ANALYSIS OF FOOD SECURITY AND POVERTY STATUS AMONG AGRO-PASTORALISTS IN BARKIN-LADI LOCAL GOVERNMENT AREA, PLATEAU STATE, NIGERIA

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ABSTRACT

This study analyzed the food security and poverty status among agro-pastoralists in Barkin-Ladi Local government area of Plateau State, Nigeria. A multistage sampling technique was used to select 230 respondents. Data collected were analyzed using Foster Greer and Thorbeeke (FGT) food security index, poverty indices and logit regression model. The result of socio-economic characteristics revealed that the mean age of agro-pastoralists was 38 years, the male respondents constituted 56% while the female respondents constituted 44%. The result further indicated that 78% of the agro-pastoralists were married while 18% were singles, 2% were divorced and 2% were single parents. On the educational status of respondents, the mean years spent by agro-pastoralists on education was 7 years. The mean household size was 5 members. The mean farming experience was 17 years. The result further indicated that 67% of the respondents had farming as their primary source of income while 33% had other secondary sources of income. The mean off-farm income of agro-pastoralists was ₦33, 850.00 per month. The result of food security status showed that 67% of the respondents were food secure while 33% of the agro-pastoralists sampled which indicate one-third of the agro-pastoralists were found to be food insecure. Also, the average daily calorie intake for the entire respondents was 6324.84 kcal while the daily recommended kilo calorie requirement was 2260 kcal. The result of poverty status in the study area shows that the poverty incidence for the agro-pastoralists was 50%; poverty gap was 35% while the poverty severity was 15%. The result of the logit regression shows that there is a relationship between food security and the poverty status of agro-pastoralists. The study recommend that; the government should subsidize the inputs of the agro-pastoralists which will lead to increased income and thus enhance increased food consumption and thereby reducing food insecurity, basic rural infrastructures should be provided in order to increase and enhance both crop and livestock productivity; the government at all levels should ensure that programmes aimed at alleviating poverty are intensified vigorously in order to lift most of the agro-pastoralists out of poverty, education of agro-pastoralists should be enhanced through the establishment of more accessible and functional schools that will increase innovation adoption; the agro-pastoralists should be encouraged to form functional co-operative societies that will enable them access credit at low interest rates which will enable bulk purchase of inputs and easy access to knowledge through information sharing. Extension agents are the link between research organizations and the agro-pastoralists, therefore, extension services should be restructured, refocused for better and efficient farmer oriented service delivery.

Key words: Food Security, Poverty status, Agro-pastoralists, Barkin-Ladi LGA, Plateau State, Nigeria.
INTRODUCTION

Agro-pastoralists are people making a living on marginal land and obtain a given percentage of their gross agricultural produce from crop production as opposed to total income from livestock only (Agricultural and Rural Development Secretariat (ARDS), 2007). They are group of people known for rearing animals and are now settled to cultivate land for subsistence crop production (Lawal, 2003). They produce the bulk of livestock products in the country. Livestock is an important source of nutrition and food security. It provides high quality food in the form of egg, meat, milk and dairy products which can contribute significantly to diversification and improve the diet of both rural and urban population. (Herrero et al., 2012)

Nigeria being the largest in Africa with a population of more than 160 million people, still accounts for 47% of the West Africa’s total population (World Bank, 2012). Nigeria is an agrarian country with about 70% of the population engaged in agricultural production (Ugwu and Kanu, 2012). Despite the rapidly growing oil industry in Nigeria, the agricultural sector is beginning to post disappointing performance and so needs to be rescued fast. As disclosed in the NBS report, “the agricultural sector in the second quarter of 2018 grew by 1.19 per cent (year-on-year) in real terms, a decrease by -1.82 per cent points from the corresponding period of 2017, also a decrease by -1.81 per cent points from the preceding quarter. The sector in the quarter contributed 22.86 per cent to overall GDP in real terms, lower than the contribution in the second quarter of 2017” (NBS, 2018). Agricultural productivity is showing signs of recovery after decades of decline, but it is happening too slowly to meet the demands of a rapidly growing urban population (IFPRI, 2011).

