Livelihood and Income Diversification Strategies among Rural Farm Households in Niger State, Nigeria

H. Sallawu[1*], L. Tanko[1], A. A. A. Coker[1] and M. S. Sadiq[1]

[1]*Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria.*

Authors' contributions

This work was carried out in collaboration between all authors. Author HS designed the study, wrote the proposal, performed the data analyses and wrote the final draft of the manuscript. Authors LT and AAAC managed the literature searches and edited the manuscript. While author MSS participated in data collection and processing. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Poverty incidence in Nigeria is higher among the rural-folks, that is, households that rely mainly on agricultural income. Income diversification is therefore seen as a way to secure income and to increase welfare of the farm households. This study investigated livelihood and income diversification strategies among farm households in Niger State, Nigeria. The study utilized data obtained from administering questionnaire to 287 farming households who were selected using multi-stage sampling procedure. Data were analyzed using descriptive statistics, and Herfindahl diversification index. The study revealed that mean age, household size, and farm size of the respondents were 42, 7, and 2.82 respectively. A total of 46.4% of the respondents had no formal education and only 12.9% had attained formal education up to the tertiary level. Majority, i.e 94.8%

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Corresponding author: E-mail: halima.sallawu@futminna.edu.ng, realhalma@yahoo.com;

had no access to credit. The study further revealed that Farm income accounted for 63%, while off-farm income accounted for 37% of the total income of the sampled farm households. Over whelming majority of the farm households had more than one source of income representing 91.3%, meanwhile non-farm activities identified in the study area are forest production, agricultural trading business, agricultural processing, business (fuel, telecommunication services, spare parts dealers, etc), transportation business, blacksmith, civil service, domestic duties, handcraft, artisanship, construction worker, tailoring, health worker, and traditional medical practitioner which jointly accounted for 93.96% participation rate and 36.9% of the total income. The result of income diversification pattern and strategies adopted by the respondents were full time farming, farmer and farm worker, farm and skilled non-farm, and mixed (from all these activities). The study therefore recommend that farm households should diversify their sources of livelihood into non-farm activities available in the study area so as to increase their earnings to bridge the poverty gap and improve their livelihood, and also the level of literacy among rural farm households, and financial markets should be looked into by the government when formulating policy and developmental issues.

1. INTRODUCTION

Poverty incidence in Nigeria is higher among the rural-folks, that is, households that rely mainly on agricultural income [1-3]. Meanwhile, it has been established that in many rural areas, agriculture alone does not provide sufficient livelihood opportunities, hence diversification into non-farm activities is seen as a form of self-insurance. This is because diversification offers people options for coping with crisis. The resultant effect of this is that rural households diversify their income sources by combining two or more jobs (multiple job holdings) to enhance consumption smoothing and acquire other basic needs [4]. [5], pointed out that for growth to have some meaningful impact on poverty, that growth must occur in sectors in which a large proportion of the poor derive their livelihood. It is worth noting that the agricultural sector remains the important sector for livelihood especially in rural Nigeria, which accounts for more than 70% of the population.

Several authors, [6-8], suggested that non-farm income can complement agricultural income in poverty reduction. In the same vein, [9-11], observed that besides the opportunity for income diversification and reduction of income variability/risks, that participation in non-farm activities offer the predominantly peasant farmers in Africa, non-farm activities could also be important means of raising financial capital among farming families. Quite a number of studies in Nigeria, [12,4] also suggested that income from household members' participation in non-farm activities has been contributing significantly to farm households' welfare. Lending credence to this, [13] reported that as much as 60 per cent of an average Nigerian farm household's cash incomes were derived from non-farm activities. Enterprise diversification is one method of reducing income variability [14]. [15] affirmed that involvement in supplementary activities is positively related to farm productivity and contributes to poverty reduction. Household income variability has also been proven to be reduced by off farm employment [16,14].

