

# Original Research Article

## LIVELIHOOD OPTIONS AND THE INTENSITY OF USE AMONG FARMERS IN NORTH CENTRAL NIGERIA

Comment [Ma1]:

### ABSTRACT

**Aims:** This research examined the various livelihood options and the intensity of use among farmers in North Central Nigeria.

**Study design:** original research using primary data collected from sampled farmers.

**Place and Duration of Study:** The study was conducted in North central Nigeria in 2023.

**Methodology:** The study used data obtained from administered questionnaire to 483 farmers. Data were analyzed using descriptive statistics and Analytic Hierarchy Process (AHP).

**Results:** Results revealed that all the farmers participated in crop farming with mean monthly income of ₦55,416.98. Other livelihood activities identified were livestock farming, petty trading, business, agricultural trading, aquaculture/artisanal fishing, agro-processing, handcraft, transportation services, tailoring/fashion design, health worker, telecommunication services, labour vending, artisans, blacksmith, domestic worker, construction worker and mining/quarry worker. Result of the AHP revealed that there was more intense use of crop farming among the livelihood options which was ranked first, then livestock farming, business and agricultural trading.

**Conclusion:** The study concluded that crop farming was the most important livelihood activity of the farmers. The farmers have diversified to take advantage of available opportunities to improve their livelihood security, reduce risk and improve their adaptation to climate change.

Comment [Ma2]: Original research and primary data are appropriate descriptors.

Comment [Ma3]: Specify the type of farmers: small, medium or large  
To strengthen this section, clarify the sampling technique (e.g., random sampling, purposive sampling).

**Keywords:** (Livelihood; Analytic Hierarchy Process; Central Nigeria)

(Suggestion: Under methodology include study design, and place and duration of study)

### 1. INTRODUCTION

As the largest employer in rural area, the largest income generator and the largest sources of raw materials, agriculture clearly plays a predominant early role, influencing the size and structure of the rural non-farm economy. In many settings, agriculture plays a predominant role governing the scale, structure, and evolution of rural non-farm activity (Haggblade *et al.*, 2016). Shittu *et al.* (2005) revealed that non-farm source contributes about half of the rural farming households' income. In line with this (Awoniyi and Salman, 2012), pointed out that farming household which are not involved in non-farm activities are more vulnerable to poverty when compared with farming households that engaged in non-farm income.

The non-farm sector offers potential to absorb a growing rural labour force, slow rural-urban migration, contribute to national income growth, and promote a more equitable distribution of income (Fikru, 2008). The higher the degree of diversification of households, the better-off they are in terms of total income (Fikru, 2008). Lending credence to this (2011) pointed out that farm households who diversified their productive activities to off farm economy are found to be better off as compared to those who confined their operation to farm sector.

Comment [Ma4]: 1. Consider beginning with a more attention-grabbing statement or a specific statistic to emphasize the significance of agriculture and non-farm activities.  
2. Clarify the research focus  
3. Avoid repetitive phrases like "predominant role," are repeated.  
4. Arrange and correlate the reviews

Farming remains important but rural people are looking for diverse opportunities to increase and stabilize their incomes as a result many rural households find themselves pursuing second-best diversification strategies through the allocation of household labour (Bhaumiket *et al.*, 2016). Two fundamental causes of diversification are also frequently mentioned in the literature (Ellis, 2008); namely, seasonality and risk. Diversification is thus assumed to play a role in overcoming the consumption smoothing problem created by the seasonality of agricultural output patterns. All households, whether rural or urban, are prone to personal shocks of chronic illness, accidents and death. Risks are thus reduced by diversifying livelihoods.

In literature, Gecho (2017) and Addisu (2017) identified three livelihood diversification strategies among farm households namely: on farm, nonfarm and off farm. Crop farming and livestock farming were identified as major livelihood activities of on farm livelihood strategy. Contrary to the above classification Wondimagegnhuaet *et al.* (2016), classified livelihood diversification strategies as on farm (crop and livestock production) and nonfarm. Off-farm activities were activities, which were carried out on someone else's farm such as wage labour, natural resource based activities like firewood/grass and charcoal selling (Yona and Mathewos, 2017). Non-farm activities also include petty trade, handicraft (weaving, spinning, carpentry, house mudding, poet making), remittance, selling of local drinks and rent of pack animal like donkey for transportation (Gecho, 2017). In addition, selling of unskilled labour force, mining and trading of small ruminants and cattle were nonfarm livelihood sources for smallholder farmers (Asfir, 2016).