Constraints to increased agricultural productivity in Nigeria include poor agricultural policies, low fertilizer use, low access to agricultural credit, land tenure insecurity, land degradation, poverty and gender issues, low and instability in research, poor market access and market efficiency, drought, pest and diseases, post-harvest losses, and high input costs (Philip, et al., 2009). According to Olomola and Nwafor, (2018) agricultural sector has not been able to deal effectively with the problem of food security for the Nigerian people when viewed from the stand point of the nutritional status of Nigeria’s household food security and price. They further stated that recent trends in food security in Nigeria showed that undernourishment in the country increased steadily from 6.1% of the population in 2010 to 7% in 2016. This measures the percentage of the population that is unable to meet the minimum calorie requirements per day. This trend represents an increase in the number of undernourished people from 9.7 million in 2010 to 12.9 million in 2016. This estimate was based on the level of food supply in the country. Aside from food availability, its affordability and price stability are important for food security. The variation of food prices in a given year (its volatility) ranged from about 2.6% around the average to about 5%. This meets the Malabo target of below 7.5% and means that wild fluctuation of food prices in a given year is not a challenge faced in Nigeria. Rather than food price volatility in a given year, what is more of a challenge is that prices have almost doubled between 2010 and 2016 as indicated by the food price index. While nominal incomes have also increased at the same pace, what this means is that, on average, households buying power has not increased in the last 6 years. Furthermore, for households on fixed wage incomes and did not experience a doubling of incomes, food prices have doubled while incomes may not have increased commensurately or at all. In addition, households in non-wage or self-employment that have not been able to command higher prices face a doubling of food prices with slower growth in income as well. Olomola and Nwafor, (2018).

Food security is not a new concept. It has been defined in a variety of ways by different authors and organizations. However, the most comprehensive definition comes from Food and Agricultural Organization (FAO) (2004) stating that Food that is available to everyone at all times, that they have means of access to it, that it is nutritionally adequate in terms of quantity, quality and variety, and is acceptable within the given culture. Only when all these five conditions are in place that it can be said that a population is food secure. The absence of any of these conditions at household, regional and national levels causes food insecurity. It can be considered as severe food insecurity when food intakes are continuously insufficient to meet the daily dietary energy requirements leading to a most severe stage of food insecurity called ‘hunger’. In Nigeria, despite agricultural policies and strategies, food insecurity remains a fundamental challenge (Machethe 2004). For instance, although agriculture remains a key component of the Nigerian economy, contributing about 37% of GDP and employing about 70% of the
active population, it received a total expenditure for agriculture of ₦203,010,092,743, representing only 2% of the total budget of ₦9.1 trillion which is a marginal shift in terms of the annual budgetary allocations (Adebayo and Okuneye, 2005; NBS, 2018). As a result, the agricultural sector has significantly underperformed given its vast potentials (Machethe, 2004). Consequently, Nigerian agriculture has failed to supply sufficient food in quantity and quality to feed the constantly growing population. Therefore, the level of food insecurity and poverty in Nigeria has continued to increase steadily since the 1980s. For instance, not less than 70% of the Nigerian population is surviving on less than a dollar per day while food insecurity prevalence in the low income urban households and rural areas respectively stands at 79% and 71% (Akerele et al., 2013 and Omorogiuwa, et al., 2014). Similarly, the proportion of Nigerian population that was undernourished in 2008 was 5.9%. However in 2016 that proportion had gone up to 7% (IFRP-GHI, 2017). Nigeria is one of the most resource-endowed nations in the world. But socio economically, Nigerians are also among the poorest in the world (Etim et al., 2009). Hence, there is a persisting paradox of a rich country inhabited by poor people, which has been the subject of great concern for many years, but more especially in the last decade. In 2018, Nigeria was ranked as the country with the most extreme poor people in the world. It showed that 86.9 Million Nigerians fall in the extreme poverty range (The World Poverty Clock).

Poverty is more easily recognized than defined (Foster et al., 2010). Therefore, a universally acceptable definition of the term has remained elusive (Nsikak-Abasi and Solomon, 2010). However, it can be regarded as the inability to adequately meet the basic human necessities, such as food, shelter, clothing and Medicare (CBN/IBR&D, 1999; IBR&D, 2010; Ibrahim and Umar, 2008). It is also a state of deprivation of human needs to which a person, household, community or nation can be subjected to. Poverty can be absolute or relative. Absolute poverty refers to subsistence poverty based on assessment of minimum subsistence requirements, involving a judgment on basic human needs and measured in terms of resources required to maintain health and physical efficiency (Foster et al., 2010). Relative poverty varies with income or economic growth. The poverty line from this approach is commonly expressed as a fixed percentage of the mean or median income or expenditure (Akinleye et al, 2007; Adepoju et al., 2011; Awoyemi et al, 2011; Balogun et al, 2011; Jagbojo, 2012). Poverty is strongly influenced by education and location but in Nigeria, it is seen as a rural problem where majority of the inhabitants engage in agricultural production as a means of livelihood (Olorunsanya, 2009; Olorunsanya and Omotesho, 2012) Poverty in Nigeria is rising, with 112 million Nigerians (representing 67.1%) of the country’s population of 167 million living in less than $1 a day. According to the Guardian, (December 17, 2016), about 112 million Nigerians (representing 67.1 per cent) of the country’s total population of 167 million live below the poverty line.