Livelihood frameworks are often used by researchers to document and analyze the processes by which individuals and households utilize their resources and opportunities to make a living in particular socio-economic context [9,17,18]. Livelihood strategies composed of a range of activities, both the access to assets and the use to which they can be put are mediated by social factors (social relations, institutions, and organizations) and by exogenous trends (e.g. economic trends) and shocks (drought, disease, floods, pests). In other words, decision of rural farm households to participate in non-farm employment depends on some factors (that is, the above mentioned capital or assets) that could be individual, household, social and communal based. Participation in the non-farm activities increases the income source which results in income growth and mitigates income variability among rural farm households. The presumption throughout various literatures is that households choose such patterns of diversification so as to achieve the best possible standard of living. The chosen combination of assets and activities is often referred to as the household's 'livelihood strategy' [19].

Diversification is defined as the act of introducing variety, especially in investments or in the variety of goods and services offered. Income diversification refers to an increase in the number of sources of income or the balance among the

different sources of income. When linked to farm and non-farm activities in the rural areas, income diversification is often used to describe the expansion in the importance of non-farm income. Thus, diversification into non-farm activities usually implies more diversity in income sources [20].

Apata et al. [21] revealed that involvement in non-farm activity translated to regular earnings from other labour employment and business investments. Given that agriculture is characterized by seasonal variations in production as well as longer production cycles, many households diversify into non-farm investments with regular incomes; others also take off-farm employment as part time activities. Mean while, [22] suggest that non-farm source contributes about half of the rural farming households' income. In line with this, [23] pointed out that farming households which are not involved in non-farm activities are more vulnerable to poverty when compared with farming households that engaged in non-farm income generating activities. The income diversification literature converges on an estimate of roughly 40 percent of African rural household income on average being derived from non-farm sources [15]. The author further revealed that non-farm sector offers potential to absorb a growing rural labour force, slow rural-urban migration, contributes to national income growth, and promotes a more equitable distribution of income. The higher the degree of diversification of households, the better-off they are in terms of total income [15]. Lending credence to this, [24] pointed out that farm households who broadened their beneficial exercises to off farm economy are observed to be in an ideal situation when contrasted with the individuals who restricted their operation to the farm segment, inferring the critical effect of off farm livelihood and income on neediness easing and full time off farm administrators are the individuals from the most noticeably awful destitution ridden groups. [25] pointed out that income sources are primarily grouped into farm, off farm and non-farm income. He recognized two explanations for livelihood diversification: desperation (destitution, absence of benefits, vulnerability, disaster) and; decision and opportunities including proactive family unit systems for enhancing expectations for everyday comforts.

Most people in Niger State derived their livelihoods from farming, fishing, and cattle rearing. Other economic activities include banking, trading, transportation, and local arts and crafts [26]. [27] found out that farming was the primary occupation of most households in Konduga Local Government Area of Borno State, Nigeria, and that they are also engaged mostly in off-farm activities such as petty trading, matting, tailoring, barbing, telecommunication services, and construction work. This is also in line with the findings of [28] who found out that majority of the households in Odeda Local Government Area of Ogun State, Nigeria are engaged in farming and other non-farm income generating activities like Artisanship, Trading, Salary jobs, Asset income, and other sources (contractor, Borehole drilling, etc).

Farming deals with indeterminate elements, for example, climate and economic situations. These instabilities can bring about variable returns (ranch pay) to the choices agriculturists make in a specific year. Acute land constraint and absence of well operating land market may counteract family units who have specific aptitudes or plenteous work from misusing their similar profitable position, and seasonality of cultivating activities results in unemployment and underemployment for a huge extent of the work power amid most times of the year.

Livelihood diversification among the rural farm households is very important due to population growth, the subsequent progressive shrinking of land holdings size and environmental degradation. It is therefore imperative to carefully analyze the returns to the various farm and non-farm employment opportunities open to the rural folks in the State so as to be able to reduce the level of poverty in the area. The findings of the study are also expected to indicate the policy interventions that might improve rural livelihoods to raise incomes and curb widespread poverty. The objectives of this study were to describe the socio-economic characteristics of the farm household heads, identify the share of household income from farm and off-farm sources, and describe income diversification patterns and strategies adopted by farm households to stabilize household income.

