

NON-FARM ACTIVITIES AND THE SUSTAINABILITY STATUS OF FOOD SECURITY IN RURAL COMMUNITIES OF ENUGU STATE

by

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ABSTRACT

There is an ongoing shift in the economic mainstream of rural areas from farm to non-farm activities. Non-farm activities are well recognized by its significant role in complementing agricultural income for rural dwellers. The government has demonstrated a commitment to confronting the issue of food security in Nigeria with different policies, however, the result indicates that the target is far from being realized, as the country is still listed among the hungry and food-insecure nations. To a great extent, what seems to be lacking is what complements households food sustainability of rural communities and this forms the basis of this research. This study aimed at assessing the sustainability status of food security of rural communities in Enugu State, Nigeria. The research used primary data which were obtained through direct field observations, questionnaire, oral interviews and information from key informants. This research also made use of descriptive analysis, mean, frequency and barometer of sustainability model. The findings show that respondents with higher educational qualification were more food secure while large family size decreased food security. More so, more males found to adopt coping strategies aimed at improving their food security. The study also found that 50% were food secure, 45.3% food insecure without hunger, 2.5% food secure with moderate hunger, and 2.2 % food insecure with severe hunger. The communities recorded a sustainability value of 0.496 in food security, implying that the communities food security are moderately sustainability. Our findings reveal that non-farm activities such as trading contributed to the high sustainability recorded in some communities with a positive effect. This study therefore suggests that the to achieve Sustainable Development Goals 2 and 3 on zero hunger, and good health and well-being respectively in Enugu State rural communities, policies that are geared towards improving non-farm

activities since it complements household's agricultural income are required.

Key words: Nonfarm activities, Food security, Barometer model, sustainability status

1.0 INTRODUCTION

Agriculture is the main source of income and employment in rural areas of the world. It provides food and offers livelihood for 36% of total world's workforce (FAO, 2013; Tuholske *et al.*, 2020). In sub-Saharan Africa where one in four people are chronically hungry, two third of the population work in agriculture (Ademwunmi, Adesimi and Akerele, 2011). It plays a significant role in supporting the livelihoods of individuals and economic growth of many developing countries. (Zimmerer *et al.*, 2019). However, the traditional image of farm households in developing countries has been that they focus almost exclusively on farming and undertake little rural non-farm activities (Merima and Jack, 2012). This image persists and is widespread even today. Policy debate still tends to explore the linkage between farm activities and non- agricultural activities with food security sustainability (Mashingaidze *et al.*, 2020).

However, the Food and Agricultural Organisation of the United Nations (FAO) (2012) refer to food security as a household's or country's ability to provide future physical and economic access to sufficient, safe and nutritious food that fulfills the dietary needs and food preferences for living an active and healthy lifestyle. Food security matters immensely; it is a topic of keen interest to policy makers, practitioners, and academics around the world in large part because the consequences of food insecurity can affect almost every facet of the society (Jones *et al.*, 2013; Boateng *et al.* 2020). A household is considered food secure when its occupants do not live in hunger or fear of starvation (FAO 2001). Food security has three dimensions, namely: food availability, food access, food utilization, (FAO/IFAD/WFP, 2015).

Similarly, researchers, policy makers, entrepreneurs and development practitioners working to improve food security, environmental health and rural livelihoods in the developing world face many uncertainties when exploring the future of food systems (Ericksen *et al.*, 2009). It is difficult to predict what economic, political and social conditions will be like in the next few years and virtually impossible to predict the medium to longer term (van Vuuren *et al.* 2012). Climate change and variability are among the greatest unknowns, and are likely to have far reaching effects on food security, environments and livelihoods (Vermeulen *et al.*, 2012),

It is a universally accepted fact that agricultural sector is incapable of creating sufficient gainful employment opportunities amidst of increasing population in the developing countries. (Adeniyi *et al.*, 2020). As a result, the impetus for achieving sustained food security in rural areas has to pivot around expanding the base of rural economic activities (UNDP, 2010). If such a comprehensive planning approach can be evolved, it could go a long way in increasing the sustainability of rural livelihood, reducing unemployment and out-migration in rural areas (Gordon and Craig, 2011).