As poverty systematically deepens and peoples’ meager incomes do not cover their basic food and dietary needs, interest in farming and other economic activities has increased and is now being promoted by different families as a food security strategy for vulnerable rural families. But these farms have limited success in providing food security and increasing incomes. Despite the involvement of rural households in various farming activities, the generality of their income remained low. Consequently, for these rural farmers to improve their wellbeing and meet the food requirements of the rural populace, their poverty situation has to be curbed (Etim et al., 2009).

Land is one of the major factors of production in agricultural production. It is a known fact that as agricultural activities increases, land availability reduces and becomes scarce. The scarcity of land has greatly reduced the level of enterprise combination which made it impossible for pastoralists to be involved in other economic activities such as crop and small ruminant animal production, marketing of crop and livestock products, farm produce storage, and care to improve the economic condition and standard of living of the agro-pastoralist households (Nworgu, 2006). Some of the problems which contribute to the scarcity of land for agro-pastoral practice include: long period of drought in sub-humid zones and increased land development (Dike, 2002). Based on the scarcity of land and its hindrance to enterprise combination, it has become very difficult for agro-pastoralists to sustain and improve their standard of living (Goldsmith et al; 2000). Aniedu (2007) equally observed other problems to include; lack of access to credit facilities, funding of research and inadequate storage facilities. The premise is that the level of technology prevailing in a given society reflects its
capacity to optimize the use of natural and human resource in production (Nwaru et al., 2008). This low state of technology has been the problem of agricultural intensification as a variable option which is the more efficient use of production inputs, increased productivity which comes from the use of improved varieties and breeds more, efficient use of labour and better farm management (Waddell, 1972; Pingali andBinswanger, 1987; Dixon et al., 2001; Nwaru et al., 2008).

From the foregoing therefore, the following objectives were generated: i. describe the socio-economic characteristics of agro-pastoralists; ii. estimate food security status of the agro-pastoralists in the study area; iii. determine the poverty status of agro-pastoralists in the study area and determine the effect of poverty on food security status of agro-pastoralists in the study area.

MATERIALS AND METHODS
Study Area
The study was conducted in Barkin-Ladi Local Government Area of Plateau State, Nigeria. Barkin-Ladi Local Government Area was created in 1976. It has a land area of 1,032km² with a population of 227,847 (NPC Projection, 2016). The Local Government Area is located in the Northern part of Plateau State. It lies between latitudes 9°N and 10°S and longitudes 8°W and 9°E. The local government shares boundaries with Bokkos Local Government area on the south east and on the North East is Kaura Local Government area of Kaduna State. The local government has five districts namely: Ropp, Heipang, Fan, Foron and Gashish (Anon, 2003). The area has a monthly temperature range of 12-29°C and a monthly rainfall record of 5-30cm, with annual rainfall of 1500mm. The months of November to January are particularly cold due to the cold dry harmattan winds. Conversely, the months of March and April record high temperatures (Anonymous, 2003).

The major ethnic group in the local government area is Berom, while others include Ron, Kulere, Foron, Angas, Gashish who are mainly engaged in marketing and production of agricultural commodities. Food crops grown in the area include: vegetables like Cabbage, Irish potato, Tomatoes, Cereals such as maize, Fonio (acha), sorghum and legumes. Livestock reared include Cattles, Pigs, Poultry, Sheep and Goat.

Sampling Procedure and Sample Size
A multistage sampling technique was used to select the agro-pastoralists. In the first stage, Barkin-ladi local government area was purposively selected because of high concentration of agro-pastoralists. In the second stage, three districts out of the five districts were selected using purposive technique. This is due to preponderance of agro-pastoral activities in these districts. In the third stage, three villages from each district were randomly selected which include Gashish; (Exland, Gindin-akwati and Karkuruk), Foron; (Sho.Kamang and Fo), and Fan; (Ndina-gura, Nding and Tafan). In the last stage, 230 agro-pastoralists representing 10 percent of the sample frame of 2,300 agro-pastoralists was randomly selected using simple random sampling technique. The compositions of the sample size are as follows: Gashish (130) and 50 respondents each from Foron and Fan districts, thus making a total number of 230 respondents.