2. METHODOLOGY

2.1 Description of Study Area

This study was conducted in Agaie, Bosso, and Wushishi Local Government Areas in Niger State of Nigeria. It is one of the 36 States of Nigeria, created out of the defunct North Western State

Table 1. Format of sampling procedure

Selected local government areas	Communities	Sampling frame (N)	Sample farm households
Agaie	Tagagi	455	124
Bosso	Maikunkele	175	48
Wushishi	Zungeru	422	115
Total	**3**	N=1,052	n= 287

Sources: Niger State Agricultural Mechanization and Development Authority (NAMDA) [29]

on 3rd February, 1976. Situated in the North central geo-political Zone, the State shares its borders with Zamfara State (North), Kebbi State (North West), Kogi State (South), Kwara (South West), Kaduna (North East) and the FCT (South East). The location of the State is between Latitudes 8°20[1] and 11°30[1] North of the Equator and also between Longitudes 3°30[1] and 7°20[1] East of the Greenwich Meridian. The provisional result of the 2006 National Population Census shows that the State has a population of 3,950,249 [30]. Going by the population growth rate in Nigeria of 2.5% [31], the population of the State was projected to 4,695,604 as at 2013. The State comprises 25 Local Government Areas grouped into three agricultural Zones: I, II, III, with each zone having 8, 9 and 8 Local Government Areas (LGAs) respectively. There are three major ethnic groups in the State, *Nupes, Gbagyi*, and *Hausa.* Other tribes are *Kadara, Koro, Dibo, Kambari, Kakanda, Dukkawa, Dakarkari, Gana-Gana, Kamuku*, etc. Niger State covers a total land area of 83,266,779 kilometres or about 8.3 million hectares which represent 8% of the total land area of Nigeria. About 85% of the land is arable; the vegetation consists mainly of short and scattered trees. Soils are predominately light and well drained. The State experiences distinct dry and wet seasons with annual rainfall varying from 1,100 mm in the Northern part to 1,600 mm in the southern parts. The temperature ranges from 23°C to 37°C and daylight duration is averagely 8.5 hours and it has a relative humidity of 40%.

Most people in Niger State derived their livelihoods from farming, fishing, and cattle rearing. Other economic activities include banking, trading, transportation, and local arts and crafts [26]. And the poverty incidence and income inequality in the State are 30.19% and 97.10% respectively [32].

2.2 Sampling Technique and Size

Multi-stage sampling technique was employed in the selection of respondents for this study. In the first stage, one Local Government Area was randomly selected from each of the three agricultural zones namely, Zones I, II and III respectively. In the second stage, one community each was randomly selected from the selected LGAs, giving a total of 3 communities. In the third stage, sampling of farm households in each community was determined proportionately giving a total of 287 farming households using [33] formula and adopted by [34].

$$n = \frac{N}{1+N(e)^2} \qquad (1)$$

Where:

n   = sample size,
N   = finite population,
e   = limit of tolerable error (level of significance = 0.05) and
1   = constant.

A summary of the selection procedure is presented in Table 1 above.

Data were collected using structured questionnaire. Data for this study was analyzed using descriptive statistics such as means, frequency, standard deviation, and Herfindahl Diversification Index. Herfindahl Diversification Index was used because it does not only measure the number of income sources or income diversification but also the evenness of income shares, with the parameter determining the weight of the number of sources versus evenness in the distribution of shares, and also the simplicity of the calculation and the small amount of data required for calculation. The diversification index is derived as the inverse of the Herfindahl index, following [35,36] as follows:

$$D = \sum_{j=1}^{n} S_j^{\alpha} \qquad (2)$$

Where:

D = Diversification index,
S_j = Share of income source with respect to the total income, $S_j = \frac{Y_j}{Y}$,
Y_j = Total income from source j,

4

Y = $\sum_{j=1}^{n} Y_j$ is total household income from all sources; j= 1, 2, 3....... n,

α = Diversity parameter, such as α ≥ 0 and α = 1, 2, and 3.