It has been shown that households in rural areas operate activities outside agriculture due to push and pull factors to achieve a common goal of food security (Reardon, Taylor,

Stamoulis, Lanjouw and Balisacan, 2012). The Push factors are those reasons for household diversification originating from a certain necessity while the Pull factors designate the reason for household income diversification driven by the desire for capital accumulation. In Nigeria for instance, though agriculture is the main source of livelihood for many people, it is considered to be incapable of sustaining the households because households that depend on solely farming are associated with food insecurity (Onuoha et al., 2018).

Food security matters from a moral perspective; it has been broadly agreed upon as a basic human right since 1948, under Article 25 of the Universal Declaration of Human Rights: “Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care” (Jones et al., 2013).

Over the years researchers have conducted scenario based assessment of food security in order to develop long lasting policy for human wellbeing (Muhammad *et al.*, 2019). The aim of the scenario process has been to provide alternate, plausible, relevant and challenging futures in narratives and numbers that can be used by policy-makers, the private sector, civil society leaders and development researchers to test ideas about the future and the strategies, technologies and research recommendations needed to deal with the future successfully (Palazzo *et al.*, 2016). Specifically, the sustainability status can guide policy prioritization, frame research questions and help agenda setting in the drive towards improved food security, environmental management and rural livelihoods in the face of climate change (Hasegawa *et al.*, 2015).

Thus, for each result of food security status, planners can ask the question: how well will our plan work under the specific conditions of this scenario? What needs to be changed? Answering these questions would encourage integration of recommendations from a range of scenarios with a plan has a better chance of being effective in the face of an uncertain. Unfortunately, most government policies are over a short term where the governments are more focused on urban social stability and security than rural lives whereby quick fixes, fast gains and cash get priority, and quantity is emphasized over quality (Abdullah, 2017). The disregard of rural food security eventually leads to increases in the need for food aid and external safety nets such as urban to rural cash flows, hence the government becomes very adept at mobilizing foreign aid money (Babatunde et al., 2007).

However, there is paucity of research on the contribution of non-farm activities on the status of food security in rural communities of Enugu State. Thus, this paper presents the assessment of household food security levels on the basis of socio-economic variables and their sustainability status with contribution from non farm activities in rural communities of Enugu State, South-eastern Nigeria.

2.0 MATERIALS AND METHODS

2.1 Selection of the sample area

Enugu state is made of seventeen 17 local government areas. However, for the purpose of this study the three senatorial zones in the state were purposively selected. From each of the three senatorial zones in the State, one LGA was purposively selected. The LGAs

selected are based on population criteria of less than twenty thousand persons for delimiting rural areas by National population commission. In this Study the term rural, is based on the definition by Madu (2010) which states that rural areas are areas of low population density, utilizing land extensively and exhibiting distinctive socio-cultural characteristics associated with the rural setting.

In all, three (3) rural LGAs were used for this study. These local government areas are Uzo-Uwani in Enugu north senatorial zone, Isi-Uzo in Enugu East senatorial zone, Oji River in Enugu West Senatorial Zone. Two Communities were randomly selected from each of the selected rural LGAs. Therefore, six (6) rural communities were selected for this research. From the breakdown of the 1991 population census figures, the selected villages had a combined population of 46,253 persons and against the background that there are an average of 4.5 people per households in rural areas (NBS, 2013), the selected villages are computed to have a total of 10,277 households. Following Cohen, Manion and Morrison (2007) which suggest that in taking a statistical sample from a large population, such as this, a confidence level of 95% and a confidence interval of between 1% and 5% be employed, this study selected a 3% (468) of the total sample for questionnaire administration . The breakdown of the selection is illustrated below.