Method of Data Collection
Primary data was the main source of information for this study. The data was collected through the administration of questionnaires aided by oral interview. The questionnaire was designed in line with the objectives of the study.

Analytical Technique
Foster, Greer and Thorbeeke (FGT) food security index
The approach taken in this study for the determination of food security index follows the identification and aggregation procedures. Identification is the process of defining a minimum level of nutrition necessary to maintain healthy living. This is referred to as the “Food Security Line”, below which people are classified as food insecure and subsisting on inadequate nutrition. The food security line used in this study was based on the daily recommended level of calorie and protein, which is 2260 Kcal (Babatunde et al. 2007). In order to generate food security indices, the nutrient content of the crop consumed was used to derive calorie availability.
For the purpose of this study, a farm household is a group of individuals who contributed to and shared a common economic resource base and rely on the income from that base for the greater part of their food acquisition and utilization. The nutrient composition of commonly eaten foods in Nigeria (Oguntona and Akintele, 1995) was used to estimate the calorie intake of households. On the other hand, the equivalent male adult scale to determine adjusted household size computed by Falusi and Olayide, 1985 was used.

Most studies focused on calorie availability and consumption in assessing food security status of respondents (Makinde, 2000, Lawal, 2003); because according to them, most diets contain adequate amount of all others required for good and healthy living once it is taken in quantity that is enough to meet the individual’s requirements. This was used to achieve objective 2.

2.4.2 FGT poverty index

Foster-Greer-Thorbecke (FGT) poverty model

In developing poverty profile, this study adopted the Foster, Greer and Thorbecke (FGT), (1984) class of poverty measure, which represents the level of income below which households are considered to be poor. The FGT class of poverty measure is defined as:

\[ P_{ai} = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{(z - y)}{z} \right)^a \]  

Where \( a = 0, \)  
\[ P_0 = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{(z - y)}{z} \right)^0 = \frac{q}{n} \]  → Poverty incidence or head count …… (3)

Where \( a = 1, \)  
\[ P_1 = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{(z - y)}{z} \right)^1 \]  → Poverty depth ………. (4)

Where \( a = 2, \)  
\[ P_2 = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{(z - y)}{z} \right)^2 \]  → Poverty severity ………… (5)

Where

\( a = \) degree of poverty aversion
\( n = \) number of households in a group
\( q = \) the number of poor households
\( z = \) poverty line
\( y = \) the per capita expenditure (PCE) of the ith household.

The 2/3 mean per capita expenditure was referred to as the moderate poverty line while its 1/3 is referred to as the core poverty line. The study was limited to the moderate poverty line because it closely approximates the $1/day international poverty line (Omonona, 2009; and NBS, 2007).

\( \alpha = \) degree of poverty aversion

Per capita expenditure = \( \frac{Total \ expenditure}{Total \ household \ size} \) ……………………………… (6)

Mean per capita household expenditure (MPCHE) = \( \frac{Total \ household \ PCE}{Total \ number \ of \ households} \) …………………………………………………………….. (7)

The categorization of the poverty line is given as:

- Extreme poor: those spending < 1/3 of MPCHE
- Moderately poor: those spending < 2/3 of MPCHE
- Non-poor: those spending > 2/3 of MPCHE
This was used to achieve objective 3.

**Relationship between poverty and food security.**
The binary logit model was used to investigate the determinants of household food security among the rural households surveyed. The USDA Household Food Security Scale (Revised in March 2000) was used to disaggregate the households into food secure and food insecure households. The dependent variable in this case, food security, was a binary variable which took a value of one if a household was found to be food secure, and zero if otherwise. A variety of models can be used to establish the relationship between the potential poverty and food security. The study employed the logit model in line with earlier researchers. Following Bogale (2009), the cumulative logistic probability model can be econometrically stated as:

\[ Yi = g (Ii) \]

\[ Ii = b_0 + \sum b_jX_{ji} \]

Where: Yi is the observed response for the ith observation (i.e., the binary variable, Yi = 1 for a non-poor household and Yi = 0 for a food insecure household); Ii is an underlying and unobserved stimulus index for the ith observation for each household; if Ii * > Ii the household is observed to be food secure, if Ii * < Ii the household is observed to be food insecure; g is the functional relationship between the field observations (Yi); (Ii*) the stimulus index determines the probability of being poor; and (Ii) the stimulus index determines the probability of being poor. The empirical model used for determining factors that influenced poverty status among low-income households in Barkin-Ladi local government area was specified as:

\[ Ii = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + \epsilon \]