Climate change and extreme weather events present severe threats and erode essential needs, capabilities and rights more especially for the poor farm households and marginalized thereby redesigning their livelihoods (UNDP, 2017). A number of livelihoods are directly climate sensitive, such as rain fed agriculture, seasonal employment in agriculture and tourism (IPCC, 2014). That is, almost all sectors in agriculture depend on weather and climate whose variability have meant that rural farmers who implement their regular annual farm business plans risk total failure due to climate change effects. Studies (Antwi-Agyei, 2012; Ibitoye *et al.*, 2014) have confirmed that food and livelihood security are severely threatened by climate change, which has a direct, often adverse influence on the quantity and quality of agricultural production in Nigeria. More so, the vulnerability of developing countries like Nigeria is worsened by heavy reliance on renewable natural resources for livelihoods, employment and incomes. Therefore, a change in climate has implications on the livelihoods of the farmers (Nicholas *et al.*, 2012). However, limited empirical information is available on the various livelihood options and the intensity of use in North Central Nigeria. Therefore, this research will contribute empirically to this knowledge gap. In addition, the knowledge of livelihood options could enhance policy towards tackling the challenges climate change is imposing on Nigerian farmers. The result of this research will also help guide investment priorities in the study area, which if implemented will build resilience.

Several studies, Tesfaye *et al.* (2011); Soltani *et al.* (2012); Khatiwada *et al.* (2017) have used Principle Component Analysis (PCA) followed by cluster analysis to categorize households into distinct livelihood strategy groups based on the percentage contribution of individual income to the total household income. This might result to misclassification of observations at the boundaries between the clusters.

Saaty (2008) compared the result of analytic hierarchy process and rating method and the result of the study revealed that the two methods do not reveals the same priorities result. For the rating method using likert-type scale the alternative priorities were very close, it was therefore concluded that AHP method where alternatives are compared with each other under various criteria is more accurate. In this study, Analytic hierarchy process which is a multiple criteria decision-making tool introduced by Saaty (1980) was used. It uses an Eigen value approach to the pair-wise comparisons (Goepel, 2013). The Analytic Hierarchy Process (AHP) is used to derive relative priorities on absolute scales (invariant under the identity transformation) from both discrete and continuous paired comparisons in multilevel hierarchic structures. AHP takes several factors into consideration simultaneously, allowing for dependence and for feedback, and making numerical tradeoffs

- (Suggestion: 1. Introduction was lengthy, breaking it into smaller sections or paragraphs for better readability**  
**2. It was fruitful if you include conceptual framework and theoretical studies separately.**  
**3. Set the hypotheses/research questions relevant to the research**  
**4. The Objective of the study should be specified concisely and clearly with variables.**  
**5. Research gap of the study to be included)**

## 2. METHODOLOGY

The study was conducted in North Central Nigeria. The States that make up the north central zone are Benue, Kogi, Kwara, Nasarawa Niger, Plateau and Federal Capital Abuja. Central Nigeria covers a total land area of 242, 425.00 sqkilometres and lies between latitude 4<sup>0</sup> and 14<sup>0</sup> North of the equator and longitudes 3<sup>0</sup> and 14<sup>0</sup> East of the Greenwich

meridian. The area has an estimated population of 20, 266, 257 people (NPC, 2006). Multi-stage sampling technique was employed in the collection of primary data for this study. For this study, farmers that participated in International Fund for Agricultural Development-Value Chain Development Programme were used. In the first stage, the two (2) participating States in North Central Nigeria under the International Fund for Agricultural Development (IFAD) - Value Chain Development Programme (VCDP) were selected. In the second stage, five (5) participating Local Government Areas (LGAs) in each State were selected, giving a total of ten (10) LGAs. In the third stage, sampling of farm households in each community were determined proportionately using Krejcie and Morgan (1970) formula in equation (1) following Ardakaniet *al.* (2012) to obtained data from 483 IFAD-VCDP farmers.

$$S = \frac{X^2 NP(1-P)}{d^2(N-1)+X^2P(1-P)} \quad (1)$$

Where:

S = The required sample size;

$X^2$  = Table value of chi-square for 1 degree of freedom at the desired confidence level (1.96);

N = Population size;

P = Population proportion (assumed to be 0.80);

$d^2$  = Degree of accuracy expressed as a proportion (0.05).