As α approach 1, the index becomes the entropy-index which was calculated as

D = $[-\sum S_i \log S_i]$ (3)

Where log is the natural logarithm

For α = 2, the index D becomes the inverse of the Herfindahl index which is commonly used as income diversification index. The Herfindahl index was computed as:

D = $\sum_{j=1}^{n} S_j^2$ (4)

D = $\frac{1}{\sum_{j=1}^{n} S_j^2}$ (5)

The general index (equation 2) measures the number of income sources and the evenness of income shares across different income source-earner combinations, with the parameter α determining the weight of the number of source-earner combinations versus evenness in the distribution of income shares. The higher the α value, the greater the emphasis on the distribution, while a parameter value of α = 0 simply counts the number of income sources. The upper limit value of the index for any α value is the number of income sources and the lowest limit is 1. The lower value occurs when a given household has only one source of income and the upper value occurs only if the shares are equal, that is, the distribution is even across all income sources. In this study the inverse of the Herfindahl index was used taking α = 2.

3. RESULTS AND DISCUSSION

Table 2 presents the socio-economic characteristics of the respondents which revealed that the average age of the respondents was 42 years. Most of the respondents are within the age range of 30-49 years and accounted for 69% while only a few of those surveyed are either too young or too old to engage in one activity or the other in the study. This implies that income diversification is common among the households headed by the young who are more energetic and could afford to take the risks associated with income diversification. This agrees with the findings of [23,37] which pointed out that majority of the households that are engaged in non-farm income 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. The distribution of respondents by household size presented in Table 2 shows that majority of the respondents have family sizes ranging from 1-10 which accounted for 79.5%, and only 20.4% of the respondents had over 10 persons per household. 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 [28] who affirmed that larger households may have to depend on more income generating activities for sustainable livelihood than smaller sized households. Distribution of respondents by farming experience as depicted in Table 2 shows that most of the respondents had 21-30 years of farming experience accounting for 40.4%, with an average of 26 years of experience. The implication of this is that the farm household heads would probably participate less in non-farm activities due to their high level of farming experience. The results further revealed that 55.80% of the respondents had farm sizes ranging between 0.5-4.0 hectares, and a typical respondent had 2.82 hectares. This implies that most respondents are subsistence-oriented farmers and income diversification will likely help raise their standard of living above the poverty level. In terms of gender, Table 2 revealed that an overwhelming majority of the household heads were male representing 95.50%. This is an indication that the males dominated agricultural activities. This agrees with the findings of [28] who revealed that the males dominated the work force in Nigeria's agricultural communities. In terms of level of education, 16.4% of the household heads had no formal education, and only 12.9% had tertiary education in the study area. It can be seen that the literacy level of farm households in the study area was relatively low. This is in line with the findings of [23] who pointed out that low educational level among farming households undoubtedly affect their income 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. The result further indicated that most respondents in the target population (i.e 94.80%) had no access to agricultural loan. It implies that only 5.20% of the respondents had access to

loan. Agricultural credit has the propensity to break the vicious cycle of poverty and raise the purchasing power of farm households who over rely on meagre household resources. The results also revealed that 61.7% had no access to extension services. This implies that majority of the farm households in the study area had no access to innovations that probably would have increased their agricultural output so as to increase their total income.

Results in Table 3 present households participation in different income generating activities and the share of income from the different income sources in the study area. The participation was calculated by dividing the number of respondents that are engaged in a particular livelihood activity with the total number of respondents, and then multiply by 100. The income share was calculated by dividing total income generated from all the respondents that

Table 2. Distribution of respondents according to socio-economic characteristics (N=287)

Variables	Frequency	Percentage	Mean (Standard dev.)
Age			
<30	20	7.00	
30-39	88	30.70	
40-49	110	38.30	
50-59	44	15.30	
>59	25	8.70	**42(10.5)**
Household size			
1-5	134	46.70	
6-10	94	32.80	
11-15	40	13.90	
>15	19	6.50	**7(4.8)**
Years of experience			
<11	16	5.60	
11-20	85	29.60	
21-30	116	40.40	
31-40	49	17.10	
> 40	21	7.30	**26(10.7)**
Farm size (hectares)			
0.5-2.0	96	33.50	
2.5-4.0	64	22.30	
4.5-6.0	78	27.20	
>6.0	49	17.00	**2.8(2.4)**
Gender			
Male	274	95.50	
Female	13	4.50	
Educational level			
None	47	16.40	
Quranic	86	30.00	
Primary	70	24.40	
Secondary	47	16.40	
College of Education	20	7.00	
College of Health Technology	3	1.00	
Polytechnic	6	2.10	
University	8	2.80	
Credit accessibility			
No	272	94.80	
Yes	15	5.20	
Extension contact			
No	177	61.70	
Yes	110	38.30	
Total	287	100	

