EXPOLATORY ANALYSIS OF CONSTRAINTS TO LIVELIHOOD DIVERSIFICATION AMONG IFAD-VCDP FARMERS IN BENUE STATE, NIGERIA

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ABSTRACT
This study investigated the constraints to livelihood diversification among IFAD-VCDP farmers in Benue State, Nigeria. A two-stage sampling techniquewas employed in the selection of respondents. A total of 240 respondents were selected for this study. Descriptive statistics andprincipal component analysis (PCA) were the analytical tools engaged in this study.The study revealed that mean age and household size were 7 and 46 respectively.The PCA result revealed that the most severe constraints the farmers faced in livelihood diversification hierarchically were public and institutional constraint; educational and training constraint; climate and production constraint; trade, norms and religious believes constraint; and time and skilled labour constraint. It was therefore recommended that there is need for both the government and non-governmentorganizations to intensify efforts on public, institutional, educational and climate policies so as to increase livelihood opportunities in the study area.

KEYWORDS: Livelihood diversification, Constraints, IFAD-VCDP, Factor analysis

INTRODUCTION

Livelihood is an idea that has been gaining increasing currency in recent years and is now seen as fundamental to poverty and climate risk reduction approaches around the world. For most households, and especially for poor farm households assets are deployed in a series of livelihood activities: that is, the means through which a household gains an income and meets its basic needs (Mabe *et al*., 2014). Livelihoods are dynamic and people adapt and change their livelihoods with internal and external stressors. Ultimately, successful livelihoods transform assets into income, dignity and agency, to improve living conditions, a prerequisite for poverty alleviation (Sallawu *et al.,* 2016). Livelihood diversification is defined as a process by which household members construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living (Ellis, 2000). Accordingly, in this study, livelihood diversification refers to the attempts by individuals and households to find new ways to raise incomes and reduce vulnerability to different livelihood shocks.

The Value Chain Development Programme (VCDP) is a six-year development initiative of the Federal Government of Nigeria (FGN) and International Fund for Agricultural Development (IFAD) programme that focuses on supporting cassava and rice value chains for small farmers in the six states of Anambra, Benue, Ebonyi, Niger, Ogun and Taraba. Within each state, the programme is being implemented in five (5) Local Government Areas (LGAs) selected on the basis of objective criteria. VCDP is well anchored in Nigeria government's vision for agricultural transformation through commodity value chain approach, with emphasis on enhancing productivity and access to markets for rice and cassava smallholder farmers.

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 (IPCC, 2014). 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 (crop, livestock, pastoralism, fishery) 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 (Ozor *et al.,* 2010).Livelihood diversification among farm households is very important due to population growth, the subsequent progressive shrinking ofland holdings size and climate variability.The findings of thestudy are expected to indicate the policy interventions that might improve farmers livelihoods to raise incomes and help guide investment priorities in the study area. Researchers will also find the body of literature useful in their quest to extend frontiers of knowledge. The objectives of this study were to describe the socio-economic characteristics of farmers and constraints to livelihood diversification among farmers under IFAD-VCDP in Benue State.

MATERIALS AND METHODS

The study was conducted in Benue State, Nigeria which was created from the former Benue-Plateau State in 1976. The State lies in the North Central Nigeria between Latitudes 6°25ʹand 8° 8ʹNorth of the Equator and Longitudes 7°47ʹ and 10° 0ʹEast of the Greenwich meridian, with total landmass of 34,059 square kilometers. The State shares boundaries with Nassarawa to the North, Taraba to the East, Ebonyi and Cross River to the South, Enugu to the South West, Kogi to the West. It also shares an international boundary with the Republic of Cameroon to the South East (Figure 1). Going by the population growth rate in Nigeria of 2.8% (World Bank, 2016), the 2006 population of the State(NPC, 2006)is projected to 5,552,212 as at 2017. Benue state comprises of 23 LGAs divided into three Agricultural Development Project zones.