Data for this study were collected using structured questionnaire and interview schedule. The data were analyzed using descriptive statistics and Analytic Hierarchy Process (AHP). The Analytic hierarchy process is a multiple criteria decision-making tool that uses an Eigen value approach to the pair-wise comparisons. Following Goepel (2013), AHP procedure, the components, criteria, and sub-criteria of intensity of use of the various livelihoods were converted into a multi-level hierarchical structure to facilitate pair wise comparisons using expert judgment at each level. The comparisons are made using a scale of absolute judgements that represent, how much more, one element dominates the other with respect to a given attribute. To make comparisons, scale of numbers are needed which indicates how many times more important or dominant one element is over another element with respect to the criterion or property with respect to which they are compared. The pair-wise comparison matrix was developed to show which alternative livelihood option is more important to the other on a 9 point scale using four sub-criteria of the frequency, period of the year, income realized per frequency and reason for engagement in the livelihood options. The weighted vector and criteria weight were computed from the normalized pair-wise comparison matrix. The weights were computed using the AHP (Eigen Vector Method (EVM) Multiple inputs) software, Goepel version 26.07.2013. The calculation of priorities were then converted into a judgmental matrix:

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix} \quad (2)$$

Where:

$A_{ij}$  = the expert's comparison rating between element  $i$  and element  $j$  of a given level with respect to the upper level of the hierarchy with:

$$a_{ij} > 0; a_{ji} = \frac{1}{a_{ij}}; a_{ii} = 1 \text{ for all } i. \quad (3)$$

The priorities or weights of the elements were estimated by finding the principal eigenvector  $W$  of the matrix  $A$  which is:

$$AW = \lambda_{max} W \quad (4)$$

Where:

$\lambda_{max}$  is the largest eigenvector of the matrix  $A$ , the vector  $W$  is then normalized to get the vector of priorities of elements of one level with respect to the upper level. The priorities served as weights of the elements at each hierarchic level.

(Suggestion: Under research methodology include subtitles like study area [specify state/district/village], research design, sampling techniques, types of data, tools used to identify data, model specification etc.....)

### 3. RESULTS AND DISCUSSION

The various livelihood activities identified in the North Central Nigeria are presented in Table 1, which reveal that all the farmers were into crop farming, with mean monthly income of ₦55,416.98. It is evident that crop farming was the most important livelihood activity in the study area. Livestock farming, business and agricultural trading were also widely pursued livelihood activities accounting for 20.50%, 16.77% and 14.29% respectively. Transportation services, petty trading, artisans and agro-processing were relatively pursued by the farmers which accounted for 8.90%, 8.70%, 6.83% and 6.42% respectively. Other livelihood activities identified in the study area were aquaculture/artisanal fishing, handcraft, blacksmith, domestic worker, tailoring/fashion designer, health worker, telecommunication services, labour vending and mining/quarry worker. The finding further revealed that besides health worker, aquaculture, livestock farming and business has higher mean monthly income of ₦105127.30, ₦98515.15 and ₦77876.54. This implies that aquaculture, livestock farming and business are more lucrative in the study area. This indicates that the beneficiaries of IFAD-VCDP in the study area have diversified to take advantage of available opportunities to improve their livelihood security, reduce risk and improve their adaptation to climate change. This result is consistent with the findings of Yona and Mathewos (2017) who ascertained that apart from farming, majority of farm households are engaged in non-farm and off-farm activities such petty trading, making charcoal, daily labourer, contraband trading, wage and handcraft so as to increase their total

**Comment [Ma5]:** Specify why did you choose the farmers from IFAD-VCDP and specify selection criteria  
Use spell check and give a neat and precise research methodology presentation.

earning. This is also in line with the findings of Majekodunmi *et al.* (2017) who revealed that farm households pursued a variety of off-farm activities, including driving commercial buses or motorcycles, teaching and trading cattle, as practiced in many economies in Nigeria.

**Table 1: Various livelihood activities in North Central Nigeria**

*Livelihood activities	Frequency	Percentage	Mean income	Rank
Crop farming	483	100	55,416.98	1
Livestock farming	99	20.50	98,515.15	2
Business	81	16.77	77,876.54	3
Agricultural Trading	69	14.29	44,688.41	4
Transportation services	43	8.90	46,532.56	5
Petty trading	42	8.70	64,252.38	6
Artisans	33	6.83	58,303.03	7
Agro-processing	31	6.42	48,870.97	8
Telecommunication services	12	2.48	54,808.33	9
Aquaculture/Artisanal fishing	11	2.28	105,127.30	10
Tailoring/Fashion designer	9	1.86	55,888.89	11
Labour vending	6	1.24	17,666.67	12
Hand craft	5	1.04	26,000	13
Health worker	5	1.04	547,081.40	13
Domestic worker	3	0.62	30,000	14
Blacksmith	1	0.21	12,000	15
Construction worker	1	0.21	40,000	15
Mining/quarry worker	1	0.21	10,000	15

Source: Field survey, 2023.

Note: \* Multiple responses.