Table 1: Summary of sampled L.G.A and communities

State	Senatorial district	Sampled LGA	Selected communities	Population of the selected villages	Average number of household	Sample size
Enugu State	Enugu North	Uzo-Uwani	Akpugo Ezedike	3201	711	21
			Asaba	2539	564	17
	Enugu East	Isi Uzo	Umualor	13,050	2900	89
			Neke	19495	4777	143
	Enugu West	Oji river	Awlaw	14182	3152	95
			Akpugo-Eze	15461	3435	103



Figure 1: South- East Geopolitical Area Nigeria showing the study area
 Source: Enugu State Ministry of Land and Survey (2012)

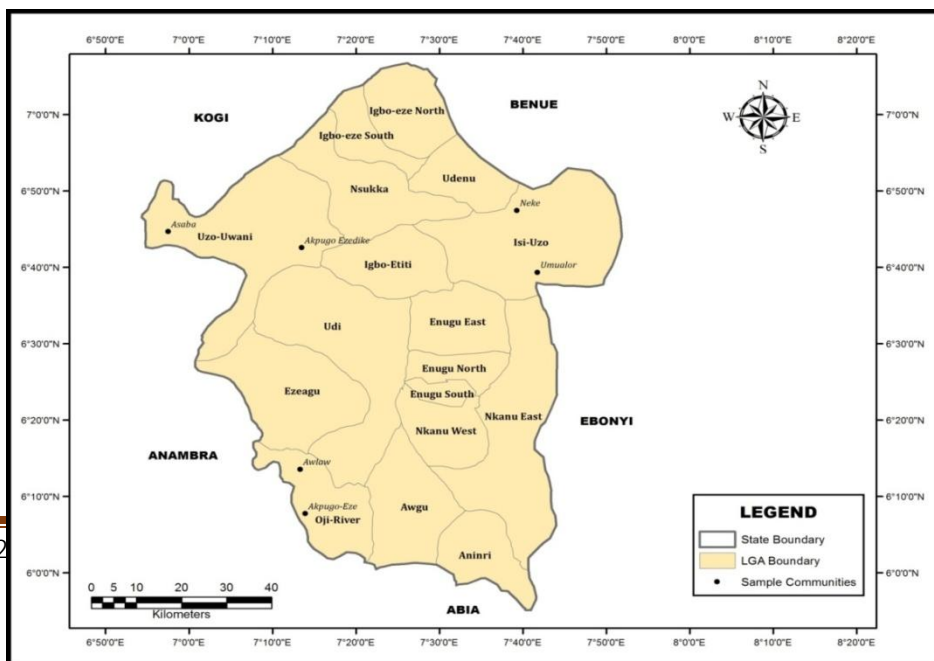


Figure 2: Enugu State showing the sampled communities
Source: Ministry of Urban Planning Enugu State (2012)

3.0 DATA ANALYSIS

Households were classified as being food-secure and food-insecure using the FSSM(2002). All households that expressed some level of food insecurity ranging from “food insecure without hunger” to “food insecure with severe hunger” were grouped as being food insecure, and the responses were further classified as being negative or affirmative. In line with the objectives of the study, the raw scores of frequency of responses generated from the questionnaire were keyed into SPSS (statistical packages for social sciences) before the application of relevant descriptive statistics and inferential tools, which were used to analyze the data. This study examined level of sustainability of food security using barometer of sustainability. This is because, barometer model was found to be the only available device for converting different indicators to a common scale while giving equal weight to a factor. It also allows coverage of the full range of indicators needed for an assessment of rural sustainability. In other words, barometer model unlike other models has no limit to the number of indicators to be investigated or studied in a particular research, hence its suitability for this study. This is mathematically expressed as

$$z_{ij} = \frac{d_{ij} - \text{Min}\{d_{ij}\}_{i=1}^{408}}{\text{Max}\{d_{ij}\}_{i=1}^{408} - \text{Min}\{d_{ij}\}_{i=1}^{408}} \quad j = 1, \dots, 12 \quad \dots (1)$$

