studies*, 12: 225- 41.

Saiyangoku, A. I. (2011). Five effects of urbanization. Retrieved on 20th February 2019 from https//www.slideshare.net/saiyangoku/5effects-of-urbanization.

Shearer, E., Lastarria-Cornhiel, S. and Mesbah, D. (1991). The Reform of Rural Land Markets in Latin America and the Caribbean: Research, Theory, and Policy Implications. LTC Paper 141, Land Tenure Center, University of Wisconsin–Madison.

Ukaejiofo, A. N. (2009). Identifying appropriate tools for land governance in Nigeria. Spatial data serving people: Land governance and the environment-building the capacity. Hanoi, Vietnam

United Nations, (2014) World Urbanization Prospects: The 2014 Revision (United Nations, Department of Economic and Social Affairs, Population Division, New York) Available at www.un.org/en/development/desa/publications/2014-revision-worldurbanization-prospects.html

United Nations (2017). Department of Economic Research and Social Affairs, Population Division. World Urbanization Prospects: The 2017 Revision.

World Bank (2016). Data report on agricultural land. Retrieved from http://data.worldbank.org/indicator/AG.LND.AGRI.K2

Zhou, S. and Awokuse, T. O. (2014). Urbanisation, nutrition transition and obesity: evidence from china. Selected paper prepared for presentation at the Agricultural and Applied Economic Association's AAEA annual meeting, Minneapolis, July 27-29, 2014

Farmers' willingness to use one-stop agricultural extension services support centre in Oyo State Nigeria

[1]Olajide, B. R. and [2]Oyebode, L. A.
[1]Department of Agricultural Extension and Rural Development, Faculty of Agriculture, University of Ibadan, Ibadan, Nigeria
[2]Department of Agriculture, College of Agriculture, Food Science and Technology, Wesley University, Ondo, Nigeria
Correspondence details: r.olajide@gmail.com

ABSTRACT

Owing to the complexities associated with accessing inputs, requisite information and other ancillary services by farmers, one-stop agricultural extension service support centre was launched by the Federal Government. In anticipation of its take-off in Oyo state, this study assessed farmers' willingness to use the services offered by the support centre. Deploying multistage sampling procedure, a total of 123 farmers were sampled to elicit data. Majority of the sample subjects were male (65.8%), married (87.0%) and had an average age, household size and net monthly income of 42.01±12.01years, 5.75±2.07persons and ₦41,219.51k±₦37,063.14k, respectively. Farming experience and farm size were 7.48±5.17 years and 6.19±10.71acres, respectively. Mechanization service ($\overline{x}$=2.10) and market information service ($\overline{x}$=1.99) were preferred most among the proposed services in the centre. Practicability of services offered ($\overline{x}$=1.89) and inability to appropriately communicate information in the service package ranked highest as anticipated constraints to effectively accessing proposed services. Willingness to use these services was high (76.0%) with market information services ranking highest ($\overline{x}$=2.07). The study established relationship between marital status (χ^2=160.157), farming experience (r= 0.018), farm size (r= 0.351), farmers preference' (r=0.766), anticipated constraints (r=0.617) and farmers' willingness to use one-stop agricultural extension services support centre. From the foregoing, it is recommended that the proposed project be upheld, however, mechanization and market information services be given priority to ensure that its overall objective and deliverables have far-reaching effect.

Keywords: Farmers' Willingness, One-Stop agricultural extension services, Farmers' preference.

INTRODUCTION

The strategic position agriculture occupies in Nigeria's economy makes its development imperative. In the recent times and in the face of dwindling fortune of Nigeria's economy from its mono-economy and heavy dependence on crude oil, development in agricultural sector is being prompted as credible alternative and a condition for long term sustainable economic growth (NAERLS, 2010). It has been widely acknowledged that no other sector touches the general wellbeing of the rural majority as agriculture does, in terms of income generation, employment creation, poverty reduction, economic growth and the food security needs of the population (NFR-NFCO, 2010).

Over the years, central to this achievement in agriculture is the smallholder farmers that have been sustaining food and agricultural production in the country. Therefore, efforts have continually being geared towards the empowerment of small holder farmers with the belief that it will impact on the total picture of agricultural development in the long run. The Federal Ministry of Agriculture and Rural Development, with the new Agricultural Promotion Policy (APP), the "Green Alternative", is adopting a holistic approach and has one of its pillars to enhance farmers' education and communication (dissemination of extension messages of farmers) (FMARD, 2016). It focuses on increased production, addressing issues in the entire value chain and improved market access.

Most of the studies agree that the Agricultural Development Programmes (ADP) have made significant impact on agricultural production in Nigeria, especially in the a areas of increased agricultural output and income as well as improved rural livelihood (Okuokenye & Okoedo-Okojie, 2014 and Omonijo *et al*, 2014). However, not all the objectives of the programme have been successful. Specifically, the provision of credit facilities (Omonijo *et al*, 2014) and infrastructural developments (Adamu & Mohammed, 2009). Furthermore, despite the perceived positive impact of the ADP in agricultural outputs and income, findings also indicate that there are challenges currently being faced by the programme in a significant number of the states where it is being implemented.

These challenges could erode the credibility and worsen growing concerns about the collapse of the

project if urgent steps are not taken to mitigate the challenges. The major challenges include inadequate funding, mainly as a result of the inability of critical stakeholders, especially the federal government and state governments to fulfill their financial obligations to the programme as and when due after the end of the World Bank intervention over the years (Omonijo *et al*., 2014; Auta & Datwang, 2010; Okuokenya & Okoedo-Okojie, 2014; Chukwuemeka & Nzewi, 2011).

In a bid to address some of the challenges faced by the ADP, a one-stop Agricultural Extension Service Delivery Centres in all the Seven Hundred and Seventy-Four (774) Local Government Areas (LGAs) was proposed. It seeks to bring technology and innovation to the doorsteps of the farmers in the 774 LGAs of Nigeria. The one-stop extension services is proposed as a lead strategy for the strengthening and reforming agricultural extension innovation delivery systems in Nigeria in a holistic and coordinated manner using a multiplicity of approaches including e-extension/knowledge management, innovation platform/farmers' learning points and establishment of farmer delivery in the 774 LGAs to reach the teaming population of farmers in Nigeria (FMARD, 2016).

The strategic objectives of the one-stop Agricultural Extension Service Delivery (AEDS) centre include providing an easy access to multi-purpose extension services, access to quality inputs and agricultural market information. The centre will attract agro dealers and other vendors to show-case, demonstrate and sell their products (inputs) and services to farmers and other end-users. The facility will also be used to host exhibitions and demonstration of value adding services to farmers and other stakeholders. It is a market place for agriculture offering services under the following thematic areas: soil testing services, agro-meteorological services, agro-input services, mechanization services, technology demonstration and adoption services, information and communication technologies kiosk services, market information service, access to agricultural extension agents and loan/credit sourcing services.

The pilot phase of one-stop agricultural extension services support centre has been launched in few states across the country and there are plans to replicate it across the country as outlined in the implementation document. It is against this background that the study looked at farmers' willingness to use the one-stop agricultural extension services support centre in Oyo state. vis a vis the services it intends to offer farmers. It is hoped that this will further address growing concerns and place in perspective issues relating to its implementation and eventual utilization.

The study sought to achieve this through the following objectives:

1. describe the social economic characteristics of the farmers in the study area;
2. describe the enterprise characteristics of the farmers in the study area;
3. ascertain farmers' preference for services offered by the support centre;
4. identify anticipated constraints to accessing services offered by the support centre;
5. determine farmers willingness to use one-stop agricultural extension services support centre.

METHODOLOGY

The study was carried out in Oyo State Nigeria. Oyo state covers approximately 28,454 square kilometres. It is homogeneous, mainly inhabited by the Yoruba ethnic group, its indigenes mainly comprise the Oyos, the Oke-Oguns, the Ibadans and the Ibarapas. The climate of the state favours the cultivation of maize, yam, cassava, millet, rice, plantains, cocoa and cashew. The population of the study comprised all farmers in the state. A multi stage sampling procedure was used to select respondents for the study. In the first stage Saki Agricultural Development Programme (ADP) was purposively selected because of the prospect of hosting the proposed pilot centre for the one-stop shop. In the second stage, out of 30 blocks, 20% of the blocks in the zone was selected which gave a total of 6 blocks. In the third stage, out of 20 cells, 10% were randomly selected. Each cell constitutes a group of farmers with 70 members of which 123 farmers were interviewed.

Variables assessed includes socio-economic characteristics (sex, marital status, age, household size, average net monthly income), enterprise characteristics (enterprise primarily engaged in, farming experience and farm size) and anticipated constraints to accessing the services provided by the support centre. This was elicited by presenting a set of anticipated constraints from which the respondents rated severity from a response option of severe constraint, mildly severe, not severe and not a constraint with scores of 3, 2, 1 and 0 assigned respectively. The grand mean was used in isolating the anticipated constraints to accessing the services provided. Other variables are farmers' preference of services provided by the support centre and willingness to use one-stop agricultural extension service delivery centre. Both variables were measured by presenting a set of services that

the service centre offers, while preference was operationalized as highly preferred, preferred, moderately preferred, and not preferred, willingness to use was operationalized as highly willing, willing, moderately willing and not willing. Scores of 3, 2, 1 and 0 was assigned in the measurement of both variables. Data were collected using interview schedule and analyzed with descriptive (frequency, percentage, means) and inferential (Pearson Product moment Correlation) statistics at p=0.05.

RESULTS AND DISCUSSION

Socioeconomic characteristics

Data in Table 1 reveals that 65.9% of the respondents were male. This distribution further attests that we have a preponderance of male to female engaged in on-farm operations, this is partly due to the labour demands and drudgery associated with farming. Majority (87.0 %) of the respondents were married. It is noticed that this status comes with some responsibilities, hence its most likely that the respondents will be willing to make use of this initiative that will enable them boost their economic activities and raise income to meet with marital responsibilities. This view is supported by Nnadi and Akwiwu (2008) that marriage increases a farmer's concern for household welfare and food security which is therefore likely to have a positive effect on their decision to participate in an agricultural project.

Table 1 presents an average age of the respondents as 42.01±12.01 years. It is appropriate to capture the respondents within the productive age. Hence, they are still active, enterprise conscious and can cope with the labour demands of their enterprise. Also they will be willing to make use of the one stop service centre and take advantage of the resources provided by this strategy to enhance their enterprise. Table 1 further reveals that the respondents had a fairly large (6.0±2.07 persons) household size. This depicts that the respondents have reasonable supply of labour that can augment the labour demands of their enterprise while they access the services offered by the support centre. Table 1 also reveals that respondents earned an average of ₦41,219.51k ± ₦37,063.14k as net monthly income. Considering present economic indices in the country, this is not encouraging. However, it surpasses the minimum wage paid to public servants. It further suggests that they will be willing to make use of the services offered by the support centre to boost production which will in turn impacts their income.

Table 1: Distribution of respondents by their socio-economic characteristics (n=123)

Variables	Frequency (percentage)	Mean and standard deviation
Sex		
Male	81 (65.9)	
Female	42 (34.1)	
Marital status		
Single	12 (9.8)	
Married	107 (87.0)	
Divorced	2 (1.6)	
Separated	2 (1.6)	
Age		
20-32	59 (48.0)	42.01±12.01
33-45	57 (46.4)	
46-58	7 (5.6)	
Household size		
1-3	30 (24.4)	5.75±2.07
4-6	86 (69.9)	
7-9	7 (5.7)	
Average net monthly income (₦)		
10,000-47,000	37 (30.1)	41,219.51±37,063.14
47,001-84,000	66 (53.7)	
84,001-121,000	18 (14.7)	
121,001-158,000	2 (1.6)	

Source: Field Survey, 2018

Enterprise characteristics of respondents

Table 2shows that a fair share (58.2%) of the respondents primarily engaged in crop farming, compared to 30.9 % and 10.6% who were engaged in livestock farming and fish farming, respectively. Their engagement in crop production could be attributed to the reduced risk associated with this venture when compared with the others. However, it is appreciated that they may be primarily engaged in this venture, they are also engaged in other farming venture as it is the usual characteristic of farmers to practice mixed farming in a bid to have alternative source of income and spread risk. Average farming experience was 7.48±5.17 years. This establishes that they are not novice in their respective ventures. This attests that they would have been sufficiently equipped to identify the services that they are in need of vis a vis the services they would be willing to use from the support centre when inaugurated. Table 2 also reveals that they have expanse of land ($\overline{x}$= 6.17 acres), with this land area the respondents will be willing to make use of services proffered by the support centre to boost their production and maximize this land area.