Source: Field Survey, 2014

Table 3. Household income share by occupation and participation in different activities

*Livelihood activities	Participation (%)	Income share (%)	Ranking
Farming	100.00	63.34	1st
Forest production	0.34	0.08	14th
Agricultural trading business	28.20	15.06	2nd
Agricultural processing	4.18	0.93	6th
Petty trading/Business	21.60	8.13	3rd
Transportation business	16.00	5.99	4th
Blacksmith	1.39	0.16	11th
Civil servant	6.96	1.30	5th
Domestic duties	3.12	0.32	7th
Handcraft	1.04	0.43	12th
Artisans	4.18	0.43	6th
Construction worker	2.09	0.71	9th
Tailoring	2.43	0.35	8th
Health worker	1.74	2.97	10th
Traditional medical practitioner	0.69	0.14	13th
Total	**194.00**	**100.00**	

*multiple responses,
Note: Official exchange rate in 2014: 1 US dollar = 160 naira.
Source: Field Survey, 2014

participated in a particular livelihood activity by the total income of all the sampled respondents, and then multiply by 100. While the ranking is on participation of the respondents in the listed livelihood activities, that is, the order of engagement in these activities from the highest to the lowest, following [38]. The results revealed that all households (i.e 100%) derived income from farming activities which accounted for 63.34% of the total income. Other livelihood activities in the study area are agricultural trading businesses, petty trading/businesses (fuel, telecommunication services, spare part dealer), transportation businesses, civil service, agricultural processing, artisanship, domestic duties, tailoring, construction work, health worker, blacksmith, handcraft, traditional medical practitioner, and forest production / harvesting. Agricultural Processing and Artisanship had the same percentage of participation with total income share of 0.93% and 0.43% respectively; this implies that Agricultural Processing is more profitable than Artisanship in the study area. In the same vein, Handcraft and Artisanship had 1.04% and 4.18% participation respectively, with both activities having the same share of the total income which implies that Handcraft making is also more profitable than Artisanship. Agricultural Trading Business, Petty Trading/Business (fuel, Tele communication services, spare part dealer, etc), and Transportation Business had the highest participation among non-farm activities in the study area. This implies that apart from farming, majority of the farm households are engaged in non-farm activities so as to increase

their total earning. This is consistent with the findings of [27] who found out that farming was the primary occupation of most households in Konduga Local Government Area of Borno State, Nigeria, and that they are also engaged mostly in off-farm activities such as petty trading, matting, tailoring, barbing, telecommunication services, and construction work. This is also in line with the findings of [28] who found out that majority of the households in Odeda Local Government Area of Ogun State, Nigeria are engaged in farming and other non-farm income generating activities like Artisanship, Trading, Salary jobs, Asset income, and other sources (contractor, Borehole drilling, etc).

Results in Table 4 presents share of households' income from farm and off-farm sources in the study area. The total income share was calculated by dividing total income from a single source with the total income of all the respondents. The results revealed that the share of household income from farm sources accounted for 63% while off-farm income accounted for 37% of the total households income in the study area. This shows that majority of the farm households in the study area were more engaged in farming activities than off-farm activities. This is in line with the findings of [39,15] which ascertained that roughly 40% of African rural household income on the average are being derived from non-farm sources. This is also consistent with the findings of [28] who found out that more than 60% of the total households' income in Odeda Local Government

7

Area of Ogun State is derived from farm sources, while non-farm income generating activities accounted for 40% of the total household income.