Where z_{ij} is the conversion of data into quantitative (fuzzy method),
 d_{ij} is the difference in the indicators,
 408 represent the number of respondent,
 J represents indicators,
 Max denotes the highest value of an indicator,
 Min stands for lowest value of an indicator. An indicator is a tool that permits to obtain information about a given reality (Bellen, 2012).
 To that end, the entropy of each of the criteria is calculated by using following equation

$$E_j = -\theta \sum_{i=1}^6 (p_{ij} - \text{Ln}(p_{ij})) \quad , \quad j = 1, \dots, 12 \quad \dots(2)$$

In which $\theta = \frac{1}{\text{Ln}(6)}$ and $p_{ij} = \frac{a_{ij}}{\sum_{i=1}^6 a_{ij}}$.

Where E_j denotes the entropy of each criteria,
 6 represents the number of communities,
 Ln stands for anti logarithms.

a_{ij} stands for $[a_{ij}]_{i=1, j=1}^{i=6, j=12}$ as the decision matrix.

Then, the uncertainty of each criterion is calculated as

$$e_{ij} = 1E_j, \quad j = 1, \dots, 12 \quad \dots(3)$$

Where e_{ij} is the uncertainty of each criterion, following that the weight coefficient of each criterion is calculated based on e_j values and as:

$$w'_j = \frac{e_j}{\sum_{j=1}^k e_j} \quad j = 1, \dots, 12 \quad \dots(4)$$

Where w_j , is the weight coefficient,
 e_j denotes expert opinion. Expert opinion is the researchers estimated value
 Applying experts' opinions about the importance of each criterion results in final values of weight coefficients of the criteria as:

$$w_j = \frac{\lambda_j w'_j}{\sum_{j=1}^k \lambda_j w'_j} \quad j = 1, \dots, 12 \quad \dots(5)$$

In which λ_i is the average weight coefficient given by the experts for the j^{th} criterion. W_j is the sustainability value. The corresponding notations for obtained weight coefficients,

and also the values of each criterion in the region are shown in the first column of Table 2.

Table 2: Dimensions, Indices, and Criteria used in Evaluation of Rural Sustainability of Food Security

	Dimension	Index	Criterion
Sustainability (F,W)....	Economic (F1,W1)	Non-food-expenses (F11,W11)	Share of household income spent on Non-food items (F111,W111)
		Non-farm-income (F12,W12)	Share of household income from all non-farm activities (F121,W121)
		Food expenditure(F13,W13)	Share of household income that is spent on food (F131,W131)
		Gift(F14,W14)	This comprises gifts received and enjoyed by members of the household(F141,W141)
	Social (F2,W2)	Education(F21,W21)	Average years of education of adult members of the household(F211,W211)
		Health(F22,W22)	Average knowledge about diet(F221,W221)
		Transport(F23,W23)	Average distance to the food market(F231,W231)
		Social capital(F24,W24)	Social capital cohesion(F241,W241)
		Government institution(F25,W25)	Government institution(F251,W251)
	Environmental (F3,W3)	Farm size(F31,W31)	Hectares of farm owned by the household(F311,W311)
		Environment Hygiene (F32, W32)	Environment Hygiene (F321, W321)
		Water Resources Availability (F33, W33)	Water Resources Availability (F331, W331)

Source: Authors computation (2021)

4.0 RESULTS AND DISCUSSION

4.1 The Implication of Socio-economic characteristics of the respondents on Food security

The Socio-economic characteristics of the respondent as well as the social/economic status were examined. The social status of the selected respondents used in this study encompassed the age, sex, marital status and educational qualification. While the respondent's economic status were the occupation and monthly income (Table 3).