Table 2: Distribution of the respondents by enterprise characteristics (n=123)

Variables	Frequency (percentage)	Mean and standard deviation
Enterprise primarily engaged in		
Crop farming	72 (58.5)	
Livestock farming	38 (30.9)	
Fish farming	13 (10.6)	
Farming experience (years)		7.48±5.17
1-6	105 (85.4)	
7-12	13 (10.6)	
13-18	5 (4.0)	
Farm size (Acres)		6.19±10.71
1-12	117(95.1)	
13-24	6 (4.9)	

Source: Field Survey, 2018

Farmers' preference of the services offered by the support centre

Mechanization services ($\overline{X}$=2.10), market information services ($\overline{X}$=1.99) and technology demonstration and adoption services ($\overline{X}$=1.98) ranked highest as services most preferred by the farmers among the proposed services in the one-stop agricultural extension services support centre as shown in Table 3. Their preference for mechanization could be hinged on the need to ease-off the use of crude tools and implement, increase acreage cultivated and replace the associated costs incurred from using human labour in production. Mechanization has become a topic of interest as labour rates for farm operation continue to rise in Nigeria, as of 2015, only two percent of farmers reported to be engaged in agricultural mechanization (Mba, 2017). The preference for market information services may be informed by their desire to make remunerative income from the sale of their produce. Poor bidding processes and weak marketing structure has been contributory factors of poor income from produce of farmers, hence their preference to seek relevant information that will enable them enhance sale. The need to be abreast with modern production technologies would have informed their preference for technology demonstration and adoption services. It is worthy to note that modern technology confers greater advantages one of which is increased output when compared with practicing stale technology.

Also preferred were agro-input services ($\overline{X}$=1.95) and loan/credit sourcing services ($\overline{X}$=1.95). The preference for these services could be hinged on the need to curtail the challenges they face when sourcing for agricultural input. The provision and supervision of this service by the extension personnel at the service centre has equally been advocated for by previous policy documents, with this, the constraints associated with accessing inputs by farmers will no longer be experienced. In addition to a department of extension and a national extension policy, the Agricultural Extension Transformation Agenda also intended to ensure provision of seeds, fertilizers and credit without (FMARD, 2012). Access to loans under friendly terms (mild collateral requirements, low interest rates and flexible pay back duration) is noticeable among some of the demand of farmers; hence, preference for this service is not surprising.

Table 3: Distribution of farmers by preference of the proposed services by the support centre (n=123)

Services offered by the support centre	HP	P	MP	NP	WM	Rank
Soil testing services	52 (42.3)	55 (44.7)	16 (13.0)	-	1.86	7th
Agro-meterological services	54 (43.9)	46 (37.4)	19 (15.4)	4 (3.3)	1.80	8th
Agro-input services	68 (55.3)	37 (30.1)	18 (14.6)	-	1.95	4th
Mechanization services	71 (57.7)	42 (34.1)	10 (18.1)	-	2.10	1st
Technology demonstration and adoption services	78 (63.4)	26 (21.1)	14 (11.4)	5 (4.1)	1.98	3rd
Information and communication Technologies kiosk services	55 (44.7)	42 (34.1)	24 (19.5)	2 (1.6)	1.80	8th
Market information service	66 (54.1)	45 (36.9)	11 (9.0)	-	1.99	2nd
Access to agricultural extension agents	55 (44.7)	55 (44.7)	11 (8.9)	2 (1.6)	1.88	6th
Loan/credit sourcing services	60(48.8)	42(34.1)	28 (22.8)	8 (6.4)	1.95	4th

HP: Highly Preferred, P: Preferred, MP: Moderately Preferred, NP: Not Preferred, WM: Weighted Mean. Source: Field Survey, 2018

Anticipated constraints to effectively access services offered by the support centre

Table 4 identifies practicability of services offered ($\overline{X}$=1.89), inadequate extension personnel at the support centre ($\overline{X}$=1.88) and intermittent supply of services ($\overline{X}$=1.84) as anticipated constraints to accessing services proposed by the one-stop agricultural extension delivery support centre. The practicability of intended services may stem from the age long reservations expressed towards government policy, perhaps, rightly so, due to policy somersaults in the recent past. Also, failure in the past for such programme to optimally benefits the clientele may account for this posture, which is a potential threat to the success of this novel idea.

The dearth of extension personnel has been a growing concern in the discharge of extension services in the country. With this, it was not surprising it was identified as an anticipated constraint in accessing the services offered by the support centre. This is consistent with FMRAD (2012) that extension agent coverage was one agent to 1,000 – 1,500 farm families. The possibility that these services may not be regularly available when sought after was also a concern. This may discourage the farmers from further seeking services from the support centre, thus undermining the achievement of its laudable objectives.

Table 4: Distribution of farmers by anticipated constraints to accessing proposed services by the support centre (n=123)

Anticipated constraints to effectively access services offered	Weighted mean	
High cost of services offered	1.57	7th
Practicability of services offered	1.89	1st
Waning interest in the support centre	1.75	4th
Sharp practices by personnel of support centre	1.71	6th
Inability to appropriately communicate information package of service	1.74	5th
Inadequate extension personnel at the support centre	1.88	2nd
Intermittent supply of services	1.84	3rd

Source: Field Survey, 2018

Willingness to use one-stop agricultural extension services support centre

Available data in Table 5 reveals that market information services ($\overline{X}$=2.07), loan/ credit sourcing services ($\overline{X}$=2.04), and mechanization services ($\overline{X}$=2.03) ranked highest among the services the respondents were willing to use. Their willingness to make use of market information may be premised on the fact that this service is the high point of the entire production value chain. With this service they will be able to obtain prompt and relevant information on the supply and demand dynamics of their produce, make informed choices on the sale of their produce from various options that will be presented, thereby make remunerative sale from their produce.

In a bid to sustain the activities of their enterprise, expand the scale of production or probably take advantage of other complementary services offered would have informed their willingness to make use of the loan/credit sourcing services. It is also prominent to state that this service is not likely to follow the path of other formal credit/loan services

farmers make use of which often is fraught with untimely release of funds, short duration of payback, high interest rates, complex collateral requirements among others. The drudgery associated with agricultural activities, the desire to expand scale of production, increase their pace of work and enhance economics of scale among others would have prompted their willingness to make use of the mechanization services offered by the support centre.

Technology demonstration and adoption service ($\overline{x}$=1.94) and agro-input services ($\overline{x}$=1.92) were also identified as services respondents were willing to use. In a bid to be abreast with latest technology deployed in production, the respondents will be willing to use this service. Identified as one of the key mandates of agricultural extension is dissemination of improved technologies, hence the delivery of this service was also notable among those proposed services and willing to be used by the respondents. The fundamental objective of agricultural extension program is to help the farm i.e., holding to gain new information and develop new abilities, as well as to apply directly on the farm the latest scientific knowledge (transfer of technology) (Dragic, Sreten and Zoran, 2009). Willingness to use agro input services may be as a result of the desire to remove the bottleneck experienced when sourcing inputs which include but not limited to supply of substandard inputs, delay in supply of inputs, a trim down in quantity supplied among other sharp practices.

Table 5: Willingness to use one-stop agricultural extension services support centre (n=123)

Services offered by the support centre	HW	W	MW	NW	WM	Rank
Soil testing services	5 (40.7)	60 (48.8)	13 (10.6)	-	1.87	7th
Agro-meterological services	53 (43.1)	53 (42.3)	18 (14.6)	-	1.85	8th
Agro-input services	64 (52.0)	40 (32.5)	19 (15.4)	-	1.92	5th
Mechanization services	76 (51.8)	33 (26.8)	14 (11.4)	-	2.03	3rd
Technology demonstration and adoption service	69 (56.0)	27 (30.1)	13 (10.6)	4 (3.3)	1.94	4th
Information and communication Technologies kiosk services	53 (43.1)	50 (40.7)	12 (9.8)	8 (6.5)	1.79	9th
Market information service	78 (63.4)	35 (28.5)	10 (8.1)	-	2.07	1st
Access to agricultural extension agents	66 (53.7)	42 (34.1)	15 (12.2)	-	1.88	6th
Loan/credit sourcing services	70(56.9)	47 (38.2)	6 (4.9)	-	2.04	2nd

HP: Highly Willing, W: Willing, MW: Moderately Willing, NP: Not Willing, WM: Weighted Mean
Source: Field Survey, 2019.

Categorization of willingness to use one-stop agricultural extension services support centre

Data in Figure 1 shows that on the overall, majority (78.8%) of the respondents were willing to use the one-stop agricultural extension services support centre. Their willingness to make use of this centre is attributed to the myriads of benefits they would derive from the support centre which will eventually increase productivity. From the statistics, one can conclude that if implemented, the objective of the one-stop agricultural extension services support centre which include but not limited to bringing technology and innovation to the doorsteps of farmers, providing easy access to multi-purpose extension service will be attained.

Figure 1: Categorization of farmers' willingness to use one-stop agricultural extension services support centre
Source: Field Survey, 2018

Hypothesis testing

In Table 6, it is revealed that significant relationship existed between marital status (χ^2= 160.167), farming experience (r= 0.018), farm size (r= 0.351), farmers' preference among the services offered (r= 0.766), anticipated constraints to accessing the services offered (r= 0.617) and farmers' willingness to use one-stop agricultural extension services support centre. Owing to the responsibilities attached to marriage, the respondents will be favourably disposed to making use of the services provided by the support centre to increase productivity and income. Increase in farm size and farming experience depicts that they are not novice hence, they would have identified the immense benefit attached to making use of the services of the support centre, thus increase in these variables made them more attuned to the use of the support centre. The established relationship between farmers' preference among services offered and willingness to use the support centre is ascribed to the fact they have observed that these services will sufficiently address production related constraints hence, their willingness to use the proposed services in the support centre to address such. The observed benefits far outweighing the constraints will be a sufficient reason for their willingness to use these services despite its anticipated constraints

Table 6: Relationship between causal variables and willingness to use one-stop extension services support centre

Variable	χ^2	r	p
Marital status	160.157		0.000
Farming experience		0.018	0.040
Farm size		0.351	0.000
Farmers' preference among the services offered		0.766	0.000
Anticipated constraints to effectively accessing services offered		0.617	0.000

Source: Field Survey, 2018

CONCLUSION AND RECOMMENDATIONS

From the foregoing; the study concludes that mechanization and market information services were most preferred of all the identified services being proposed by the support centre. Practicability of the services offered by the support centre and inability to appropriately convey information of service package were prominent as anticipated constraints to accessing services offered. Willingness to use one-stop agricultural extension services support centre was high with marketing information and loan/credit sourcing services prominent among the services they are willing to use. Owing to the profound willingness to use the one-stop agricultural extension services support centre, the study recommends that the idea is sustained with emphasis placed on effective communication of service packages to clientele while mechanization and market information services should be accorded attention to enhance overall effectiveness of the initiative.

REFERENCES

Adamu, M. U., and Mohammed, W. A. (2009). The effect of agricultural development project (ADP) on the rural farmers in Adamawa state, Nigeria. *Asian Journal of Agric and Rural Dev.*;2(3):405–410.

Auta, S. J., and Dafwang, N. (2010). The agricultural development projects (ADPs) in Nigeria: Status and policy implication. *Res J Agric Biol Sci.*;6(2):138–143.

Chukwuemeka, E. and Nzewi, H. N. (2011): An empirical study of World Bank agricultural development programme in Nigeria. *American Journal of Social and management Sciences.* 2011;2(1):176–187. 10.5251/ajsms..2.1.176.187

Dragic, Z., Sreten, J. and Zoran, R. (2009). Agricultural Extension in the Function of Rural Development. Paper prepared for presentation at the 113th EAAE Seminar "The role of knowledge, innovation and human capital in multifunctional agriculture and territorial rural development", Belgrade, Republic of Serbia December 9-11

Federal Ministry of Agriculture and Rural Development: The Extension Transformative Group (2012). *Final Report of the Agricultural Extension Transformation Component of the Agricultural Transformation Agenda.* Nigeria: FMARD.

FMARD (2016): Federal Republic of Nigeria: New Agricultural Policy Thrust "Federal

Ministry of Agriculture and Rural Development, Abuja.