Where: Pi = the probability of an ith household being food secure stands for dummy, Xi = vector of explanatory variables which are defined as:
- \( X_1 = \) Age of Household Head (AGE) in years
- \( X_2 = \) Gender of Household Head (GEND) – Male =1, Female = 0
- \( X_3 = \) Marital Status of household Head (MSTAT) – Married =1, Otherwise=0
- \( X_4 = \) Educational Level of household Head (Years)
- \( X_5 = \) Household size (Number)
- \( X_6 = \) Expenditure on health (Naira)
- \( X_7 = \) Expenditure on food (Naira)
- \( X_8 = \) Off-farm income (Naira)
- \( X_9 = \) Farm size (Ha)
- \( X_{10} = \) Food Security Index

The parameters of the logistic regression model were estimated using the maximum likelihood approach. This was used to actualize objective 4.

**RESULTS AND DISCUSSION**

**Socio-economic Characteristics of Respondents.**
Socio-economic characteristic of the agro-pastoralists used include age, gender, marital status, household size, educational status, occupation, household monthly income etc.

Result from Table 1 revealed that 84% of the respondents were male while 16% of the respondents were female. This shows that male agro-pastoralist household heads was more than the female in the study area. The reason probably is that agricultural production is tedious in nature especially in food crops cultivation. It agrees with Girei et al., (2013) who observed that majority of the groundnut producers in Hong local government area of Adamawa state of Nigeria were males.

From Table 2 below, majority (57%) of the agro-pastoralists household respondents were within the
age bracket of 31-40 years. This is followed by the respondents in the age bracket 41-50 years with 19% while the age brackets 21-30 and > 50 years had 17% and 7% respectively. The mean age of respondents in the study area was 38 years. This means that most of these agro-pastoralists are in their active age and are involved in various agricultural productions. This result is similar to Nwanosike (2011) whose findings show that the farmers he studied are within the ages ranging from 31-40 years.

The results showed that majority of the respondents (68%) were married while 18% were single. This indicates that married people are more involved in agricultural production in the study area. This was also observed by Oluwatayo, et al., (2008) who said that higher household size provides enough persons for family labour.

The result revealed that 30% of the respondents had about 1-5 household members while 50% and 15% of the farming households had about 6-10 and 11-15 household members and a mean of 5 members per household respectively. This implies that majority of the agro-pastoralists households in the study area do not have large household size, hence income earned from farming activities will be expended on these members which will consequently improve their welfare. Oluwatayo et al., (2008) attested that higher household size provides enough persons for family labour and less money needed to pay for hired labour. The result showed that most of the agro-pastoralists households in the study area had one form of formal education or the other. About 13% of the respondents had tertiary education, 23% have secondary education while 28% and 36% had primary and non-formal education respectively. This implies that with the influence of educated farmers, the adoption of farming techniques may not be difficult as they are more likely to learn with ease and disseminate information and or innovation. This result is in line with the findings of Oyekale and Idjesa (2009) who observed that farmers with formal educational qualifications are more likely to adopt agricultural technological innovations more than those without or with little educational qualifications.

The result base on the years of farming experience of the respondents in Table 6 indicated that 38% of the respondents have 11-15 years of farming experience while the respondents with least farming experience are within the range of 1-5 years. The mean years of farming experience in the study area was 17 years. This implies that most of the farmers have been practicing agro-pastoralism for a good numbers of years. This means that the agro-pastoralists will be able to make sound decisions as regards resource allocation and management of their farms. This result is in line with the report of Food and Agriculture Organization (FAO, 2002 cited in Haruna 2010) that farmers with 14 years of farming experience are regarded as “experienced farmers”.

The result on Table 9 showed that personal savings (72%) is the major source of funding for the agro-pastoralists. Source of funding from friends and relations and commercial banks accounted for the lowest percentage (3% and 2%) respectively. The result further reveals that commercial banks are less patronized for financial support for agro-pastoral practice in the study area. This may be due to high interest rate on collected loan as discovered by Amao et al., (2013) in their work titled Poverty among Farming Households in Osun State, Nigeria.