Table 3: Demographic Characteristics of the respondents

Variable	Characteristics	Frequency	Percentage
Age	15-29years	86	21.1
	30-49years	113	27.7
	50-64years	178	43.6
	65years	31	7.6
Sex	Male	322	78.9
	Female	86	21.1
Education	No formal education	20	4.9
	FLSC	267	65.4
	SSC/WASC/TC11	114	27.9
	OND/NCE	7	1.7
Primary Occupation	Farm	391	95.8
	Nonfarm	17	4.2
Secondary Occupation	Nonfarm	363	89
	Farm	45	11.0
Monthly Income	Less than N5000	16	3.9
	N5,000-N10,000	211	51.7
	N11,000-N15,000	112	27.5
	N16,000-N20,000	37	9.1
	Above N21,000	32	7.8
Family Size	2-4	62	15.2
	5-8	310	76.0
	Above 8	36	8.8
Family type	Monogamous	364	90
	Polygamous	44	10.0
Religion	Christianity	401	98.2
	Islam	7	1.72

Source:Field work (2021)

The age structure of the household heads were categorized into these age brackets;15-29years,30-49years,50-64years and above 65years.The age structure of the head of households show that the population of most of the respondents fall within the age brackets of 15-29years,30-49years and 50-64years respectively. The percentages within these age brackets are 20.1%, 26.5% and 41.7%, hence it gives a vivid interpretation of the household heads age distribution. The ratio of the head of households that have attained 65years and above to the household heads within the age bracket of 15-29years therefore is 0.36. This signifies that the population of the household heads within the age bracket of 65years and above is the least in number among other age brackets. The high

concentration of head of household from the ages of 29 to 64 years portrays that it is at this stage of life that one can considerably cater for the needs of oneself and as well rear a family. These further, show that there is high population of heads within these productive stage ages which have positive implications on development and thus, the population would have high coping strategies which can sustain them in feeding. However, according to the findings of Anyaejis and Arene (2010) and Muhammadet al (2019), the households led by older people turn out to be more food secure than households led by younger people. This is because aged people are more honest about the needs of their physical, social and farming environments. However, age may reveal a negative outcome because an aging head of household might be less productive in delegating their farm operations, which may in turn lower farm turnout and productivity. Living past the expected age is assumed to have a negative impact on the result and there is room for further investigation.

In addition, it was found that the greater number of the respondents who are head of households are males. Male account for 78.9% which is about 322 people out of 408 head of households while 21.1% numbering 86 people are females. The main reason for male dominance of the respondents is because of the specific emphasis on the head of the household as the breadwinner and male headed household are more populous than female headed households in study area. Besides in most important cases in Igbo tradition where the father of the household is late, the first and eldest son who is the bread winner usually assume the hierarchy of the head of household regardless of the presence of the fathers wife (Oliver, 2017).

Furthermore, most of the heads of the households have acquired formal education. However, educational attainment proves one of the most important determinants of Food utilization. Majority of the household heads obtained primary and secondary education. From the analysis, 89.2% of the sample respondents have attained primary and secondary education. This means, they have better knowledge of food utilization. This agrees with earlier reports that a person's educational level directly affects their economic capacity and sustenance for accessing food (Lee and Frongillo, 2001).

In terms of marital status, the result shows that there is a higher percentage of married people than divorced/separated people in the study area (Figure 3).