Kolawole, A; Motunrayo, S; Suresh C. B and Rahman, S. (2015). "Private Sector Participation in Agricultural Extension for Cocoa Farming in Nigeria: The Case of Multi-Trex Integrated Foods". https://www.sciencedirect.com/science/article/pii/B9780128022313000085. Accessed 22/11/2018.

Mba, E. (2017, February). *Problems and Prospects of Agricultural Mechanization in Nigeria, 5 December 2015.* Retrieved from InfoGuideNigeria https://infoguidenigeria.com/problems-and-prospectsgricultural-Mechanization.

NAERLS (2010): National agricultural Extension and Research Liaison Services. A Comparative Study of the Agricultural Extension Systems in Nigeria with Special focus on Personnel and funding (DRAFT ONLY)

NFRA-NFCO (2010): Third National Fadama Project Project (Fadama III): Volume: project Implementation Manual.

Nnadi, F. N., and Akwiwu, C. D. (2008): "Determinants of Youths' participation in Rural Agriculture in Imo State, Nigeria". Journal of Applied Sciences 8 (20): 328-333

Okuokenye, G. F. and Okoedo-Okojie, D. U. (2014): Evaluation of extension agents' commitment to the agricultural loans and inputs supply programme on special rice production in Delta state, Nigeria. *Journal of Applied Science and Environmental Management.* ;18(2):327–335. 10.4314/jasem.v18i2.25

Omonijo, D. O., Toluwase, S. O. W., and Oludayo, O. A. (2014): Impacts of Agricultural Development Programme (ADP) on Rural Dwellers in Nigeria: A Study of Isan-Ekiti. *International Research Journal of Finance and Economics*; 128:41–55.

Assessment of post-harvest losses in marketing of leafy vegetables in Oriade local government area of Ilesa: Implications for food security

[1]Alao, O. T., [1]Bamiwuye, O. A., [2]Agboola, T. O. and [2]Apantaku, I. E.
[1]Department of Agricultural Extension and Rural Development, Faculty of Agricultural Production and Management, Osun State University, Osogbo
[2]Department of Agricultural Economics and Agri-business Management, Faculty of Agricultural Production and Management, Osun State University, Osogbo
Correspondence details: alao40@yahoo.com

ABSTRACT

Leafy vegetables offer both nutritional benefits and great economic potentials in boosting food security, yet their perishable nature may lead to huge post-harvest losses and food insufficiency. The study assessed post-harvest losses in the marketing of leafy vegetables in Oriade Local Government Area (LGA) of Osun State. It describes the socio-economic characteristics of the leafy vegetable marketers, causes of post-harvest losses of leafy vegetables and compares the mean post-harvest losses by socioeconomic characteristics of the leafy vegetable marketers. A two-stage sampling procedure was used to select a sample of 120 leafy vegetable marketers from four purposively selected markets in the LGA (Ilo, Ijebu-Jesa, Ijeda and Iwoye). Primary data were collected with the aid of a structured interview schedule. Independent t-test and One-way analysis of variance were used to compare differences in mean losses. Results show that the respondents' mean age, household size and monthly income were 41.2 years, 4 people and N8,547.50, respectively. Majority of the respondents were female (70.8%) and had no formal education (62.8%). The three causes of post-harvest losses with highest weighted mean scores were the problem of insects and pests (2.39), the perishable nature of leafy vegetables (2.38) and the bad state of rural roads (2.35). The mean post-harvest losses during the dry seasons were significantly lower than the mean post-harvest losses during the raining seasons ($t=5.78$; $p<0.01$). In conclusion, pests/insects, bad roads and perishable nature of leafy vegetables were the most significant causes of post-harvest losses. Hence, extension officers should encourage farmers to use insecticides/pesticides to control pest and diseases on their farms; government should make rural roads accessible for easy transportation of vegetables and marketers should buy the quantity of vegetables they can sell in a day at a time.

Keywords: Food security, Leafy vegetables, Mean losses, Post-harvest

Introduction

Agriculture has been described as the backbone and resilient sustainer of the Nigerian economy and engine of national development in terms of provision of employment and livelihood for people of Nigeria (Izuchukwu, 2011; Mohammed, 2016 and Oluwaseyi, 2017). Nigeria is blessed with an abundance of natural resources sufficient enough to meet the food and nutritional requirement of the populace as well as to help other nations of the world.

One of the goals of Nigeria's agricultural development policy is to ensure that the nation produces enough food for all (Metu, Okeyika, and Maduka, 2016). Achieving this goal, however, has been a great challenge for many years and more challenging in recent times in the face of global coronavirus pandemic. Post-harvest losses in agricultural products have been attributed to the poor road network and transport problems (Gogo, Opiyo, Ulrichs and Huyskens-Keil, 2018). With the attendance restriction in movement due to COVID-19 pandemic, such losses may increase drastically thereby contributing to the food insecurity situation in Nigeria. According to Ilaboya, Atikpo, Omofuma, Askhame and Umukoro (2012), facilitating access of agricultural products to market is one of the effective ways of ensuring food security. Not only that agricultural product should get to the market, but they should also get to the final consumers in good quality and time.

Vegetables are important sources of vitamins and minerals needed for the maintenance of good health and its production has great economic potential in boosting food security. Marketing of vegetables also provides employment opportunities for many Nigerians and also serve as a source of livelihood. Although vegetables are of great nutritional value, they are perishable except under intensive care through harvest and post-harvest process.

Vegetables are edible seeds, root, bulb, stem, tuber or leaves of any numerous of herbaceous plant that can be consumed fresh either cooked or raw by man (Sinha, Hui, Evranuz, Siddiq, and Ahmed, 2010). Vegetables can be classified into three – leafy vegetables, fruity vegetables and root

vegetables. According to Alvino and Barbieri (2016), leafy vegetables are a wide group of horticultural plants that roughly can be defined as "vegetables cultivated for the edible part constituted of foliar structures, comprising lamina, petiole, midrib and veins". Common examples of leafy vegetables in Nigeria include lettuce, cabbage and amaranths. In terms of the nutritional benefits, leafy vegetables are the most nutritious food plants that provide essential micronutrients and vitamins to meet the daily nutrient requirements for human diet (Iheanacho *et al.,* 2009). The low caloric value of leafy vegetables also makes them ideal for weight management and can offer numerous health benefits including reduced risk of obesity, cardiovascular disease and high blood pressure (Ejoh *et al.,* 2007; Ejoh and Samuel, 2016). Leafy vegetables are found almost everywhere and there has been an increase in the trading and commercial activities of these produce and products.

Post-harvest loss may occur for instance, if there is poor management at pre and post-harvest stages and poor handling of produce during transit and storage. Post-harvest loss of any agricultural produce may also threaten the sustainable use of scarce resources for food production (Kitijonga, 2010, Munhuewyi, 2012). Elimination of post-harvest losses in the marketing of leafy vegetables is important to boost food security and availability and also prevent waste of human effort, farm inputs, investments and scarce resources such as water, seed, fertiliser, soil nutrient (Adeyemi, 2010). Despite the nutritional benefits and economic advantage of leafy vegetables, the evidence is scarce in the literature on post-harvest losses of agricultural produce such as leafy vegetable in Nigeria except for the work of Adebooye and Farinde (1997) on review of postharvest losses in fruits and vegetables in Nigeria over two decades ago. Although Olayemi *et al.,* (2012) assessed postharvest losses of some selected crops in eight LGAs in Rivers State, Nigeria less than a decade ago, their emphasis, however, was not on leafy vegetables. Most of other studies on vegetables and leafy vegetables in Nigeria either addressed the chemical components of leafy vegetables (Mensah *et al*., 2008; Sobukola *et al.,* 2010; Inam *et al.,* 2016 and Ajayi *et al.,* 2018); health benefits (Adegoke *et al*., 2018; Ejoh and Samuel, 2016); efficiency of production (Adeoye, 2020); or the mineral and nutritional composition (Iheneacho *et al*., 2009; Asaolu *et al.,* 2012; Akinwunmi, 2016; Oyedele, 2017; Okewole *et al*., 2018; Akintayo, 2019 and Sha'a *et al*., 2020). There is therefore, a dearth of much-needed data upon which policy and programmes addressing post-harvest losses of leafy vegetables can be based. Hence, this study assessed the postharvest losses in the course of marketing leafy vegetables among marketers in Oriade Local Government Area of Osun State, Nigeria. The study specifically:

i) described the socioeconomic characteristics of leafy vegetable marketers;
ii) identified the causes of post-harvest losses of leafy vegetables; and
iii) compared the estimates of the mean post-harvest losses by socioeconomic characteristics of the leafy vegetable marketers.

METHODOLOGY

The study was conducted in Oriade Local Government Area (LGA) of Osun State Nigeria. The LGA shared boundary with Ekiti State on one side and Ondo State on another. The study population consists of leafy vegetable marketers. A two-stage sampling technique was used to select a sample of 120 leafy vegetable marketers. In the first stage, four rural community markets were purposively selected in the LGA namely: Ilo, Ijebu-Jesa, Ijeda and Iwoye, based on their abundant production of leafy vegetable throughout the year and high concentration of vegetable marketers in the area. In the second stage, out of the list of 600 vegetable marketers provided by their Associations, a proportion of twenty percent (20%) was selected from each community market, thus, 50 marketers were selected out of a total of 250 in Ilo, 30 out of 150 in Ijebu-Jesa and 20 each out of 100 in Ijeda and Iwoye, respectively, making a total of 120 vegetable marketers in the LGA.

Primary data were collected with the aid of structured interview schedule on socioeconomic characteristics of the leafy vegetable marketers such as age, education, marital status, religion, gender, household size, monthly income and years of experience in leafy vegetable marketing. Data on types of leafy vegetables, post-harvest losses in leafy vegetables, three years preceding the survey (2016, 2017 and 2018), causes of postharvest losses, market constraints were also collected.

Descriptive statistics such as frequency distribution, means, standard deviation and weighted mean score were used to describe some variables of the study while independent t-test and one-way analysis of variance to compare differences in mean losses in leafy vegetables by socioeconomic variables.

RESULTS AND DISCUSSION

Socioeconomic characteristics of the leafy vegetable marketers

Table 1 shows the result of the description of the socioeconomic characteristics of the respondents engaged in leafy vegetable marketing. These characteristics included age, religion, gender marital status, household size, years of education, vegetable marketing experience, and membership of cooperative society as well as the annual income of leafy vegetable marketers.

Age of the respondents was 41.2±11.5 years. At least two-fifths (40.83%) were less than 40 years of age, while the bulk of the marketers (59.2%) were 40 years of age and above. This analysis shows that most of the marketers engaged in leafy vegetable marketing in the study area were at their middle age and as such have the energy to market leafy vegetables. The result of religious affiliations revealed the two major religions flourish in the study area with adherents of Christianity having dominance (47.5%) compared with Islamic religion (34.2%). Less than 1 in 5 of the marketers were not adherents of the two major religions in Nigeria. As expected, the percentage distribution of the respondents by sex showed that the bulk of the vegetable marketers were female (70.8%) compared with 29.2 percent of male who were into vegetable marketing. In terms of household size, more than half (54.2%) of the marketers had less than 4 people in their household, while 45.8 percent had 5 or more people in their households. The mean household size was 4.0±2.0 people. This suggests a moderate household size for the sample of the leafy vegetable marketers in the study. We classified education into three – those who have no education at all, those who have formal education and those who have adult education. We considered adult education as informal education (Obasi, 2014). Table 1 shows the distribution of the marketers according to these three categories of education. The majority (62.8%) of the leafy vegetable marketers in the sample had no formal education; 21.5 percent had one form of formal education or the other while 15.7 percent had adult education. This finding suggests that most of the marketers engaging in leafy vegetable marketing were not educated. A consideration of the marital status of the marketers also show that the majority (78.3%) were married as at the time of the survey while 10 percent were still single. A substantial percentage of the marketers were widowed, separated or divorced (11.7%).

Furthermore, results in Table 1 reveals that 65.0 percent of the marketers earned a monthly income of less than ₦10,000; at least 3 in 10 (30.8%) earned between ₦10,000 and ₦19,999 while less than 5 percent earned at least ₦20,000 per month. The leafy vegetable marketers earned between ₦2,300 and ₦30,000 monthly with a mean income of ₦8,547.5±₦4,518.73. By implication, on average, leafy vegetable marketing alone fetches at least ₦8,500 monthly for the marketers in the study area. This is less than the minimum salary of the civil servant of N18,000 per month.