It is inhabited predominantly by the *Tiv* and *Idoma* people. Other ethnic groups include *Igede, Etulo, Abakwa, Jukun, Hausa, Igbo, Akweya,* and *Nyifon*. The State experiences two distinct seasons, the wet season and the dry season with mean temperature of 28^0C. Benue State has abundant human and material resources, most of the people in the State are farmers while inhabitants of the riverine areas engage in fishing as their primary or secondary occupations. Benue State is acclaimed the nation's food basket because of its diverse rich agricultural produce which includes yams, rice, beans, cassava, soya beans, benniseed, maize, millet, tomatoes and a lot of fruits. Poultry, goat, sheep, pigs and cattle are the major domestic animals kept (Benue State Agricultural and Rural Development Authority (BSARDA), 1998).
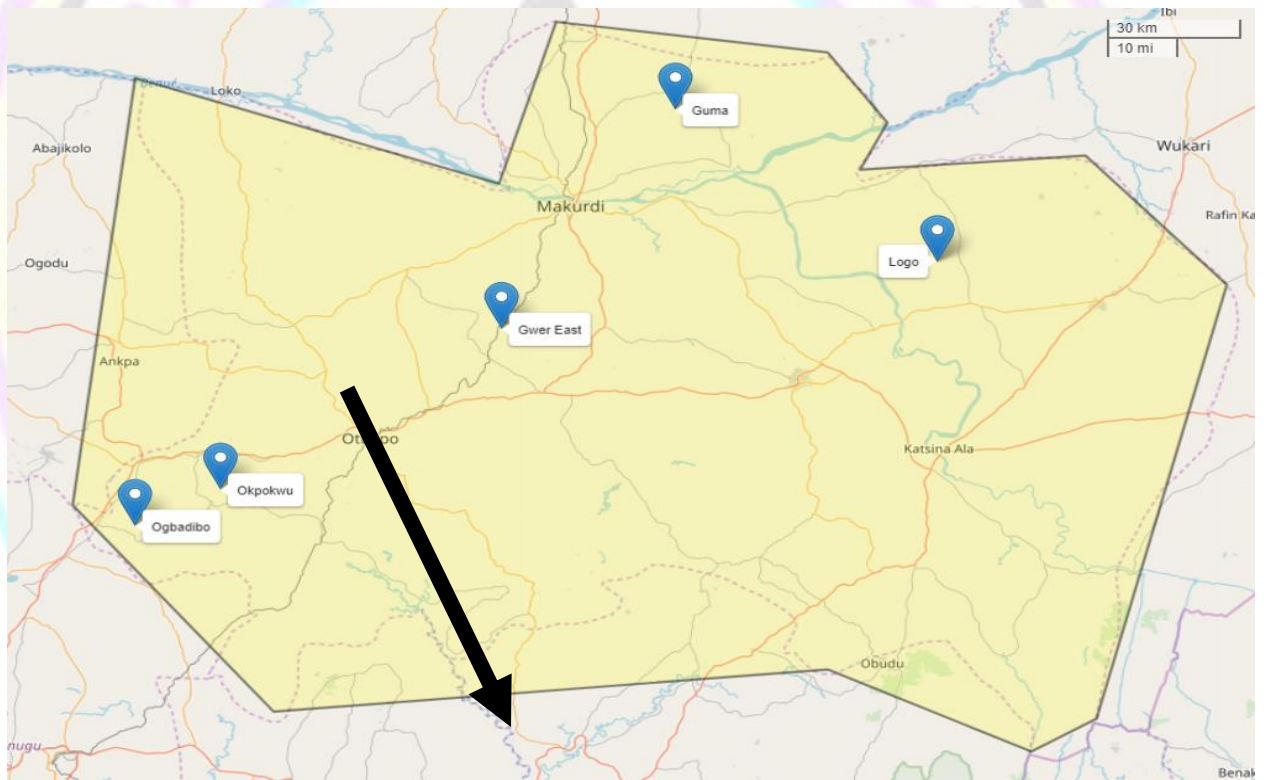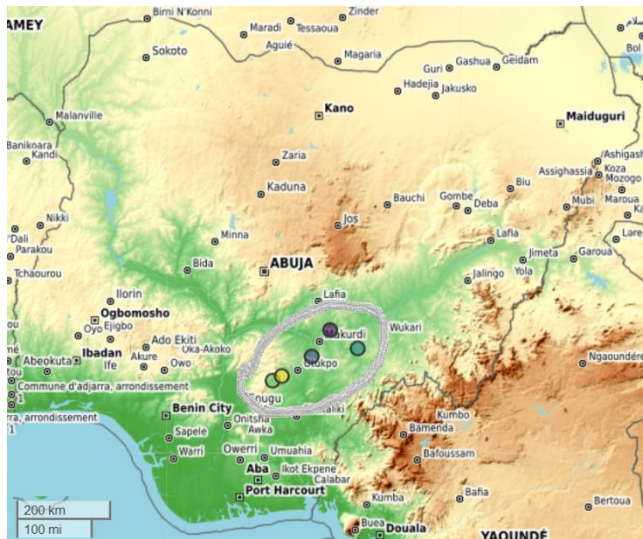
Figure 1 Map of Nigeria showing the participating Local Government Areas in IFAD-VCDP in Benue State, Nigeria[1]