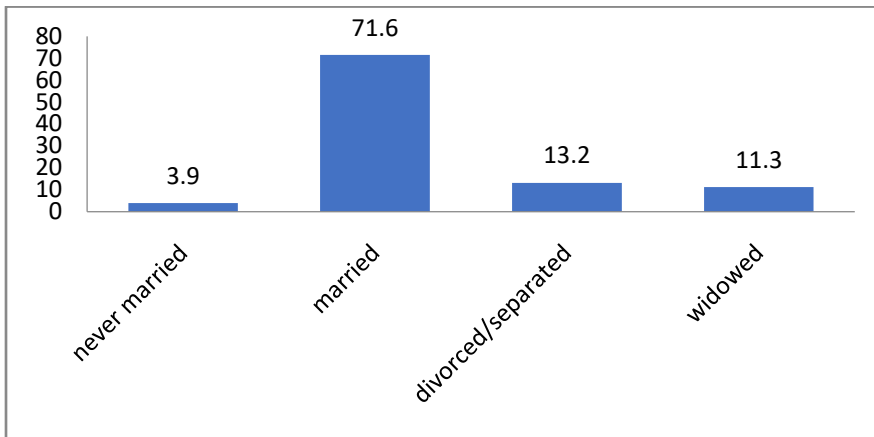


Figure 3: Marital status of head of household

Similarly, it was also found that the population of the singles, most especially the youths, comprising those that assume position as the bread winner where the father of the household is late and those that had babies in their father’s house were 3.9% while the population of the widowed was 11.3%. The fact that the married people have the largest percentage of 71.6% of the respondent is an indication that there will be a great increase in food access and food utilization in the rural areas of Enugu state in the foreseeable future. Moreover, good knowledge of the marital status of the heads of the households is an important tool that direct and determine the level of work load on the head of the household for providing food.

Our findings revealed that majority (211 out of 408) of the heads of the households earned income ranging from ₦5000-₦10000 per month while the head of household that earned ₦ 11000.00-₦15000.00 per month were 112 out of 408 persons. The low income earners with monthly income less than ₦ 5000.00 accounted for 3.7% of the total number of head of households. Only 4 of the coping strategies out 14 coping strategies sampled earned ₦ 21000.00 and above. These indicate that most inhabitants engaged in coping strategies are low income and medium income earners. We found that engagement in both farm and coping strategy is the major way the rural households make money to sustain the household

Furthermore, direct relationship exists between the income of the head of the households and the type of coping strategies engaged (Table 4).

Table 4: Cross tabulation of monthly income and coping strategy type

	Monthly Income(₦)					Total
	less than N5000	5000-10000	11000-15000	16000-20000	Above 21,000	
Restaurant	2	34	0	0	0	36
Nursing	0	4	0	0	0	4
Building	3	44	2	0	4	53

Welding	1	0	0	0	0	1
Baskets weaving	0	24	4	0	0	28
Tailoring	1	34	4	0	0	39
Photography	3	13	0	0	0	16
Owns a TV viewing center	4	26	9	0	0	39
Repair of vehicle	2	7	17	0	0	26
Transport operation	0	0	31	0	0	31
Trading	0	11	36	29	2	78
Furniture making	0	5	8	8	8	29
Hair Dressing	0	8	0	0	18	26
Teaching	0	1	1	0	0	2
Total	16	211	112	37	32	408

Source: Field work (2021)

Our findings reveal that most of the household heads that earn above ₦20,000 are engaged in daily trading. Which implies that trade gives more income than any other activities in the study area. Out of 14 sampled coping strategies, 4 earned ₦21,000.00 and above monthly while 10 earned less than ₦ 5000.00 to ₦ 20000.00.

On the other hand, only 2 coping strategies were employed by heads of households who earned income between ₦ 16000.00 to ₦ 20000.00. Also 8 earned less than ₦ 16000.00 monthly while the remaining 4 earned ₦ 21,000 and above. This fact in other words portrays low and medium income level of household's heads in its diversification of coping strategies.

Also, the earnings per month of any household contribute immensely and determine to a great extent the food access and level of sustainability of the rural household.

In the study area, accessibility is problematic as most of the internal road networks in the communities are in deplorable conditions. Transportation has significant relationship with food availability and food access. Household consider the distance to food access. Communities with the worst internal road networks are Umualor and Akpugo-ezike while the internal roads of Neke, Asaba, Akpugo-eze, and awlaw are better off. The major means of transportation within the study area include motorcycles (Okada), bicycles, buses and pick up for commercial purposes especially during their market days. These are used to transport people and agricultural produce from the farms then to the markets on market days.

The availability or otherwise of water in desirable quantity and quality is of utmost concern to any population (Nzeadibe and Ajaero, 2010). From our results, the main source of water in our study area is surface/rainwater (see Table 5).