The distribution of marketers according to membership of cooperative society shows that 62.5 percent of the vegetable marketers were members of cooperative society compared with 37.5 percent who were non-members. This shows that most of the leafy vegetable marketers belonged to a cooperative society and as such may have access to loan facilities to support their vegetable business.

Table 1: Distribution of the socioeconomic characteristics of leafy vegetable marketers (n=120)

Variable	Frequency	Percentage (100%)
Age		
Below 40 years	49	40.8
40 years or more	71	59.2
Mean/Std, 41.2 / 11.5 years		
Religion		
Christianity	57	47.5
Islam	41	34.2
Others	22	18.3
Gender		
Male	35	29.2
Female	85	70.8
Household size		
Less than 5	65	54.2
5 and above	55	45.8
Mean/Std, 4/2 persons		

Variable	Frequency	Percentage (100%)
Educational qualification		
No formal education	75	62.8
Formal education	26	21.5
Adult education	19	15.7
Marital status		
Single	12	10.0
Married	94	78.3
Others	14	11.7
Marketing experience (years)		
Below 10 years	49	40.8
10 years and above	71	59.2
Membership of the cooperative society		
Yes	75	62.5
No	45	37.5
Monthly income (₦) on Leafy vegetables		
Less than 10,000	78	65.0
10,000- 19,999	37	30.8
20000 and above	5	4.2
Mean/Std ₦8,547:50/ ₦4,518:73		

Source: Field Survey, 2019

Types of leafy vegetable marketed

Five types of leafy vegetables were reported by the marketers. These are *Telfairia occidentalis, Celosia argentea, Amaranthus hybridus, Corchorus olitorous* and *Solanum macrocarpon.* Results in Table 2 show that most marketers traded in more than one type of leafy vegetables. For example, 52.1 percent traded in *Amaranthus hybridus and Corchorus olitorous;* 27.4 percent traded in all the five vegetables while 14.1 percent traded in *Amaranthus hybridus* only. This finding shows that most of the marketer traded in at least two types of vegetables except for *Amaranthus hybridus.*

Table 2: Distribution of the respondents according to types of vegetable marketed (n=120)

Types of vegetables	Frequency	Percentage
Telfairia occidentalis	1	0.8
Celosia argentea	1	0.8
Amaranthus hybridus	17	14.1
Corchorus olitorous	2	2.1
Amaranthus hybridus & Corchorus olitorous	62	52.1
Telifairia occidentalis, Amaranthus hybridus and Corchorus olitorous	1	0.8
Amaranthus hybridus & Corchorus olitorous, solanum macrocarpon	3	2.5
All	33	27.3

Source: Field Survey, 2019

Causes of post-harvest losses of leafy vegetables

According to the leafy vegetable marketers, six causes of post-harvest losses were identified. Table 3 shows the six reasons identified as causes of post-harvest losses of leafy vegetables by the extent of post-harvest loss. The majority of the marketers ranked the problem of insects and pests as very high (47.5%) and moderately high (44.2%). Poor demand for leafy vegetable by consumers and market glut were each ranked moderately low by at least seven out of every ten marketers. The three causes of post-harvest losses with highest Weighted Mean Scores (WMS) were the problem of insects and pests (2.39) ranked number one, the perishable nature of leafy vegetables (2.38) ranked 2nd and the bad state of rural roads (2.35) ranked 3rd. The least of the six causes identified by the marketers was poor handling of vegetables. Earlier studies have also identified poor handling of leafy vegetables as a major cause of post-harvest losses (Gogo *et al.,* 2018; Apolot *et al.,* 2020), but it was the least of the causes according to this study among the marketers. Other studies have attributed physiological and environmental factors as the primary causes of post-harvest losses of vegetables (Sudheer and Indira, 2007) as a result of the perishable nature of leafy vegetables. Physiological

deterioration of freshly harvested leafy vegetables due to high temperature (Ladaniya, 2008) may affect the shelf-life and as such may reduce the nutritional quality of the product.

Table 3: Distribution of the marketers according to the causes of post-harvest losses (n=120)

S/N	*Causes of post-harvest losses	Very high	Moderately high loss	Low loss	**WMS	Rank
1.	The problem of insects and pests	57(47.5)	53(44.2)	10(8.3)	2.39	1
2.	The problem of the perishable nature of vegetables	54(44.6)	57(47.9)	9(7.4)	2.38	2
3.	The bad state of rural roads	55(45.8)	53 (44.2)	12 (10.0)	2.35	3
4.	Market glut	20(16.5)	84(70.3)	16(13.2)	2.03	4
5.	Poor demand for vegetable by consumers	12(9.9)	84(70.3)	24(19.8)	1.90	5
6	Poor handling of vegetables	26(21.5)	49(41.3)	45(37.2)	1.84	6

Source: Field Survey, 2019
*** Multiple responses**
****WMS =Weighted Mean Score**

Mean post-harvest losses in leafy vegetables by socioeconomic characteristics

Results in Table 4 compared the current estimates of mean post-harvest losses according to selected socioeconomic characteristics of leafy vegetable marketers during the dry and rainy seasons. The mean postharvest losses were higher in both dry and rainy seasons for younger marketers below age 40 years compared with their elderly counterparts who were 40 years or higher. This result indicates that younger marketers on the average recorded higher loss than the elderly. There may be many reasons for this finding. Firstly, the elderly marketers may be more experienced than the younger marketers in the marketing business. In another way, the younger marketers may be overzealous by buying more than what they could market in a day without taking cognizance of the perishable nature of the product. The mean difference in post-harvest loss by age of respondents was, however, not statistically significant. Male vegetable marketers on the average recorded a lower post-harvest loss in dry (₦615.71) and the rainy season (₦1,014.29) than the female marketers who on the average recorded ₦703.53 during the dry but higher (₦1,070.71) rainy season. Further analysis shows that the mean difference in postharvest losses between male and female marketers was not significant for both dry (₦615.71for male, ₦703.53 for female) and rainy seasons (₦1,014.29 for male, ₦1,070.71 for female). The implication of this finding is that post-harvest loss of leafy vegetable is independent of the gender of the marketers. Leafy vegetable marketers who had adult education on the average recorded the highest losses (₦2,036.84**)** compared with those who had formal education (₦1,833.08**)** and those with no education (₦1,620.00). However, the mean differences in post-harvest loss were not statistically significant. This finding also suggests that experience of post-harvest loss have nothing to do with the level of education of the marketer and as such loss may occur irrespective of the level or education.

A comparison of mean difference in post-harvest losses according to religious affiliation showed that Christians experience greater loss on the average during the dry season (₦706.14) compared with adherents of Islamic religion (₦652.43). The mean post-harvest loss was nearly the same between Christians and Muslims during the rainy season (₦1,085.26 vs ₦1,081.71). This indicates post-harvest loss does not necessarily happen as a result of religious affiliation. There were variations in mean post-harvest losses by the level of income with those in the middle category (₦10,000-₦19,999) reporting the highest loss in both dry and rainy seasons than those earning below ₦10,000 and those earning ₦20,000 and above. Leafy vegetable marketers who were members of cooperative society on the average reported a lower loss in both seasons compared with their counterparts who were non-members. Surprisingly, marketers with longer years of experience (10years and above) in vegetable marketing recorded higher loss (₦1,758.45) than those with less than 10 years in the business (₦1,694.08**).** This suggests that experience may not be enough in reducing post-harvest loss in vegetable marketing. Although some variations were recorded in the mean post-harvest losses by socioeconomic characteristics of the marketers, the losses were consistently higher during the rainy season than the dry season possibly because production of vegetable is higher during the rainy season. Also, the moisture content of the leafy vegetable is higher during the rainy

season than that of dry season. Hence, the rate of spoilage is higher which leads to a greater loss.

Table 4: Mean post-harvest losses in leafy vegetables by socioeconomic characteristics (n =120)

Post-harvest losses (₦)	The year 2018		
	Dry	**Rain**	**Total**
Age			
Below 40	687.75	1081.84	1769.59
40 and above	671.12	1035.21	1706.34
t-statistic; p value	**0.214; (ns)**	**0.416; (ns)**	**0.350, (ns)**
Gender			
Male	615.71	1014.29	1630.00
Female	703.53	1070.71	1774.24
t-statistic; p-value	**1.051; (ns)**	**0.465; (ns)**	**0.740; (ns)**
Education			
No education	632.00	988.00	1620.00
Formal education	725.00	1108.08	1833.08
Adult education	794.74	1242.11	2036.84
F statistic; p-value	**1.38; (ns)**	**1.50; (ns)**	**1.60**
Religion			
Christianity	706.14	1085.26	1791.40
Islam	652.43	1081.71	1734.15
Others	652.27	922.73	1575.00
F statistic; p-value	**0.25 (ns)**	**0.64(ns)**	**0.39(ns)**
Income			
<10,000.00	668.59	1025.77	1694.36
10,000-19999	700.00	1091.89	1791.89
20,000+	660.00	1220.00	1880.00
F statistic: p-value	0.08 **(ns)**	0.35 **(ns)**	0.19 **(ns)**
Membership of the cooperative society			
Yes	643.33	1018.00	1661.33
No	735.55	1114.67	1850.22
t-statistic; p-value	**1.18 (ns)**	**0.85 (ns)**	**1.03 (ns)**
Years of experience			
<10 years	670.40	1023.67	1694.08
10years +	683.10	1075.35	1758.45
t-statistic; p-value	**0.16 (ns)**	**0.46 (ns)**	**0.36 (ns)**

Mean differences in post-harvest losses between dry and rain seasons (2016-2018)

Figure 1 shows the mean losses in post-harvest of leafy vegetables according to season between the year 2016 and 2018**.** Further analysis in Table **5** compared the overall mean differences in post-harvest losses by season (dry and rain) for the year 2016, 2017 and 2018 as well as all the three years combined using independent t-test. For the year 2016, the mean difference in post-harvest losses between the two seasons was significantly different. This is because the p-value associated with the t-statistic of -2.77 is small ($p<0.01$). At a 95 percent confidence level, the mean post-harvest loss for the dry season in 2016 was between ₦702.16 and ₦884.50. Similarly, the mean post-harvest loss for rain season in 2016 was between ₦970.61 and ₦1,792.62. The results were similar for years 2017 and 2018 and all the three years combined. Further analysis showed that for each of the three years and all the three years combined, the mean post-harvest losses during the dry seasons were significantly lower than the mean post-harvest losses during the raining seasons. These results suggest that vegetable marketers experience post-harvest loss all year round, irrespective of the seasons but experienced higher loss during the rainy season. The higher loss probably occurred because the supply of vegetables exceeded the quantity demanded by the consumers.

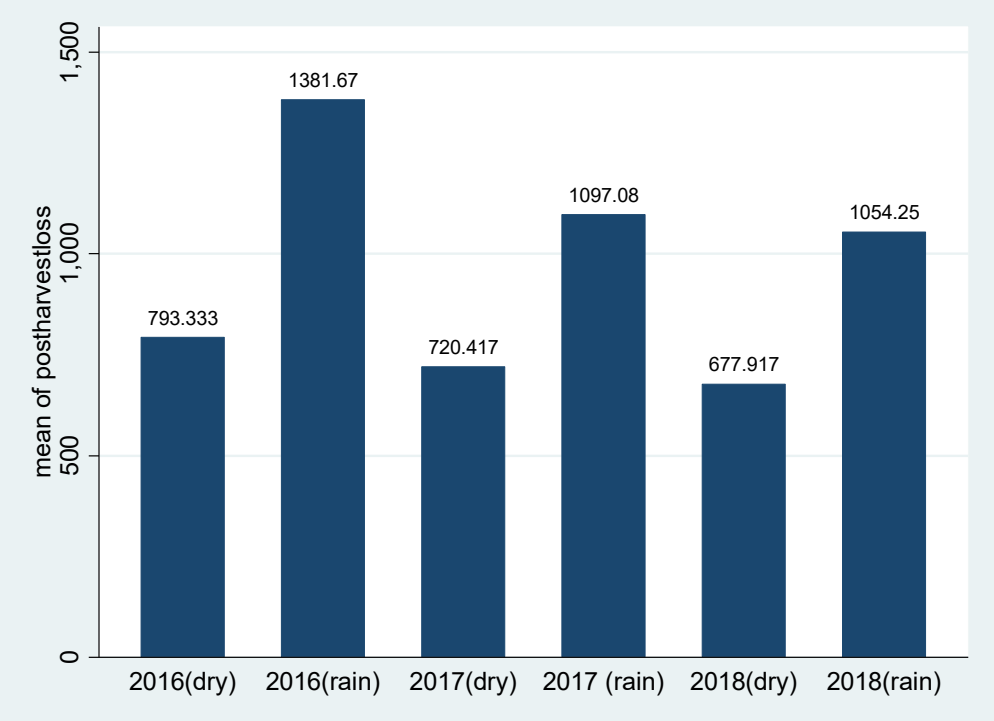

Fig 1: Trends in mean post-harvest losses per month by each season and year (2016-2018)