The priority weights obtained from Analytic Hierarchy Process (AHP) on intensity of use of the livelihood options is presented in Table 2. The pair-wise comparison matrix was developed to show which alternative livelihood option is more important than the other on a 9 point scale using four sub-criteria of the frequency, period of the year, income realized per frequency and reason for engagement in the livelihood options. The weighted vector and priority weight were computed from the normalized pair-wise comparison matrix. Result in Table 2 reveals that there was more intense use of crop farming among the livelihood options which was first with criteria weight of 22.14%. Livestock farming was second with 15.25%, followed by business which was third with 12.52% and then agricultural trading which was fourth with 10.79%.

To check for the consistency of the pair-wise ranking, that is, to show the likelihood that the ranking were done randomly, principal eigen value ( $\lambda_{max}$ ) was computed. The principal eigen value ( $\lambda_{max}$ ) was 18.25 with consistency index of 0.015 and random index for (n=18) was 1.61. The consistency ratio (CR) for the matrix was 0.90%. This implies that the

**Comment [Ma6]:** Include 483 are farmers alone or from other livelihood sources  
Income from different livelihood alone or including farming activities.

responses of the farmers were highly consistent for the whole hierarchy. Since the decision criteria is that the consistency ratio should be less than or equal to 10%, otherwise the judgment need to be revised to improve the consistency. This could be attributed to the fact that IFAD-VCDP focuses mainly on crops that is, rice and cassava and also partly a reflection of subsistence nature of most of the farmers who produces mainly for home consumption. More so, crop farming does not required special skill to start, although they are climate dependent. High level of consistency in ranking would help guide the farmers in the choice of livelihood decisions. This is in consistent with the findings of Galadima (2016) who found out that crop farming constitutes the most important livelihood option among the beneficiaries of IFAD community-based agricultural and rural development programme in Yobe State, Nigeria. This is also in line with the findings of Mengistu (2016) who revealed that the major farm household livelihood diversification activities were crop and livestock production, petty trading and remittance.

**Table 2: Intensity of use of the livelihood options in North Central Nigeria**

Livelihood activities	Weighted vector	%Priority weight	Rank
Crop farming	3.984	22.14	1 <sup>st</sup>
Livestock farming	2.745	15.25	2 <sup>nd</sup>
Business	2.253	12.52	3 <sup>rd</sup>
Agricultural trading	1.941	10.78	4 <sup>th</sup>
Petty trading	1.277	7.09	5 <sup>th</sup>
Transportation services	1.277	7.09	5 <sup>th</sup>
Artisan	0.942	5.24	6 <sup>th</sup>
Agro-processing	0.917	5.09	7 <sup>th</sup>
Aquaculture/Artisanal fishing	0.472	2.62	8 <sup>th</sup>
Telecommunication services	0.471	2.62	8 <sup>th</sup>
Tailoring/Fashion Designer	0.431	2.39	9 <sup>th</sup>
Hand craft	0.239	1.33	10 <sup>th</sup>
Health worker	0.241	1.34	10 <sup>th</sup>
Labour vending	0.238	1.33	11 <sup>th</sup>
Domestic worker	0.175	0.98	12 <sup>th</sup>
Mining/Quarry worker	0.130	0.72	13 <sup>th</sup>
Blacksmith	0.129	0.72	14 <sup>th</sup>
Construction worker	0.129	0.72	14 <sup>th</sup>
Amax	18.25		
Consistency Index (CI)	0.015		
Random Index (RI) (n=18)	1.61		
Consistency Ratio (CR)	0.009		

Source: Field survey, 2023.

(Suggestion: explain policy implications, limitations and avenues of future research)

#### 4. CONCLUSION

The study concluded that crop farming was the most important livelihood activity of the farmers. The beneficiaries of IFAD-VCDP in the study area have diversified to take advantage of available opportunities to improve their livelihood security, reduce risk and improve their adaptation to climate change. It was therefore recommended that farm households should diversify their sources of livelihood into activities like artisans, aquaculture, livestock farming, transportation services, business and agricultural trading in order to take advantage of available opportunities to improve their livelihood security, reduce risk and improve their adaptation to climate change. There is also need for expansion of rural infrastructure such as schools, pipe born-water, rural electrification and wireless telecommunication services by government and non-governmental organizations to achieve the goal of farm household livelihood security as well as rural development.

(Suggest if there is any government schemes available for improvement of agricultural activities)

#### DEFINITIONS, ACRONYMS, ABBREVIATIONS

AHP- Analytic Hierarchy Process

IFAD-VCDP – International Fund for Agricultural Development-Value Chain Development Programme.

#### CONSENT (WHEREEVER APPLICABLE)

Not applicable

#### ETHICAL APPROVAL (WHEREEVER APPLICABLE)

Not applicable

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**Comment [Ma7]:** Review Provide a strong foundation for your study.

**Some suggestion:** Ensure a reference and citation style  
Add DOI number wherever possible

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