The result in Table 9 shows that majority (35%) of the respondents engage in mining while 23% of the agro-pastoralists were engage in marketing. This implies that the agro-pastoralists engage in other business activities to improve their agro-pastoral practice. This means that agro-pastoralists engaging in other activities may help to reduce the poverty status and ensure food security of the household due to increased income generation from off farm occupation.

The result revealed that 58% of the respondents in the study area had no access to extension contact. This indicates that they do not have access to new information and technology to improve on their agricultural activities and base on their literacy level the respondents can easily adapt to innovations. For this reason it is important that the extension agents should contact the agro-pastoralists to educate them on how to reduce poverty and food insecurity in the study area.

The Findings in Table 12 revealed that 20% of the respondents were members of cooperative society, while 80% of the respondents did not belong to any cooperative society. This may greatly affect their ability to pull their resources together for agricultural production. Membership of clubs, association or cooperative societies avail farmers the opportunity to obtain credit, receive inputs at subsidized or at cheaper rates; and to obtain important and recent
information concerning their farming activities. This view is also held by Nwaru, et al., (2006) and Adeola et al (2011). The effect of this result is that agro-pastoralists who belong to the cooperative societies enjoy the benefits accruable to members through the pooling of resources together for a better expansion of their production frontier; efficient and effective management of resources and for profit maximization.

**Agro-pastoralists’ food security status.**

The findings in table 16 revealed the food security status of the respondents in the study area. The result shows that 67% of the respondents were foods secure while 69 of the agro-pastoralists sampled representing 33% representing one-third of the agro-pastoralists was found to be food insecure. Also the average daily calorie intake for the entire respondents is 6324.84 kcal while the daily recommended kilocalorie requirement is 2260 kcal. This shows that 67% of the agro-pastoralists’ representing two-third of the agro-pastoralists’ calorie intake is higher than the recommended calorie intake. Both the minimum and maximum kilocalorie intake of the agro-pastoralists was higher than the average daily recommended calorie. This agrees with Ojeleye et al., 2014 who in their research on assessment of farm household food security and consumption indices in Nigeria, noted that One third of the household were found to be food insecure, in spite of the fact that the total household daily calorie requirement was found to exceed the total household daily calorie consumed, the calorie consumed was just at the threshold of adequacy raising the question of household accessibility and food distribution efficiency.
Table 1: Socioeconomic Characteristics of the Respondents

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<th>Gender</th>
<th>Frequency</th>
<th>Percentage (%)</th>
<th>Cumulative frequency</th>
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<tbody>
<tr>
<td>Male</td>
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<td>84</td>
<td>84</td>
</tr>
<tr>
<td>Female</td>
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<td>16</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>100</strong></td>
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<table>
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<tr>
<th>Age (years)</th>
<th>Frequency</th>
<th>Percentage (%)</th>
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<td>17</td>
<td>17</td>
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<td>31-40</td>
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<tr>
<td>41-50</td>
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<tr>
<td>Single</td>
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<td>18</td>
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<td>Widow</td>
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<td>Divorce</td>
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<td><strong>100</strong></td>
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<td>Primary</td>
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<td>Secondary</td>
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<td>Non-Formal</td>
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<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td>Farming</td>
<td>63</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Farming &amp; other trades</td>
<td>12</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household size</th>
<th>Frequency</th>
<th>Percentage (%)</th>
<th>Cumulative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 10</td>
<td>184</td>
<td>80.00</td>
<td>80.00</td>
</tr>
<tr>
<td>11-20</td>
<td>35</td>
<td>15.22</td>
<td>95.22</td>
</tr>
<tr>
<td>21 – above</td>
<td>11</td>
<td>04.78</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>230</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Farming Experience</th>
<th>Frequency</th>
<th>Percentage (%)</th>
<th>Cumulative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>27</td>
<td>11.74</td>
<td>11.74</td>
</tr>
<tr>
<td>6 – 10</td>
<td>82</td>
<td>35.65</td>
<td>47.39</td>
</tr>
<tr>
<td>11 – 15</td>
<td>87</td>
<td>37.83</td>
<td>85.22</td>
</tr>
<tr>
<td>&gt;15</td>
<td>34</td>
<td>14.78</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of credit</th>
<th>Frequency</th>
<th>Percentage (%)</th>
<th>Cumulative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal savings</td>
<td>175</td>
<td>76.08</td>
<td>76.08</td>
</tr>
<tr>
<td>Commercial banks</td>
<td>02</td>
<td>0.87</td>
<td>76.95</td>
</tr>
<tr>
<td>Cooperative</td>
<td>18</td>
<td>7.83</td>
<td>84.78</td>
</tr>
<tr>
<td>Friends</td>
<td>35</td>
<td>15.22</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>230</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extension services</th>
<th>Frequency</th>
<th>Percentage (%)</th>
<th>Cumulative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>97</td>
<td>42.17</td>
<td>42.17</td>
</tr>
<tr>
<td>No</td>
<td>133</td>
<td>57.83</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>230</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coop Membership</th>
<th>Frequency</th>
<th>Percentage (%)</th>
<th>Cumulative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>46</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>No</td>
<td>184</td>
<td>80.00</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>230</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Distribution of the respondents by their food security status