Table 5: Test of significance of mean differences in yearly post-harvest losses between dry and rain seasons (2016-2018)

The year 2016	**Season**	**Mean (₦)**	**Std Error**	**95% C.I.**
	Dry	793.33	46.04	702.16 - 884.50
	Rain	1381.67	207.60	970.61 - 1792.72
	Difference	588.34	107.79	
t= -2.77; p<0.01				
Year 2017	**Season**	**Mean**	**Std Error**	**95% C.I.**
	Dry	720.42	40.47	640.27 - 800.56
	Rain	1097.08	47.86	1002.32 - 1191.85
	Difference	376.67	62.68	
t= 6.01 ; p<0.01				
The year 2018	**Season**	**Mean**	**Std Error**	**95% C.I.**
	Dry	677.92	38.01	602.66 - 753.18
	Rain	1054.25	54.92	945.49 - 1163.01
	Difference	376.33	66.80	
t= 5.63 ; p<0.01				
All the 3 years	**Season**	**Mean**	**Std Error**	**95% C.I.**
Combined	Dry	730.56	24.11	683.14 - 777.97
	Rain	1177.67	73.53	1033.06 - 1322.27
	Difference	447.11	77.38	
t=5.78 ; p<0.01				

CONCLUSION AND RECOMMENDATIONS

The study concluded that the most traded leafy vegetables are *Amaranthus hybridus and Corchorus olitorous.* Also, majority of leafy vegetable marketers experienced postharvest losses during dry and rainy season between 2016 and 2018 but with higher loss during rainy seasons. Although the post-harvest losses decline by year from 2016 to 2018, the amount of loss was however substantial. Post-harvest loss was mainly attributed to the effect of pests/insects and bad

roads. To reduce post-harvest losses, we therefore, recommended that extension workers should encourage farmers to use insecticides or pesticides to control pest and diseases on their farms; government should make rural roads accessible for easy transportation of vegetables from rural communities to the urban centres or markets. Marketers should also be encouraged to buy the quantity of vegetables they can market in a day because of the perishable nature of the product.

REFERENCES

Adebooye, O. C., & Farinde, A. J. (1997). A Review of Postharvest Losses in Fruits and Vegetables in Nigeria: The Need for an Extension Strategy. *Journal of Agricultural Extension*, *1*.

Adegoke, A. O., Agbonlahor, M., Aladejebi, J. O., & Ajakpovi, A. P. (2018). A Socio-Economic Assessment of Nursing Mothers' consumption of Leafy Vegetables in Abeokuta Metropolis of Ogun State Nigeria. *FUOYE Journal of Agriculture and Human Ecology*, *1*(1).

Adeoye, I. B. (2020). Factors Affecting Efficiency of Vegetable Production in Nigeria: A Review. In *Agricultural Economics*. Intech Open.

Adeyemi, H. M. (2010). Food Security: Agriculture and Gender Relations in Post-harvest Storage. *African Research Review*, 4(4).

Ajayi, O. B., Bamidele, T. J., Malachi, O. I., & Oladejo, A. A. (2018). Comparative proximate, minerals and antinutrient analysis of selected Nigerian leafy vegetables. *Journal of Applied Life Sciences International*, 1-8.

Akintayo, O. I., Lawal, B. O., Oyedele, D. J., & Adebooye, O. C. (2019). Marketing of indigenous leafy vegetables by farmers in Oyo State, Nigeria: constraints and opportunities. *Acta horticulturae*.

Akinwunmi, O. A., & Omotayo, F. O. (2016). Proximate analysis and nutritive values of ten common vegetables in south-west (Yoruba land) Nigeria. *Communications in Applied Sciences*, *4*(2).

Alvino, A., & Barbieri, B. (2016). Vegetables of temperate climates: leafy vegetables. The Encyclopedia of Food and Health. Academic Press, Oxford, 393-400.

Apolot, M. G., Acham, H., Ssozi, J., Namutebi, A., Masanza, M., Jagwe, J., & Deborah, R. (2020). Postharvest practices along supply chains of Solanum Aethiopicum (shum) and Amaranthus lividus (linn) leafy vegetables in Wakiso and Kampala Districts, Uganda. African Journal of Food, Agriculture, Nutrition and Development, 20(3), 15978-15991.

Asaolu, S. S., Adefemi, O. S., Oyakilome, I. G., Ajibulu, K. E., & Asaolu, M. F. (2012). Proximate and mineral composition of Nigerian leafy vegetables. *Journal of food Research*, *1*(3), 214.

Ejoh, R. A., Nkonga, D. V., Inocent, G., & Moses, M. C. (2007) Nutritional components of some non-conventional leafy vegetables consumed in Cameroon. Pak J Nutr 6(6):712–717

Ejoh, S. I., & Samuel, F. O. (2016). Identification of traditional green leafy vegetable benefits to consumers and level of utilisation in a rural farming community in southwest Nigeria: qualitative findings. *West Afr J Food Nutr*, *13*(1), 10-23.

Gogo, E. O., Opiyo, A., Ulrichs, C., & Huyskens-Keil, S. (2018). Loss of African indigenous leafy vegetables along the supply chain. *International Journal of Vegetable Science,* 24(4), 361-382.

Iheanacho, K. M., & Udebuani, A. C. (2009). Nutritional composition of some leafy vegetables consumed in Imo state, Nigeria. *Journal of Applied Sciences and Environmental Management, 13(3).*

Ilaboya, I., Atikpo, E., Omofuma, F., Asekhame, F. and Umukoro, L. (2012) Causes, Effects and Way forward to Food Insecurity. Iranica *Journal of Energy & Environment,* 3, 180-188.

Inam, E., Ibanga, F., & Essien, J. (2016). Bioaccumulation and cancer risk of polycyclic aromatic hydrocarbons in leafy vegetables grown in soils within automobile repair complex and environ in Uyo, Nigeria. *Environmental Monitoring and Assessment*, *188*(12), 681.

Izuchukwu, O. (2011). Analysis of the contribution of the agricultural sector on the Nigerian economic development. *World review of business research*, *1*(1), 191-200.

Kitijonga, L. (2010). Identification of appropriate postharvest technologies for improving market access and incomes for small horticultural farmers in Sub-Saharan Africa and South Asia. WFLO Grant Final Report. Grant number 52198

Ladaniya, M. S. (2008). Commercial fresh citrus cultivars and producing countries. *Citrus Fruit: Biology, Technology and Evaluation. Academic Press, San Diego*, 13-65.

Mensah, J. K., Okoli, R. I., Ohaju-Obodo, J. O., & Eifediyi, K. (2008). Phytochemical, nutritional and medical properties of some leafy vegetables consumed by Edo people

of Nigeria. *African Journal of Biotechnology*, *7*(14).

Metu, Amaka G. and Okeyika, Kenechukwu O. and Maduka, Olisa D. (2016) Achieving Sustainable Food Security in Nigeria: Challenges and Way Forward. In: 3rd International Conference on African Development Issues (CU-ICADI), May 9-May 11 2016, Covenant University, Ota, Nigeria

Mohammed, M. (2016). Towards a diversified Nigerian economy, the contribution of agriculture to the GDP of Nigeria. *International Journal of Economics, Commerce and Management*, *4*(4), 581-590.

Munhuewyi, K. (2012). Postharvest losses and changes in quality of vegetables from retail to consumer: a case study of tomato, cabbage and carrot (Doctoral dissertation, Stellenbosch: Stellenbosch University).

Okewole, S. A., Oyekunle, L. O., Akande, O. O., Adebisi, T. T., & Olubode, T. P. (2018). Nutritional compositions of selected green leafy vegetables in Oyo State, Nigeria. *Asian Journal of Applied Chemistry Research*, 1-7.

Olayemi, F. F., Adegbola, J. A., Bamishaiye, E. I., & Awagu, E. F. (2012). Assessment of post-harvest losses of some selected crops in eight local government areas of rivers state, Nigeria. *Asian journal of rural development,* 2(1), 13-23.

Oluwaseyi, A. B. (2017). The prospects of agriculture in Nigeria: How our fathers lost their way-a review. *Asian Journal of Economics, Business and Accounting*, 1-30.

Oyedele, D. J., Adebooye, O. C., Akintayo, O. I., & Lawal, B. O. (2017, November). Marketing of indigenous leafy vegetables by farmers in Oyo State, Nigeria: constraints and opportunities. In *African Vegetables Forum 1238* (pp. 193-198).

Sha'a, K. K., & Pwakangdi, S. A. (2020). Antioxidant Activities, Nutritional Composition and Antinutritional Properties of Two Leafy Vegetables (Cleome rutidosperma and Cassia tora) Consumed in Adamawa State, Nigeria. *Asian Food Science Journal*, 18-27.

Sinha, N., Hui, Y. H., Evranuz, E. Ö., Siddiq, M., & Ahmed, J. (2010). Handbook of vegetables and vegetable processing. John Wiley & Sons.

Sobukola, O. P., Adeniran, O. M., Odedairo, A. A., & Kajihausa, O. E. (2010). Heavy metal levels of some fruits and leafy vegetables from selected markets in Lagos, Nigeria. *African Journal of Food Science*, *4*(6), 389-393.

Sudheer, K. P., & Indira, V. (2007). *Post-harvest technology of horticultural crops* (Vol. 7). New India Publishing.

Coverage of reproductive health issues in Nigerian newspapers

Adeleke, O. A., Busari, F. M. and Badiru, I. O.
Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria,
Correspondence Details: aladeoluwaseun@yahoo.com, +2348038079312

ABSTRACT

Newspaper as one of the channels of media is useful in passing information to the public and various stakeholders on several issues due to its wide coverage. This study was carried out to investigate the coverage of reproductive health issues in selected newspapers in Nigeria. Three Nigerian newspapers were selected for the study namely: Punch, Vanguard and The Nation. Two days of the week and a weekend were purposively selected for this study and a total of 149 news articles were used for the study. Data collected were analysed using descriptive statistics (frequencies, percentage) and inferential (Analysis of Variance) statistics at $p< 0.05$. Results revealed that sex education (38.9%) and maternal health (42.3%) were mostly reported. Reproductive health experts (50.3%) were the highest source quoted across the newspapers followed by news reporters (26.2%). The highest space allotted to reproductive health issues was 68-746sq.cm with 40.3%. The bulk of reproductive health issues were placed on other pages (80.5%) of the newspapers which are of less prominence to the audience. There was a significant difference in the spaces allotted to reproductive health issues ($F= 3.041$, $p= 0.001$) across newspapers. It is pertinent for Nigerian newspaper industry to improve the coverage of reproductive health issues and increase the space allotted to the issue to enhance visibility and effective communication to the audience.

Keywords: Content categories, Maternal health, Nigerian newspapers, Reproductive health issues.

INTRODUCTION

Reproductive health refers to the health and well-being of women and men in terms of sexuality, fertility regulation, pregnancy and birth, including maternal health and the health of the newborn (Zheng, Lu and Lu, 2013). Reproductive health is a critical component of women's general health. It has been established that when women lack access to safe and comprehensive reproductive health care, the consequences can be damaging (Adeleke, 2018). However, men also demand specific reproductive health needs and have responsibilities in terms of women's reproductive health because of their decision-making power in the home (WHO, 2015). Poor reproductive health reduces women's ability to work and also means that other family members may need to give up income-generating work in order to do the work that a woman might do in caring and providing for the family. The overall effects of good sexual and reproductive health influence the success and sustainability of social development and economic growth ((IPPF, 2015).

Odeleye (2015) averred that one of the basic social needs is health, which is significant in agricultural production and quality of life of rural household dwellers, especially women. However, it has been established that women's death caused by childbirth, unsafe abortion process and pregnancy complications are threat to agricultural development as it reduces labour in the agricultural sector. It also affects development of the economy, food and nutrition security, as well as child and elderly care in the household (Adeleke, 2018). When individuals can control their choices about reproduction health, they will be able to participate in education, labour force, care for their families and have more capacity to contribute to community and social life. Meanwhile, many socio-cultural barriers contribute to the imbalance in the availability of reproductive health services among families such as inadequate health services, insufficient health personnel, poverty, male partner opposition, lack of awareness and proper information (Abdulraheem, Oladipupo and Amodu, 2012). Access to information is germane to the use of reproductive health services. A better informed woman is likely to make appropriate decisions about place of delivery, pregnancy emergencies and so on but many developing countries have women with poor education which is more prevalent in rural communities (Adeleke, 2018).