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[1]The maps are produced using a combination of some r packages i.e. Pebesma (2018), Cheng, Karambelkar & Xie (2018), Appelhans, Detsch, Reudenbach & Woellauer (2018), Kahle & Wickham (2013), Wickham, H. (2017)

A two-stage sampling technique was employed in the collection of primary data for this study. In the first stage, all the five (5) participating Local Government Areas (LGAs) in the State were selected. In the second stage, sampling of farm households in each community was determined proportionately using Krejcie and Morgan (1970) formula and adopted by Ardakani *et al.* (2012). The formular is presented in eqn. (1)

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

(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 squared expressed as a proportion (0.05) and
1= Constant

A total of 240 respondents were selected for this study. The data was collected using interview schedules with the aid of trained enumerators. The data were analyzed using descriptive statistics and principal factor model.Factor analysis is a data reduction technique used to reduce a large number of variables to a smaller set of underlying factors that summarize the essential information contained in the variables. The constraints were grouped using principal factor method with varimax orthogonal rotation method developed by Kaiser (1958). The factor solution should explain at least half of each original variable's variance, so the communality value for each variable should be 0.30 or higher. The criterion of eigen value or characteristic root (Eigen value) greater than 1.0 was used for defining the number of the factors that were retained (Chong *et al.*, 2013). Model acceptance was based on three criteria: each variable, in order to be included in the variable cluster of a factor, must load to it more than 0.4, each factor must have more than two variables and variables that load in more than one constraint were discarded following Akinnagbe (2010); Anselm and Taofeeq (2010); Mohammed *et al.* (2013). The model is presented in eqn. (2) as:

$$Y_1 = a_{11}X_1 + a_{12}X_2 + *** + a_{1n}X_n$$
$$Y_2 = a_{21}X_1 + a_{22}X_2 + *** + a_{2n}X_n$$
$$Y_3 = a_{31}X_1 + a_{32}X_2 + *** + a_{3n}X_n$$

(2)

$$Y_n = a_{n1}X_1 + a_{n2}X_2 + *** + a_{nm}X_n$$

Where:
$Y_1, Y_2, ..., Y_n$ = Observed variables/ constraints to livelihood diversification;
a_1 - a_n = Constraint loading or correlation coefficients;
$X_1, X_2, ..., X_n$ = Unobserved underlying factors constrainingfarm households to diversify livelihood.

To judge the sampling adequacy and the factorability of the matrix as a whole, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) was used. Bartlett's test of sphericity relates to the significance of the study and therefore shows the validity and suitability of the responses collected. If the KMO is greater than 0.8 (meritorious) then factorability is assumed. High values Kaiser-Meyer-Olkin (KMO) between 0.8 and 1.0 indicate factor analysis is appropriate (Chong *et al.*, 2013).

RESULTS AND DISCUSSION

Socio-economic characteristics of IFAD-VCDP farmers in Benue State: Figure 1 presents the age distribution of the farmers which revealed that the average age of the respondents was 46 years. Most of the respondents are within the age range of 30-59 years which accounted for over 80%. This implies that livelihood diversification is common among the households headed by the young who are more energetic and could afford to take the risks associated with livelihood diversification. This agrees with the findings of Awoniyi and Salman (2012) which pointed out that majority of the households that are engaged in livelihood diversification are still in their productive years. They are able to engage themselves in multiple income generating activities that can enhance the households' purchasing power and consequently their welfare status.

Finding in figure 2 below revealed that an overwhelming majority of the farmers were male representing over 70%. This is an indication that the males dominated agricultural activities. This agrees with the findings of Sallawu *et al.* (2016) who revealed that the males dominated the work force in Nigeria's agricultural communities.

Findings in figure 3 below revealed that majority of the farmers have family sizes ranging from 1-10 which accounted for over 80%. From the analysis, household size in the study area is fairly large with an average of 7 members. This is in line with the finding of Okere and Shittu (2012) who affirmed that larger households may have to depend

on more income generating activities for sustainable livelihood than smaller sized households.

Majority of the respondents were married which accounted for over 70% as depicted in Figure 4. This in line with the findings of Atagher and Okorji (2014) who revealed that revealed that majority of the farmers in Benue State were married which accounted for over 70% of the respondents.