Results in Table 5 presents income diversification pattern adopted by farm households in the study area. The measure of income diversification which takes into account the variations in the income shares was estimated using the inverse of Herfindahl index concentration. The higher the number of income sources and/ or the more evenly distributed the income shares, the higher the value of Herfindahl diversification index. Results in Table 5 shows that 8.70% of farm households did not diversify their income generation that is; they depended on a single source of income which was farming. Majority of farm households accounting for 78.80% were moderately diversified, that is, they depended on two income sources. While 12.50% were highly diversified, that is, they depended on more than two sources of income. The mean was 2.2 which implied that majority of farm households in the study area had two sources of income which may limit their total earning, this has also lends credence to the result of the diversification strategy. This is in line with findings of [4] who revealed that rural households diversify their income sources by combining two or more jobs (multiple job holdings) to enhance consumption smoothing and acquire other basic needs.

Table 4. Share of household income from farm and off-farm sources

Sources	Total income share	Percentage
Farm income	0.625	63.00
Off-farm income	0.374	37.00
Total	**1**	**100.00**

Note: Estimates are based on annual per capital incomes expressed in terms of adult equivalent.
Source: Field Survey, 2014

The income diversification strategies adopted by farm households in the study area presented in Table 6 indicated that 8.7% of all households pursued farming as a full time strategy and it predominates among poorest households with a mean income of NGN 240,180.00 per annum reflecting the low returns to farming in the study area. This is in line with the finding of [23] who found out that farming households which are not involved in non-farm activities are more vulnerable to poverty when compared with farming households that engaged in non-farm income generating activities. The proportion that pursued farmer and farm worker strategy (i.e cultivating his own farm, and also work in other people's farm for money) was 15% of the total respondents with mean income of NGN 683,625.00 per annum which is almost three times higher than that of full time farming. Majority of the sampled households pursued farm and skilled non-farm strategy (i.e cultivating his own farm, and also work outside the farm as skilled worker) accounting for 64%, with higher mean income of NGN 999,455.08 per annum which was higher than the full time farming, and farmer and farm worker strategies respectively. The mixed livelihood strategy, that is, deriving income from all the three sources is associated with the highest average income (NGN 2,842,582.35) per annum and is only adopted by 11.8% of all households. This indicated that livelihood diversification is important towards raising farm household income. This finding is in line with previous studies which have shown that the higher the degree of diversification of households, the better-off they are in terms of total income, that is, richer households have more diversified livelihood strategies while full time farming is more common among poorer households [40,41,42,15].

Table 5. Herfindahl diversification index

Level of diversification	Frequency	Percentage
Not diversified (HDI = 1)	25	8.70
Moderately diversified (HDI >1.0<=2.0)	226	78.80
Highly diversified (HDI >2.0 <=3.0)	36	12.50
Total	**287**	**100.00**

Source: Field Survey, 2014

Table 6. Distribution of households by livelihood strategy and mean income levels

Diversification strategy	Frequency	Percentage	Mean income (₦) per annum
Full time farming strategy	25	8.70	240, 180.00
Farmer and farm worker strategy	43	15.00	683, 625.58
Farm and skilled non-farm strategy	185	64.50	999, 455.08
Mixed strategy (from all these activities)	34	11.80	2, 842, 582.35
Total	**287**	**100.00**	

Source: Field Survey, 2014

4. CONCLUSION

The study concluded that farming households that diversified their income sources had enhanced income compared with farming households who do not diversify their income sources. Richer households tended to be more diversified. Despite the potential of livelihood diversification, only few of the farm households have diversified adequately. This may be due to the low level of literacy among the farm households because only few of the farm households head had education to tertiary level. And education undoubtedly affect their income diversification patterns as the respondents may lack the required skill to secure well paid jobs, also in addition, education enhances the technical competence and entrepreneurial spirit. The study also validated empirical findings of many studies that an increase in income diversification led to a rise in total income, that is, the higher the degree of diversification of farm households, the better-off they are in terms of total income and livelihoods. The study therefore, recommend that farm households should diversify their sources of livelihood into non-farm so as to increase their earnings to bridge the poverty gap, also the level of literacy among rural farm households, and financial markets should be looked into by the government when formulating policy and developmental issues.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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