One of the Sustainable Development Goals (SDGs) is to achieve reduction in maternal and infant mortality by the year 2030 which can only be possible when women and couples are well informed about measures to be taken in ensuring healthy living in every facet of their lives like family planning, information and education. This can be achieved through the use of mass media.

Mass media has been found useful in discharging useful information in diverse areas of human's life. It creates awareness and diffusion of information to the society. One of the examples of mass media is the print media in which newspapers has played a crucial role over the past decades. This is because newspapers can be read at one's convenience and more than once which is key in acquiring better

understanding of the contents being read thereby achieving behavioural change (Omitoyin, Adegoke, Olajide and Badiru, 2018).

Bales (2013) opined that government, Non-Governmental Organisations (NGOs) and other agencies have overtime used media as its mouthpiece for persuading the citizenry, health reformer that has power of bringing buried topics to the spotlight and bring public health to the policy agenda. Mass media is a very important communication outlet and has been found to play a greater role in the process of positive change. This assertion was supported by Van den Ban and Hawkins (2011) that mass media does this in variety of ways including setting agenda for important discussion, topics, transferring knowledge, changing opinions and behaviour. Newspaper also helps the process of information exchange for those searching for information and also supports new behaviours (Fawole and Olajide, 2012).

Policy makers and other stakeholders need to obtain considerable amount of information on reproductive health to make informed decisions which the media can provide. The media as instruments of mobilization, awareness creation and information exchange play important roles in reviewing performance, identifying problems and assessing successes towards achieving holistic coverage of rural reproductive health issues. To measure media performance in this regard requires an empirical study. Naturally, most newspaper organizations tend to favour articles of stories that will definitely increase the profit and readability; issues such as entertainment news, politics tend to attract more audience or readership because publishing organizations are profit oriented, which could lead to the relegation of reproductive health news to the background (Ogundola, 2016). Maternal mortality rates could be reduced if proper information is channelled through several mass media outlets in which newspaper is one. This is why this study is designed to analyse in-depth coverage of reproductive health issues in the selected Nigerian newspapers.

The general objective of this study was to investigate the coverage of reproductive health issues in Nigerian newspaper. The specific objectives were to:

1. determine the reproductive health issues content categories that were reported;
2. identify the sources quoted in the reported reproductive health issues;
3. ascertain the space allotted to reproductive health issues and
4. ascertain the placement given to reproductive health issues in the Nigerian newspaper.

METHODOLOGY

Content analysis was adopted for this study. All the newspaper in circulation were the population for this study. However, three national daily newspapers namely the Punch, Vanguard and The Nation were purposively selected due to their rating based on readership and influence attributed to national newspaper (Media Reach OMD Nigeria, 2014).

The coverage of reproductive health information by the media is not certain though there are indications that such news is routinely reported in the newspapers. Therefore, the time frame for this study was from January 1st, 2017 to December 31st, 2018.

For the purpose of this study, three widely read newspaper were selected for the purpose of data collection and analysis in this study. Newspapers articles for this study were gathered from Kenneth Dike Library, University of Ibadan (research library data base) using key words “reproductive health issues”. Articles that were selected for the research include; news articles, feature article and culled article.

Purposive sampling was used to pick one weekend (Saturday and Sunday) and one weekday for each newspaper depending on when they report reproductive health issues within the selected time frame. This is justifiable due to scantiness in reporting reproductive health issues.

A total of 149 articles drawn from 260 editions of the three papers constituted the population of this study. Thirty-six articles and stories on reproductive issues were obtained from The Nation, while 55 and 58 articles were obtained from Vanguard and Punch, respectively.

Descriptive statistics (frequencies, percentages and mean) and inferential statistics; ANOVA were used to describe and test the hypothesis of the study.

RESULTS AND DISCUSSION

Reproductive health issues reported in the newspapers

Results in Table 1 shows the content categories that were reported by the three newspapers within the study time frame and they were maternal health news (42.3%), sex education (38.9%), issues on ovarian cancer (10.1%), and sexually transmitted diseases (8.71%). Content category with the highest frequency is maternal health news (42.3%) followed by sex education (38.9%). This implies that the enlightenment on maternal health will reduce maternal and child mortality which is one of the goals of Sustainable Development Goals (SDGs). Also, sex education especially for children and teenagers is gradually gaining ground which is expected to increase parents' awareness on the essence of educating children about sex at an early age. This will in turn reduce sexual abuse and violence that is rampant in our society. This corroborates the report of Ram, Andajani and Mohammadnezhad (2020) that exposure of parents to proper information on sex education and reproductive health is central to curbing sexual violence.

Table 1: Distribution of reproductive health issues reported in the Dailies

Type of news	Frequency	Percentage (%)
Maternal health	63	42.3
Sex education	58	38.9
Issues on ovarian cancer	15	10.1
Sexually Transmitted Diseases (STDs)	13	8.7
Total	**149**	**100.0**

Source: Newspaper Content Analysis, 2019

Sources of information quoted in the reported stories

Table 2 reveals that 50.3%, 26.2% and 10.1% of reproductive health experts, news reporters and residents or victims of a reported situation gave information to the media on reproductive health issues, respectively. Religious leaders (6.7%), government officials (2.7%) and Non-Governmental Organisation (NGOs) (4.0%) gave least information on reproductive health news. This implies that most sources of information on reproductive health news were from health source which is more suitable, reliable and authoritative than non-health source. This is in consonance with Orhewere, 2010 and Alade, 2012 that information from health expert and personnel tends to be more reliable and accurate.

Table 2: Distribution of sources of information on reproductive health in Nigeria's dailies

Sources of information	Frequency	Percentage (%)
News reporters	39	26.2
Reproductive health experts	75	50.3
Residents/victims	15	10.1
Religious leaders	10	6.7
Government officials	4	2.7
Non-Governmental Organisations (NGOs)	6	4.0
Total	**149**	**100.0**

Source: Newspaper Content Analysis, 2019

Space allotted to the Stories

Table 3 shows the frequency of space allotted to reproductive health issues in the three newspapers. The result shows that 40.3% was within 68 – 746sq.cm and 36.9% of the spaces allotted to reproductive health issues was within 747 – 1425sq.cm. It was observed that as the spaces of reproductive health news was increasing, the frequency was reducing which suggest that a small amount of space was frequently allotted for reproductive health news which may be due to more spaces occupied by other news like politics and entertainment. This is in consonance with Adesoye (2015) who identified space constraints as one of the reasons for poor reportage of crucial issues that is of health benefits to the populace. Omitoyin, *et al*, (2018) affirmed that if more space is allotted to issues, more information will be revealed to the public.

Table 3: Distribution of reproductive health issues based on space allotted in the dailies

Space allotted (sq.cm)	Frequency	Percentage (%)
68-746	60	40.3
747-1425	55	36.9
1426-2104	23	15.4
2105-2783	6	4.0
2784-3462	3	2.0
3463-4141	2	1.3
Total	**149**	**100.0**

Source: Newspaper Content Analysis, 2019

Placement of reproductive health issues in the newspapers

Table 4 presents the placement of reproductive health issues in Nigerian newspapers. Majority of the articles were not given adequate prominence required. The largest proportion (80.5%) of the news was on other pages, 16.8% were on the middle page, 1.3% at both the back page and front page. Ofuoku and Agumagu (2013) reported that the front page is used to present readers with important, attractive, eye catching and major headlines of news. It is established that Nigeria's newspapers normally report around issues like sports, entertainment and politics which will generate more revenue for the newspaper industry (Olajide and Fawole, 2014). Emphasis should also be placed on reproductive health issues so as to birth a healthy nation.

Table 4: Distribution of reproductive health issues based on placement of articles in the newspapers

Placement	Frequency	Percentage
Front page	2	1.3
Back page	2	1.3
Middle page	25	16.8
Other pages	120	80.5
Total	**149**	**100.0**

Source: Newspaper Content Analysis, 2019

Test of difference in the spaces allotted to reproductive health issues across newspapers.

Result on Table 5 reveals that there was significant difference in the spaces allotted to reproductive health issues across newspapers (F= 3.041, p= 0.001). This implies that editors of newspapers did not allot the same space for reproductive health news. This may suggest that the allotment of spaces for report is determined by the editor of each newspaper and not just on the availability of information. The Post hoc analysis shows that the Vanguard newspaper has mean score of 1095.24 which is statistically greater than the mean scores of Punch and Vanguard which are 1067.31 and 766.08, respectively. This result indicates that the Vanguard newspaper allotted more space to articles on reproductive health news than the Nation and Punch.

Table 5: Test of difference in the spaces allotted to reproductive health issues across newspapers

	Sum of squares	df	Mean squares	F	Sig.	Decision
Between Groups	2727951.04	2	1363975.52	3.041	0.05	Significant
Within Groups	65495045.72	146	448596.20			
Total	68222996.76	148				

Source: Newspaper Content Analysis, 2019

Table 6: Post hoc of space allotted to reproductive health issues across newspapers

Newspaper	df	Subset for alpha = 0.05	
Nation	36	766.08	
Punch	58		1067.31
Vanguard	55		1095.24

Source: Newspaper Content Analysis, 2019

CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, it could be concluded that sex education and maternal health news were more covered among other reproductive health news, although with low prominence given to them by the media in the Nigeria dailies. This is establishing the fact that information on reproductive health in Nigerian newspapers is not sufficient to keep readers informed of important health issues that is germane to their wellbeing. Also, reproductive health issues may gain low public awareness and policy formulation due to low reportage by Nigerian newspaper.

The Nigerian newspaper editors should improve the coverage of reporting sensitive issues like reproductive health issues in strategic pages such as the front page to attract the attention of the public. The total space allotted to reproductive health issues need to be increased especially by editors of the Nation and the Punch newspapers so as to enhance visibility and effective communication with the public and various stakeholders.

REFERENCES

Abdulraheem I. S., Olapipo A. R. and Amodu M. O. (2012). Primary health care services in Nigeria: Critical issues and strategies for enhancing the use by the rural communities, Journal of Public Health and Epidemiology, Vol. 4(1), pp. 5-13

Adeleke, O. A. (2018). Effects of empowerment status on utilisation of reproductive health services among rural women in Nigeria, PhD thesis submitted to the Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria, pp. 30-38

Adesoye, T. D. (2015). Framing and reportage of Ebola disease outbreak in selected Nigerian newspapers. M.sc thesis submitted to the Department of Agricultural Extension and Rural Development, University of Ibadan, p. 3.

Alade, O. A. (2012). Assessing the adoption of family planning methods among rural women in Oyo State, Nigerian Journal of Rural Sociology, Vol 12, No 2, pp. 49-57

Bales, S. N. (2013). Framing Studies and Global Interdependence: An Introduction to Research. Washington, D.C. The Framework Institute

Fawole, O. P. and Olajide, B. R. (2012). Framing of climate change news in three Nigerian newspapers, Journal of Agricultural Extension, 16,(1), pp. 31 – 41.

IPPF (2015). Sexual and Reproductive Health and Rights – the core of sustainable development. Sexual and reproductive health and rights – a crucial agenda for the post – 2015 framework, 3 (2), p. 10.

Media Reach OMD Nigeria (2014). Percentage readership among the ten largest Newspapers

Odeleye, T. G. (2015). An overview of health and occupational hazards of rural women in Nsukka Local Government Area: implications for social work intervention. Mediterranean Journal of Social Sciences, 5, (7), pp.1404 – 1411.

Ofuoku, A. U. and Agumagu, A. C. (2013). Farmers' perception of Audio Visual aids on Technology dissemination. Agricultura Tropical et Subtropical, 41 (4): 192- 196.

Ogundola, B. T. (2016). Framing of Lassa fever in Nigerian newspapers. M.sc thesis submitted to the Department of Agricultural Extension and Rural Development, University of Ibadan, p. 3.

Olajide, B. R. and Fawole, O. P. (2014). Coverage and content analysis of biotechnology and genetically modified organisms in four selected Nigerian daily newspapers, Tropical Agricultural Research and Extension, Vol 16 (3), pp. 80-86

Omitoyin, S. A., Adegoke, O. I., Olajide, B. R. and I. O. Badiru (2018). Reporting of aquaculture issues in Nigerian Newspapers, Nigerian Journal of Rural Extension and Development, Vol 12, p.76.