<table>
<thead>
<tr>
<th>Statistical estimates</th>
<th>Food Secure</th>
<th>Food Insecure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>155</td>
<td>75</td>
</tr>
<tr>
<td>Percentages</td>
<td>67</td>
<td>33</td>
</tr>
<tr>
<td>Average daily calorie intake (Kcal)</td>
<td>6324.48</td>
<td>2253.86</td>
</tr>
<tr>
<td>Maximum daily calorie intake (Kcal)</td>
<td>25412.27</td>
<td>1001.00</td>
</tr>
<tr>
<td>Minimum daily calorie intake (Kcal)</td>
<td>2285.43</td>
<td>1001.00</td>
</tr>
</tbody>
</table>

Agro-pastoralists’ Poverty status.
The poverty line used for this study was collected from monthly maximum and minimum per capital expenditure (MPCE) of the sampled household. Two third (₦7, 599.26) of the monthly PCE of the sampled household was used as poverty line.
The poverty of the agro-pastoralist households which included poverty head count or incidence (P₀), poverty gap or depth (P₁) and squared poverty severity (P₂) were analyzed. The (P₀) for the entire households was 50%. This means that 50% of the agro-pastoralist households in the study area were poor and 50% households were non-poor. The poverty gap index (P₁) usually referred to as the depth of an average poor person from the poverty line was 39%. The poverty incidence (P₀) which measures the distance to each poor person to one another was found to be 0.15. This means that among the poor households 15% were severely poor. This shows that the poor households were not equally poor but vary in their degree of poverty. The average per capital expenditure (PCE) was (₦11, 398.89), while the maximum (PCE) was found in the study at (₦70, 055) and the minimum per capital expenditure was (₦1, 339.78) for the respondents.

Table 3: Household poverty profile and indices

<table>
<thead>
<tr>
<th>Poverty</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-poor</td>
<td>115</td>
<td>50.00</td>
</tr>
<tr>
<td>Moderate poor</td>
<td>110</td>
<td>47.82</td>
</tr>
<tr>
<td>Core poor</td>
<td>05</td>
<td>2.17</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100</td>
</tr>
</tbody>
</table>

FGT poverty indices
- Poverty incidence 50.0
- Poverty depth 0.39
- Poverty severity 0.15
- Average PCE 11,398.89
- Min PCE 1,339.78
- Max PCE 70,055
- Std. Deviation 10993.15
- Coefficient of variation% 96.44

Poverty line (2/3) = ₦7, 599.26

Effect of socioeconomic factors on the food security status of the respondents
The coefficient of age was found to be negative and significantly related with the food security status of the respondents. The result means that age was a significant factor in determining the food security status of the agro-pastoralists in the study area. This implies that as age of the respondents in the study area increase, it will reduce the probability of being food insecure. This is probably because accumulated knowledge and experience of farming systems a farmer acquired pays off over a long period of time (Bonabana-Wabbi, 2002).
The coefficient marital status of the agro-pastoralists measured was negative and statistically significant at 1% level of probability. The result implies that marital status was a significant factor in determining the food security status of the agro-pastoralists in the study area.
area. This means that marital status has significant effect on the food security status of the respondents in the study area. As the marital status of the agro-pastoralists changes, there is the probability of the respondents becoming food insecure.

The coefficient of education of the agro-pastoralists measured was positive and statistically significant at 1% level of probability. This implies that as educational level of respondents’ increase, the likelihood of changing the food security status of respondents will also increase. This also means that educational attainment has significant effect on the food security status of respondents in the study area.

According to Idowu, et al. (2018), smaller farming households with low level of education could prevent them from getting opportunities other than farm such as formal employment etc.

The coefficient household size of the agro-pastoralists measured was positive and statistically significant at 1% level probability. The result implies that household size was a significant factor in determining the food security status of the agro-pastoralists in the study area. This means that an increase in household size will lead to an increase in the likelihood of being food secure, particularly if the composition of the household is made up of adults who are actively involved in the agro-pastoral activities.