In terms of level of education as depicted in figure 5, 25% of the farmers have completed secondary school education, 21% are still undergoing programmes in colleges of education, 13% have completed university education and 11% have completed primary education in the study area. It can be seen that the literacy level of farm households in the study area was fairly low. This is in line with the findings of Awoniyi and Salma (2012) who pointed out that low educational level among farming households undoubtedly affect their livelihood diversification patterns and that generally, there is a low level of education among the rural farming households and this has implications for their income-earning capacity as the respondents may lack the required skill to secure well paid jobs. Also, farmers may find it difficult to adopt modern improved techniques of production or operations because of their lack of education. Education enhances the technical competence and entrepreneurial spirit.

Exploratory Factor Analysis: The factorability of the 22 constraint variables was examined. Several well-recognized criteria for factor analysis were used. Firstly, it was observed that all the 22 variables correlated at least 0.3 with at least one other variable which shows that the variables are correlated but not highly correlated, indicating that there is relationship between the variables and also uniquely contributing to explaining the data matrix of the variables scale, suggesting reasonable factorability. Secondly, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.836 which is meritorious based on the KMO classification. The KMO provides an overall measure of the overlap or shared variance between pairs of variables. Since the study tried to identify variables that are related but yet provide unique information to the factors, higher values indicate overlap but not to the point of hindering the analysis due to multicollinearity. The Bartlett's test of sphericity was significant ($X^2(231) = 2905.957$ P< 0.001), which shows that the matrix is significantly different from zero (0), that is, the matrix is significantly different from identity matrix. This indicated that there are sufficient inter-correlations to conduct the factor analysis. Given all the above indicators, factor analysis was deemed to be suitable with all 22 variables.

Table 1 showed the varimax-rotated principal component analysis (PCA) of constraints to livelihood diversification of farmers under (IFAD-VCDP) in Benue Sate, Nigeria. From the result, five factors were extracted based on the responses of the farmers. The Kaiser criterion (1960) as used by Mohammed *et al*. (2013) and Chong *et al*. (2013) was used for selecting the number of underlying factors or principal components to be retained. Typically, what was considered in terms of what factors to retained are the eigen values, the uniqueness of each variable, communality and the number of individuals that are in the analysis. In this study, the number of factors was decided by leaving out components with corresponding Eigen values (a measure of explained variance) of less than one. Only variables with factor loadings of ±0.40 and above at 10% overlapping variance were used in naming the factors. Variables that loaded in more than one constraint were also discarded. The communality which is the percentage of variance for the variable that is explained by the common factors for all the variables are above 0.30. Uniqueness could be pure measurement error or it could represent something that is measured reliably in that particular variable, but not by any of the others. If the uniqueness is high, then the variable is not well explained by the factor. The eigen values and the proportion of eigen values explained in terms of the variability of 18 variables were retained are presented in Table 1.

After the factor analysis, the first combination of variables in the first factor explained about 31% of the variance, the second factor component explained about 16% of the variance, the third factor explained about 7.8% of the variance, the fourth factor explained about 5.6% of the variance and the fifth factor explained about 4.6% of the variance in the 18 variable scale. The true factors that were retained explained 65 % of the variance in the 18 constraining factor or variable components.

To make the structural factor more interpretable, the factors were rotated using varimax orthogonal rotation. This is done to maximize the distance between the factors orthogonally. These factors are: 1: Public and institutional constraint, 2: Educational and training constraint, 3: Climate and production constraint, 4: Trade, norms and religious believes constraint and 5: Time and skilled labour constraint.

Public and institutional constraint: The variables that load high in factor 1 are: inadequate infrastructure (0.831), inadequate access to capital (0.825), unstable price of transportation cost (0.791), government policy (0.785), inadequate credit facilities (0.771), no urban centre in proximity (0.638), inadequate input delivery system (0.637),

lack of access to market (0.581) and poor transportation system (0.529). This is in line with the findings of Ewebiyi and Meludu(2013) which revealed that there are various challenges to livelihood diversification among the rural dwellers which includes lack of infrastructural facilities, inadequate livelihood assets and, poor transportation system. Lending credence to this, Zigale (2016) pointed out that several constraints act as obstacles to livelihood diversification, and main constraints faced by the households were poor asset base, lack of financial facilities, lack of infrastructure, and lack of opportunities in non-farm activity.