Orhewere, J. A. (2010). Newspaper Coverage of Economic and Financial Crimes In Nigeria And Readers' Perception of the Campaign, PhD Thesis, Department of Communication Arts, University of Uyo, Uyo.

Ram, S, Andajani, S. and Mohammadnezhad, M. (2020). Parent's perception regarding the delivery of Sexual and Reproductive Health (SRH) Education in Secondary Schools in Fiji: A Qualitative study, Journal of Environmental and Public Health, Volume 2020, Article ID 3675684, 8 pages.

Van den Ban, A. W., Hawkins, H. S. (2011). Agricultural extension: 2nd edition. Blackwell Sci., pp 121.

World Health Organization (2015). Department of Reproductive Health and Research, Partner Brief. Geneva, Switzerland. WHO/RHR/09.02. Available at World Health Organization, WHO (2015a). WHO definition of health.

Zheng, Z., Lu, C. and Lu, M. (2013). Reproductive health and access to services among rural –to-urban migrants in China, Working papers on migration and health in China, 2013-2014

The profitability of cheese production in Ola-Oluwa local government area, Osun State

[1]Agboola, T.O., [2]Alao, O.T., [1]Akintunde, K.O., and [1]Odewumi, T. O.
[1]Department of Agricultural Economics and Agribusiness Management, Osun State University, Osogbo, Osun State
[2]Department of Agricultural Extension and Rural Development, Osun State University, Osogbo Osun State
Correspondence Details: timothy.agboola@uniosun.edu.ng

ABSTRACT

The study carried out an economic analysis of cheese production in Ola-Oluwa Local Government Area, Osun State, Nigeria. It described the socioeconomic characteristics of the cheese producers, identify the constraints and determine the cost and return on cheese production. A two-stage sampling procedure, cluster sampling to select 10 communities and snowball sampling to select 12 cheese producers, was used to select 120 respondents. Descriptive statistics (frequency, percentages and mean) and inferential statistics (budgetary and regression analyses) were used to analyse data obtained. Findings reveal that all (100.0%) were female, 40.8% were within the age range 41-50 years and 95.0% were married. More than two-thirds (78.3%) had enterprise experience ranging from 18 to37 years, 53.3% had no formal education and the mean household sizes was 7 persons. The major constraints faced by cheese producers are inadequate funding (85.8%), distance to market (68.3%), farmer/herders' conflicts (65.0%) and insufficient fodder (56.7%). Total revenue from cheese production was N481882.50, while the total variable coast was N372, 000 giving a gross margin of N109882.50 with the net farm income of N107136.10. Cost of raw milk (t = 5.460), cost of packing (t = 5.190) and the number of lactating cows (t = 6.230) had a positive influence on gross margin of cheese producers and was significant at 1% level. Similarly, cheese production experience and cost of preservative were positive and significant at 5% and 10% level, respectively. In conclusion, cheese production was profitable in the study area but the producers should adopt modern technology in producing cheese to meet the international standard to enhance the gross margin profit.

Keywords: Cheese production, Cheese preservation, Gross margin

INTRODUCTION

Animals are used as food either directly or indirectly, mostly after processing. Animal foods include milk, which is obtained from the mammary glands of mammals, e.g. cow milk, which in many cultures is drunk or processed into various other dairy products (Curry, 2013). Milk is an essential part of the daily diet for growing children and expectant mothers. Milk is a major constituent of the diet; its quality assurance is considered essential to the welfare of a community (Marimuthu, Sankar, Sathish, Vivek and Mohan Raj, 2013). Milk is defined as lacteal secretion, practically free from colostrum obtained by the complete milking of healthy cows. Milk that is in the final form for beverage use should be pasteurized, and should not contain less than 8.25% milk solids –not – fat and not less than 3.25% milkfat (Ocansey, 2010).

It can also be defined as a white fluid secreted by the mammary glands of female mammals for the nourishment of their young and consists of minute globules of fat suspended in a solution of casein, albumin, milk sugar and inorganic salts (Douglas, 2007). Milk is an excellent source of all nutrients except iron and ascorbate (Ukwuru, Ibeneme and Agbo, 2011). It is one of the main products in the most pastoral system in Africa, yet the contribution of dairying to pastoral economics is often overlooked (Kerven, 1986). Milk consumption in Nigeria has taken the form of addition of small amounts of concentrated milk products such as evaporated milk or milk powder to breakfast cereals, porridge, cocoa beverages, tea and coffee (Nsofor, and Anyanwu, 1992).

The White Fulani or Banaji cattle were reported as the leading triple purpose (meat, milk and draught) breed in West Africa (Belewu, 2006). They also play an important role in the religion and social lives of the people. They serve as a reserve of family wealth and as a mark of respectability and status in the community. Cattle are well known to be the major source of milk worldwide, however, the milk production by local cattle breeds in Nigeria have been reported to be low due to the poor quality and insufficient feeds and feedstuffs especially during the dry season (Olafadehan and Adewumi, 2010).

In Nigeria, milk production is mainly done by the Fulani nomadic people who are pastoralists involved in the rearing of cattle moving from one location to another in search of green pasture. Due to lack of refrigeration facilities, the Fulani women process the surplus fresh milk into a soft, unripened cheese called "warankasi" or "wara" in short term (Adetunji and Babalobi, 2011). Cheese is a concentrated dairy commodity produced by acid or rennet coagulation or curdling

of milk, stirring and heating the curd, draining off the whey, collecting and pressing the curd. The cheese is ripened, cured, or aged to develop flavour and texture (Raheem and Saris, 2009). Cheese is a dairy product made from pressed milk curds produced mainly from animal milk throughout the world where animal production is available. Different types of cheese are made from unripened (fresh) or ripened (aged) cheese (Huth, DiRienzo, Miller, 2006).

Cheese is a nutritious food and one of the numerous products from the processing of milk of cows, goats, sheep, buffalos, camels and yaks. It is produced by coagulation of the milk protein known as casein (Akinloye, and Adewumi, 2014). Cheese is an important milk product with milk nutrients having good storage properties with increased shelf life. It is traditionally produced to preserve the nutrients of milk. It is said to be the product of the selective concentration of milk (Parihar and Parihar, 2008).

Commercial milk coagulants exist but their cost is a limiting factor in poor rural households in Africa making cheap alternatives attractive. However, there are needs for caution to ensure that the latter's use does not introduce health risks to the consumers. Use of *Calotropis procera* leaves in making fresh cheese from fresh milk was first reported among the Fulani pastoralists (Abakar, 2012).

Despite the traditional method employed in the production of cheese, the small quantities of cheese produced appear to be a valuable food and source of protein particularly among the Fulani where it serves as a means of livelihood (Akintunde, Bisi-Johnson. OBesong, Enwe, Okoli Uaboegbenni, 2010). Available empirical studies in Nigeria on dairy production issues associated with milk production are mostly descriptive analysis and ordinary least square regression model; concentration has been on the production of milk, yoghurt and other dairy products with few on Cheese production. (Akintunde, Bisi-Johnson, OBesong, Enwe, Okoli Uaboegbenni, 2010; Adetunji and Babalola, 2011and Ocansey, 2010). However, none of these studies has taken into account the effects of constraints on cheese production among Fulani women. Therefore, this study contributes to the literature on production and gross margin analysis of Cheese production in Olaoluwa local government area of Osun state. The specific objectives were to describe the socio-economic characteristic of the cheese producers, identify the constraints to the cheese production and determine the cost and return on cheese production in Ola-Oluwa Local Government Area, Osun State, Nigeria

METHODOLOGY

The study area is Ola Oluwa Local Government (LGA) of Osun State, Nigeria. The headquarter of Ola Oluwa. LGA is Bode Osi and the LGA is made up of several towns and villages including Ikire Ile, Iwara, Bode Osi, Obamoro, lle Ogo, Asa, Ajagun lase, Ajagba, Ogbaagbaa and Telemu. The estimated population of Ola Oluwa LGA is about 103,600 as at the year 2006 census with the area mostly populated by members of the Yoruba ethnic group. The agrarian local government is also occupied by Fulani, Ebira and Igbo ethnic groups. (Wikipedia, 2018). Farming is the major economic activity in Ola Oluwa LGA with crops such as cocoa cashew, and rice is grown in the area. Other important enterprises of the people of Ola Oluwa LGA include animal rearing and craftsmanship (Wikipedia, 2018).

A two-stage sampling procedure was used to select 120 respondents for the study. In the first stage, cluster sampling was used to select 10 communities where there is a concentration of cheese producers in the study area. The second stage involved the selection of 12 Fulani women per community using snowballing sampling technique and a total of 120 women were sampled.

Primary data were obtained through field survey with a well-designed questionnaire for this study. The questionnaire was designed in English language and was interpreted in orally into the Yoruba language to elicit information from the respondents.

The data collected were analyzed with descriptive statistics and inferential statistics. The descriptive statistics that were used in this study include means, frequency counts and percentages. The inferential statistics used was multiple regression analysis.

Profitability index was determined using two measures of profitability analysis to determine the profitability of cheese production, these include: Cost and Return Analysis and Gross Margin (GM)

Benefit Cost Ratio (BCR) = Total Revenue (Benefit) ÷ Total cost.

The budgetary analytical approach was used to estimate cost and return in cheese production to know the net profit of cheese producers.

Profit = Total Revenue - Total variable cost

Mathematically, π= TR-TFC+TVC

Where π denotes profit: TR is Total Revenue (amount realized from the enterprise); TFC is a total fixed cost (expenditure incurred on fixed assets used in production equipment e.g., pot, bowl, conical basket etc.) and TVC is the total variable cost (cost of milk, cost of transportation, cost of coagulation etc.).

The Gross margin (GM) equation is given as: GM= TR – TVC = P x Q - TVC. Where: GM= Gross margin (in Naira), Q= Quantity of milk processed to cheese process (Liters/pieces), P= price of cheese (in Naira).

The implicit model used for the study is expressed as;
$Y= f(X_1+X_2+X_3+X_4+X_5+X_6+X_7+X_8+et)$
Where;
Y= Gross margin of cheese production in Naira (N)
X_1= Cost of raw milk in Naira
X_2= Cost of coagulant in Naira
X_3= Cost of packaging in Naira
X_4= Cost of lagidi in Naira
X_5= Cost of preservative in Naira
X_6= Cost of transportation in Naira
X_7= Number of lactating cows
X_8= Cheese production experience
X_9= Error term

RESULT AND DISCUSSION

Socioeconomic characteristics

Table 1 shows that the majority (40.8%) of the cheese producers were in the age range of 41 and 50 years, while 37.6 % of the respondents were between the age of 31 and 40. The mean age of cheese producers in the area of study was 38.0±77 years. This implies that cheese producers are still active and productive. This finding supports the research of (Habibu, 2016), that majority of cheese producer is between the age of 41 and 50. All the respondents were female indicating that cheese production is a female-dominated, while their husbands were cattle rearers. Almost all (95.0%) of the cheese producers were married, very few (3.3%) were widowed, and (1.7%) were single. This implies that the majority of the cheese producers in the study area were married and have responsibilities.

The majority (65.0%) of the cheese producers had a family size between 4 and 6 persons, 27.5% had a family size between 7 and 9 persons. The average family size of the cheese producers was 6.0±1.4 persons. This implies that on the average, there is an appreciable number of family labour that may be giving helping hand in cheese production. This is in agreement with Osotimehin *et al*., (2006) when he reported that nomads had over six household members.

More than half (53.3%) of the respondents had no formal education, while 32.5% had between 1 and 6 years, 12.5% of the cheese producers had between 7 and 12 years, while 1.67 percent had above 12 years. The average years of formal education were 3.0±4.4. Muhammed et al., (2009) noted that the level of education is expected to influence farmers' adoption of agricultural innovations and decision on various aspects of farming. This development had greatly hampered their adoption of modern technology in producing cheese

Most (93.3%) of the cheese producers had cheese production as their primary occupation and very few (6.7%) were farmers. It can be concluded that the primary occupation of Fulani women in the study area is cheese production.

Some (39.17%) of the cheese producers had between 18 and 27 years, and between 28 and 37 of cheese production experience. The mean years of cheese production experience were 25.0±7.8 years. This shows that most of the cheese producers had been into production for quite some time. This is in tandem with the submission of Lawal and Adedeji (2013).