The coefficient of expenditure on food of the agro-pastoralists measured was positive and statistically significant at 1% level probability. The result means that expenditure on food was a significant factor in determining the food security status of the agro-pastoralists in the study area. This implies that an increase in expenditure on food will to an increase in the likelihood of being food secure. An increase in the food expenditure of the household is an indication of an increase in the income of the household, which empowers the household to purchase and consume variety of food, thereby increasing the nourishment of the household.

The coefficient of off-farm income of the agro-pastoralists measured was positive and statistically significant at 1% level probability. The result means that off farm income was a significant factor in determining the food security status of the agro-pastoralists in the study area. This means that an increase in off-farming income will result to an increase in the likelihood of changing the food security status of the respondents. This also means that, farmers with an additional source of income will be willing to meet the demand of the household and therefore are non-poor. This is in agreement with the findings of Omonona et al., (2006) in their work titled urban people’s perception and causes of poverty in Nigeria.

The coefficient poverty status of the agro-pastoralists measured was negative and statistically significant at 1% level probability. The result implies that poverty status was a significant factor in determining the food security status of the agro-pastoralists in the study area. This means that the poorer the agro-pastoralists, the less food secured the households will be.
Table 4: The determinants of poverty status of the respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>10.01461</td>
<td>0.1859484</td>
<td>53.86</td>
</tr>
<tr>
<td>Age</td>
<td>0.0058431</td>
<td>0.0036723</td>
<td>-1.59</td>
</tr>
<tr>
<td>Gender</td>
<td>0.0174516</td>
<td>0.0830324</td>
<td>-0.21</td>
</tr>
<tr>
<td>Marital status</td>
<td>-0.227828</td>
<td>0.0373756</td>
<td>-6.10***</td>
</tr>
<tr>
<td>Education</td>
<td>0.0125346</td>
<td>0.0046473</td>
<td>2.70***</td>
</tr>
<tr>
<td>Household size</td>
<td>0.1413661</td>
<td>0.0067284</td>
<td>21.01***</td>
</tr>
<tr>
<td>Expenditure on health</td>
<td>0.0000136</td>
<td>5.60</td>
<td>2.42**</td>
</tr>
<tr>
<td>Expenditure on food</td>
<td>0.0000202</td>
<td>2.74</td>
<td>7.37***</td>
</tr>
<tr>
<td>Off farm income</td>
<td>0.0000112</td>
<td>8.53</td>
<td>13.11***</td>
</tr>
<tr>
<td>Farm size</td>
<td>0.0112103</td>
<td>0.0267699</td>
<td>-0.42</td>
</tr>
<tr>
<td>Poverty status</td>
<td>-0.0000187</td>
<td>7.07</td>
<td>-2.65***</td>
</tr>
</tbody>
</table>

*** Significant at 1%, ** significant at 5%, * Significant at 10%.

Summary, Conclusion and Recommendations

The study analyzed food security and poverty status of agro-pastoralists in Barkin-ladi Local Government area of Plateau state. The result of food security analysis shows that two-thirds of the agro-pastoralists were food secure while one-third of the agro-pastoralists were food insecure and the minimum calorie consumption of these respondents is higher than the average daily recommended calorie consumption. The agro-pastoralists were not equally poor and also, 50% of the agro-pastoralists were poor. There is also relationship between poverty status and food security status of respondents in the study area. The study recommends that; the government should subsidize the inputs of the agro-pastoralists which will lead to increased income and thus enhance increased food Consumption and thereby reducing food insecurity, basic rural infrastructures should be provided in order to increase and enhance both crop and livestock productivity; the government at all levels should ensure that programmes aimed at alleviating poverty are intensified vigorously in order to lift most of the agro-pastoralists out of food insecurity, education of agro-pastoralists should be enhanced through the establishment of more accessible and functional schools that will increase innovation adoption; the agro-pastoralists should be encouraged to form functional co-operative societies that will enable them access capital at low interest rates which will enable bulk purchase of inputs and easy access to knowledge through information sharing. Extension agents are the link between research organizations and the agro-pastoralists, therefore, extension services should be restructured, refocused for better and efficient farmer oriented service delivery.
REFERENCE
Folorunso, S.T., Gama, E.N and Ademiluyi, I.O

Hunger Worldwide.


Folorunso, S.T., Gama, E.N and Ademiluyi, I.O