Educational and training constraint: The variables that load high in factor 2 are: lack of skill training and ability (0.853) and limited education (0.852). This is in accordance with the findings of Hussein and Nelson (2004) which revealed that constraints to livelihood diversification are low population, no urban center in proximity, market access, government policy that extract surplus, limited availability of education and skill training.This is also in line with the findings of Zigale (2016) which pointed out that constraints to livelihood diversification are poor asset base, lack of financial facilities, lack of awareness and training facilities and lack of opportunities in non-farm activity.

Climate and production constraint: The variables that load high in factor 3 are: rainfall variability (0.882), declining farm size (0.770) and shortage of animal feed (0.624). This is in line with the findings of Ayele (2008) who pointed out that rainfall variability, declining farm size, lack of draught power and institutional deficiencies in credit and input delivery are the major constraints to livelihood endeavours.

Trade, norms and religious believes constraint: The variables that loads high in factor 4 are: restriction on trade and movement (0.796) and norms and religious believes (0.585). This is in line with the findings of Hussein and Nelson (2014) revealed that constraints to livelihood diversification are restriction on trade and movement, government policy that extract surplus, terms of trade, norms and religions.

Time and skilled labourconstraint: The variables that loads high in factor 5 include: shortage of time (0.662) and inadequate skilled labour (0.650). This is in accordance with the findings of Hussein and Nelson (2014) who revealed that constraints to livelihood diversification are availability of infrastructure, skilled labour availability and shortage of time.

By utilizing factor rotation, it was established that there are five constructs that consists of more than one variable. Meanwhile, it is important to calculate the internal consistency reliability for coefficient alpha for the whole scale and for each factor retained. Cronbach's alpha test was used to test the consistency between the items in the entire scale and for each factor. The Cronbach's alpha is based on the average inter-item correlation. According to Pallant (2015), a scale with a Cronbach's alpha higher than 0.7 is required in order to create a reliable construct of exploratory studies. Based on the results of the reliability consistency presented in Table 2 revealed that coefficient alpha for the overall scale was 0.877 which is very good. The internal consistency reliability for factor 1 was 0.906 which is excellent, coefficient alpha for factor 2 was 0.826 which is very good, coefficient alpha for factor 3 was 0.806 which is also very good, coefficient alpha for factor 4 was 0.756 which is good and coefficient alpha for factor 5 was 0.749 which is also good. This implies that the most severe constraint is public and institutional, followed by educational and training, followed by climate and production, then trade, norms and religious believes constraint and the least constraint is time and skilled labour. This implies thatopportunities to diversity vary among households, with differences in resource endowments (land, labour, capital) and access to markets and institutions playing a central role in the extent to which diversification occurs. The livelihood diversification of the farm household portfolio of activities is determined not only by asset portfolios but also having the skills, location, capital, credit and social connections.

CONCLUSION

In conclusion the study has validated empirical findings of many studies by revealing the principal constraints that the farmer faced in diversifying their livelihood which are public and institutional constraint; educational and training constraint; climate and production constraint; trade, norms and religious believes constraint; and time and skilled labour constraint.The livelihood diversification of the farm household portfolio of activities is determined not only by asset portfolios but also having the skills, location, capital, credit and social connections. It was therefore recommended that there is 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, need for establishment of Farmers' Training Centers in IFAD-VCDP Zonal offices so as to develop skills and ability of the farmers,Government and donor agencies should assist in connecting rural communities with all-weather roads in order to facilitate rural-urban

linkages and its economic implications by constructing and maintaining feeder roads,and also the government and non-government organizations should intensify efforts on public, institutional, educational and climate policies so as to increase livelihood opportunities in the study area.
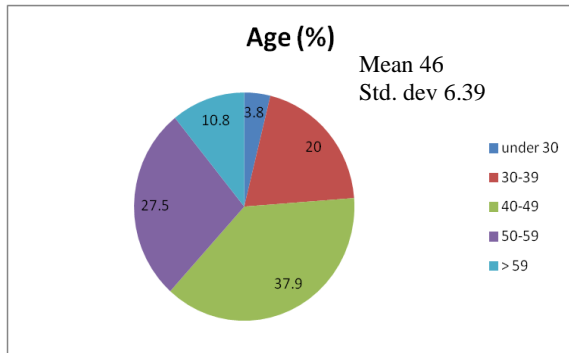