The size of the herd is traditionally considered as a measure of wealth and social status among the nomads (Ngetha, 2000 and Ogundiwin, 1978); the larger the size of the herd of a nomad, the greater the security such an individual enjoys. The majority (54.2%) of the cheese producers had between 41 and 80 herds of cattle, while very few (1.6%) had above 120. The means herd size is 51.0±25.0 cattle. Furthermore, the majority (64.1%) of the cheese producers had between 3 and 6 lactating cows. This implies that most of the cheese producers have an appreciable cow in which milk can be drawn from. This result conforms with Zekeri and Mukhtar (2015) that the majority of cheese producers were having a minimum of three lactating cows and a maximum of six lactating cows per household.

TABLE 1: Distribution of cheese producers according to their socio-economic characteristics (n = 120)

Socioeconomic characteristics	Frequency	Percentage
Age		
21-30	23	19.1
31-40	45	37.6
41-50	49	40.8
51-60	3	2.5
Mean = 38, STD 7.7 years		
Gender		
Male	0	0
Female	120	100
Marital Status		
Single	2	1.7
Married	114	95
Widow	4	3.3
Household Size		
1 - 3	7	5.8
4 – 6	78	65
7 – 9	33	27.5
≥10	2	1.7
Year of Education		
No formal education	64	53.3
1 – 6	39	32.5
7 – 12	15	12.5
>12	2	1.67
Primary Occupation		
Cheese production	103	88.3
Farming	4	3.3
Trading	8	6.7
Artisan	2	1.7
Farming Experience		
7-17	23	19.16
18-27	47	39.17
28-37	47	39.17
38-47	3	2.5
Herd Size		
1-40	44	36.7
41-80	65	54.2
81-120	9	7.5
Number of Milking Cows		
3 - 6	77	64.2
7 - 10	35	29.2
11 -14	8	6.6
>120	2	1.6

Source: Field Survey, 2019

Constraint to cheese production

Table 2 shows that the major constraints confronting cheese producers in the study area in descending order are inadequate funding (85.8%) ranked 1st, distance to market (68.3%) ranked 2nd, farmer/herders' conflicts (65.0%) ranked 3rd and insufficient fodder (56.7%) ranked 4th while lack of formal education and poor record-keeping (13.3%) ranked 10th, lack of improved breeds (12.5%) ranked 11th and lack of extension services (4.2%) ranked 12th was the least constraint to cheese producers in the study area. This indicates that education is not an important prerequisite for cheese production in the study area. This may be one of the reasons why the Fulani herders are not educated.

Table 2: Constraints to cheese production (n = 120)

Constraints	Frequency	Percentage%	Ranking
Inadequate funding	103	85.8	1st
Distance to market	82	68.3	2nd
Farmer/Herder conflicts	78	65.0	3rd
Insufficient fodder	68	56.7	4th
Low breed dairy cattle	63	52.5	5th
Non-accessibility to drugs for cows	34	28.3	6th
Processing and preservation facilities	33	27.5	7th
Low milk production of indigenous cattle	29	24.2	8th
Poor market	18	15.0	9th
Lack of formal education	16	13.3	10th
Poor record-keeping	16	13.3	10th
Lack of improved breeds	15	12.5	11th
Lack of extension services	5	4.2	12th

Source: Field Survey, 2019
***Multiple answer choices**

Cost and return on cheese production

Budgetary analysis in Table 3 reveals that the depreciation on the fixed asset was ₦2,746.40 while the total variable cost was ₦372,000.00, and the total revenue was ₦481,882.50. The result further reveals that the average net income of the cheese producer was ₦107,136.10 per annum on cheese production. The results show that cheese production was a profitable venture in the study area.

Table 3: Costs and Returns Analysis for cheese production

S/N	Item	Amount	Scale
A	Revenue (TR)	481,882.50	
B	Variable Cost		% of TVC
	Cost of raw milk	175,230.00	47.11
	Cost of coagulant	14,460.00	3.89
	Cost of packaging	47,550.00	12.78
	Cost of preservative	50,610.00	13.60
	Cost of transportation	76,200.00	20.48
	Cost of lagidi	7,950.00	2.14
C	Total variable cost (TVC)	372,000.00	100
D	Gross margin (TR-TVC)	109,882.50	
E	Fixed cost		
	Depreciation on the fixed cost	2,746.40	
F	Total production cost	374,746.40	
G	Net cheese processing income	107,136.10	

Source: Field Survey, 2019

The result of the Regression analysis in Table 3 shows that R-squared was 80.4% indicating that the variation in cheese production in the study area is explained by the independent variables in the model and the F-value (65.73) was significant at 1% level, showing that the model has a good fit.

The coefficients of the cost of raw milk (X_1), cost of packaging (X_3) and the number of lactating cows (X_7) were positive and significant at 1% level. This implies that these variables are positively related to the level of gross margin from cheese production in the study area.

Similarly, the cheese production experience (X_8) and cost of preservative (X_5) were positive and significant at 5% and 10% level, respectively; a direct relationship between these variables and the level of gross margin from cheese production in the study area.

Table 4: Results of Regression Analysis showing linear relationship between level of cheese production and gross margin of production

Variables	Coefficient	Standard error	t-value	Probability
Cost of raw milk (X_1)	0.514	0.094	5.460	0.000*
Cost of coagulant (X_2)	0.540	0.845	0.640	0.524
Cost of packaging (X_3)	2.821	0.543	5.190	0.000*
Cost of lagidi (X_4)	-0.829	0.748	-1.110	0.270
Cost of preservative (X_5)	3.722	2.063	1.800	0.074***
Cost of transportation (X_6)	-1.662	0.349	-4.760	0.000*
Number of lactating cows (X_7)	2488.483	399.121	6.230	0.000*
Cheese production experience (X_8)	149.836	71.824	2.090	0.039**
Constant	3160.854	7055.767	0.450	0.655

R-squared = 0.804, Adj R-squared = 0.729, F value = 65.730
***significant at 1% level, **significant at 5% level, ***significant at 10% level**
Source: Field Survey, 2019

CONCLUSION AND RECOMMENDATION

In conclusion, the mean age of the cheese producers was 38 years, all-female, married with a household size between 4 and 6 people and had no formal education. The main constraint to cheese production is inadequate funding, distance to market, farmers/herders' conflict, insufficient folder. The net profit income from cheese production is N107,136.10. Cost of raw milk (t = 5.460), cost of packing (t = 5.190) and the number of lactating cows (t = 6.230) had a positive influence on gross margin of cheese producers and was significant at 1% level. Therefore, the government should provide a conducive grazing environment and financial assistance for producers of cheese to acquire modern milking technology. Top breed dairy cows should be imported to Nigeria to enhance the net profit of cheese producers, Cheese producers should initiate the modern way of packaging their products to meet the international standard to improve on the net profit.

REFERENCES

Abakar, M. N. M. (2012). Essai de fabrication d'un fromage frais traditionnel sénégalais à partir du lait de vache coagulé per la papaïne naturelle. Memoire de master en de l'université cheikh anta diop de dakar ecole inter-etats des sciences et medecine veterinaires de dakar. 46p.

Adetunji, V. O. and Babalobi, O. O. (2011). A comparative Assessment of the Nutritional contents of 'Wara' A West African soft cheese using calotropis procera and Cymbopogon citrates as coagulants. African Journal of Food Agriculture, Nutrition and Development.

Akinloye, A. M. and Adewumi, O. O. (2014), Effects of local coagulants on the yield of cheese using cow and sheep milk, *International Journal of Development and Sustainability*, Vol. 3 No.1, pp. 150-161.

Akintunde, T. I., Bisi-Johnson, OBesong, P. O., Enwe, Okoli, P. N., Uaboegbenni, P. O. (2010). Proximate Analysis and Microbiological Quality of Cheese Produce from Raw Cow milk obtained from Fulani settlement in Ogun State Nigeria. Using Acid Bacterial and Extract from Sodom Apple Leaf‖ *calotropis. Journal of Nutrition Pakistan*. 9(9):920-925.

Belewu, M. A. (2006). A Functional Approach to Dairy Science and Technology. 1st.edn. Pp. 137-172.

Douglas, K. M. (2007). Milk as a white fluid secreted by the mammary glands of female mammals for the nourishment of the young, British Jour. Butr. Res., 11: 885–93.

FAO (1994). Production Yearbook 48: 281.

Habibu Bello (2016), Analysis of Yoghurt and Cheese Processing and Marketing Kwara State Nigeria, Department of Agriculture and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University Zaria Kaduna State.

Huth, P. J., DiRienzo, D. B., Miller, G. D. (2006) Major scientific advances with dairy foods in nutrition and health. J Dairy Sci 89: 1207-21.

Ikpi, A. E. (1981): "Food Systems Organisation Problems in Developing Countries: The Nigeria Experience" A paper presented at Michigan State University, U.S.A.

Kerven, C. (1986). Some Research and Development implication for pastoral dairy production in Africa. ILCA Bull., 26: 29–35.

Lawal, A. K. and Adedeji, O. M. (2013). Nutritional and elemental analysis of

warankasi (a fermented milk product) sold in Lagos metropolis, International Research Journal of Biotechnology (ISSN: 2141-5153) Vol. 4(6) pp. 112-116.

Marimuthu, M., Sankar, N., Sathish, A., Vivek, S. and Mohan, Raj N. (2013). Comparative study on Physicochemical quality of raw milk samples collected from different villages of Karur district Tamilnadu, India. International Journal of Pharmaceutical, Chemical and Biological sciences. 3 (3), 635-638.

Muhammed, Lawal, A. Omotesho, O. A. and Falola, A. (2009); Technical Efficiency of Youth Participation in Agriculture; A case Study of Youths in Ondo State, South-West Nigeria. Journal of Agriculture, Food and Environment 5(1)20-26

Ngetha, M. W. (2000**).** Development Trends on Small Scale Milk Production and Processing. Cambridge University Press, Cambridge.

Nsofor, L. M. and Anyanwu, K. B. (1992). Development and Evaluation of concentrated soymilk Beverage. Journal of Food Science and Technology **29(5):** 331-332.

O'Connor, C. B. (1993). Traditional Cheese-making Manual. ILCA Publishing. Addis Ababa. Pp 24.

Ocansey, K. A. (2010). Development of cheese product from coconut milk. MSc. Thesis. Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Ogundiwin, J. O. (1978). A study of the traditional manufacturing processes and chemical composition of warankasi, a Nigerian soft white cheese. Nig. Food Journal 2: 72-78.

Olafadehan, O. A., and Adewumi, M. K. (2010). Milk yield and composition of prepartum Bunaji cows supplemented with agro-industrial by-products in smallholder dairy

Zekeri, M. and Mukhtar, L. A. (2015). Analysis of Costs and Return to Small Scale Dairy Producers and Marketing in Igabi Local Government Area, Kaduna State, Nigeria. Journal of Agricultural Science and Environment 15(1):1-14.

production systems. Trop. And Subtrop. Agroecosystems 12: 557-564.

Olaloku, E. (1976): "Milk Production in West Africa: Objective and Research Approaches, Journal of the Association for the Advancement of Agriculture in Africa, Vol. 13.

Osotimehin, K. O., Tijani, A. A. Olukomogbon, E. O. (2006)**.** An economic analysis of small scale dairy milk processing in Kogi State, Nigeria. *Livestock Research for Rural Development* 18 (11)

Parihar Pradeep and Parihar Leena, (2008). Dairy Microbiology. Students' edition. Milk products; pg. 196, 265.

Raheem, V. D. and Saris, D. E. J. (2009): Characterization and application of *calotropis procera*, a coagulant in Nigeria wara cheese. *International journal of food science and technology*, pp. 5-11.

Sodiya, C. I., Fabusoro, E. & Agbaje, R. A. (2006). Income Generating Activities of Agropastoral Fulani Women in the Ogun State of Nigeria: Implications for Extension Support Operations. ***International Journal of Agricultural Sciences, Science, Environment and Technology***. (ASSET) Series A 6 (1), 181-187. Published by the University of Agriculture, Abeokuta, Nigeria. http://www.unaab.edu.ng/journal/index.php/SeriesA

Ukwuru, M. U., C. L. Ibeneme and G. I. Agbo (2011). New Product Development from Tigernut (*Cyperus esculentus*) and Their Sensory, Proximate and Microbiological Evaluation. *Pak. J. Nutr., 10 (2): 101-105.*

World Bank (1990). Dairy development in sub-Saharan Africa: A study of issues and options. World Bank Washington Dc, USA