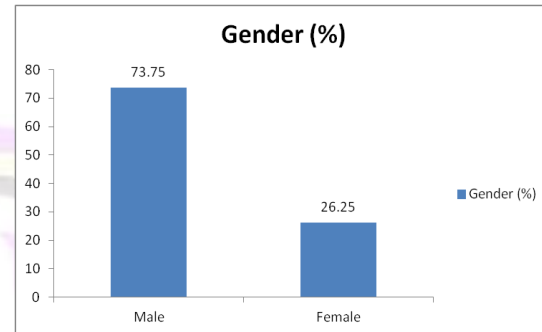**Figure 1: Age distribution of the farmers**

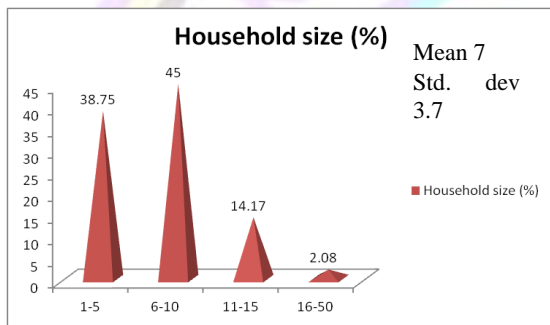**Figure 2: Gender distribution of the farmers.**
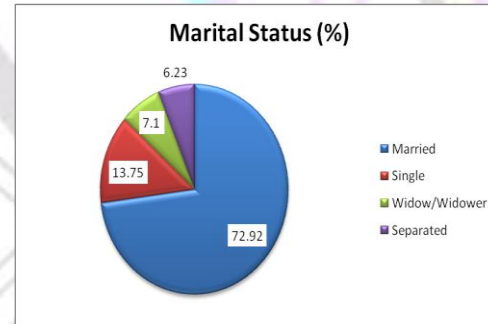

Figure3: Household size of the farmers.
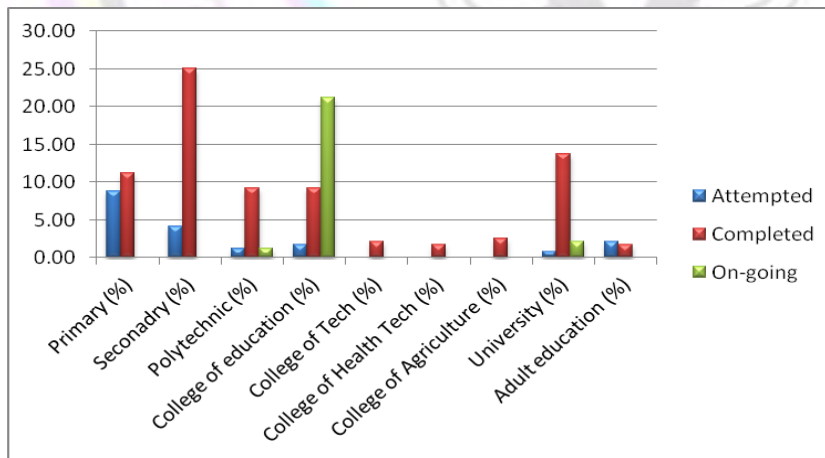

Figure 4: Marital status of the farmers

Figure 5: Educational attainment of the farmers

Table 1: Principal component analysis on constraints to livelihood diversification in Benue State

S/No	Constraints	Components*					Communality
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	
1	Inadequate infrastructure	0.831					0.729
2	Inadequate access to capital	0.825					0.747
3	Unstable price of transportation cost	0.791					0.663
4	Government policy	0.785					0.689
5	Inadequate credit facilities	0.771					0.731
6	No urban centre in proximity	0.638					0.693
7	Inadequate input delivery system	0.637					0.549
8	Lack of access to market	0.581					0.613
9	Poor transportation system	0.529					0.554
10	Lack of skill training and ability		0.853				0.793
11	Limited education		0.852				0.788
12	Rainfall variability			0.882			0.818
13	Declining farm size			0.770			0.717
14	Shortage of animal feed			0.624			0.568
15	Restriction on trade and movement				0.796		0.720
16	Norms and religious believes				0.585		0.546
17	Shortage of time					0.662	0.594
18	Inadequate skilled labour.					0.650	0.503
	Percentage (%) of total variance	31	16	7.8	5.6	4.6	

Source: Field survey, 2018.
Extraction method: Principal Component Analysis,
Rotation method: varimax with Kaiser Normalization.

Table 2. Reliability analysis for the scale and factors retained

Construct	Number of variables	Cronbach's alpha
Overall scale	18	0.877
Factor 1	9	0.906
Factor 2	2	0.826
Factor 3	3	0.806
Factor 4	2	0.756
Factor 5	2	0.749

Source: Field survey, 2018.

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