Table 5: Distribution of types of water supply in the study area

	Pipe borne Water	Borehole/Well	Surface water	Total
Umualor	0	0	69	69
Asaba	0	0	21	21
Neke	0	2	117	119
Akpugo-Eze	0	18	28	46
Awlaw	50	0	27	77
Akpugo-ezedike	0	0	76	76
Total	50	20	338	408

Source:Field work (2021)

The implication is that during the dry season, these communities suffer from acute shortage of clean water. Aside its domestic usage, herdsmen have their cattle drink from the same source and this, according to the respondent, makes the water unfit for drinking within that period. Similarly, Awlaw is the only community found making use of pipe born water. Communities such as Akpugo-eze and Neke make use of boreholes to support their major source of water. These boreholes were built by the Government respectively. We noticed that the populations in our study area usually buy water for their domestic use. Finally, it was gathered that access to potable water is a luxury.

4.2 The Implication of Nonfarm activities on Food security

The primary employment of the rural household is agriculture which accounts for 95.8% of the total respondents; hence the household livelihood is more than one primary activity. The remaining 4.2% are engaged in other coping strategies as their primary occupation. This also indicates that the primary occupation of the household is agriculture.

While 89% of the total respondents engage in coping strategies as their secondary occupation, 11.0% are engaged in agricultural activities as their secondary occupation.

The distribution of these coping strategies shows that while 19.1% of the respondents are engaged in trade, 0.2% are engaged in welding activities. (Figure 4)

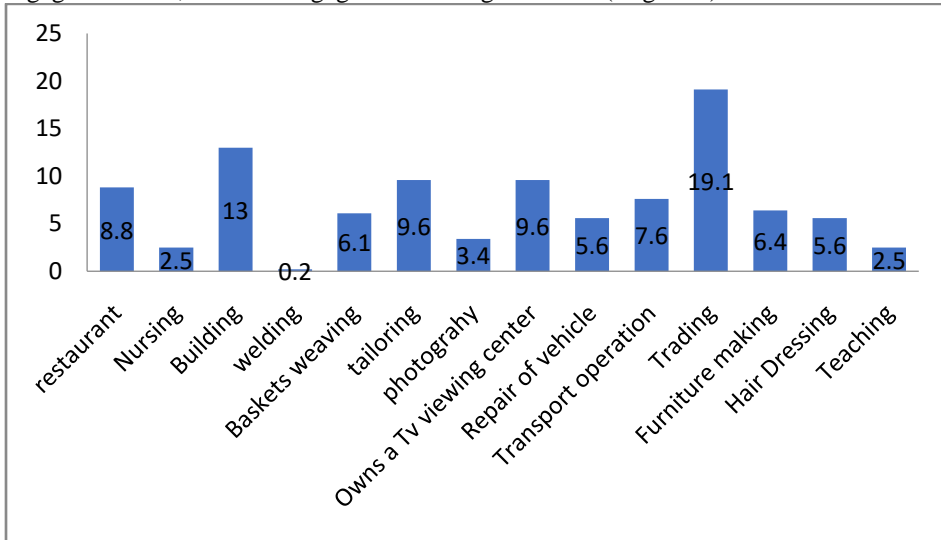


Figure 4: Distribution of Coping Strategies

Trading is believed to be the commonest activity to initiate support for food access and family needs in the study area. It was also found that people go into trading because it requires little capital to start while making income for feeding is their major aim. Furthermore, it was found that almost all the people engaged in nursing and teaching are non indigenes of the study area while only few indigenes were found in the activity. Similarly, while it was found that unsteady power supply was the major problem affecting welding work, basket weaving was found to be seasonal with December and January as their peak production periods. In addition, it was found that 98.0% of the head of households are engaged in both farm and other coping strategies in the study area while 2% accounts for households that depend only on agriculture for livelihood (Table 6).

Table 6: Frequency of both Farm and Coping strategies

	Frequency	Percent
Both coping strategies and farm occupation	400	98.0
Farm	8	2.0
Total	408	100.0

Source; Field work (2021)

It was found that households that engage only on farm activities find it difficult to maintain food security without hunger and family problems while households that engaged on both activities have food security with less hunger. However, agriculture is seasonal, we found that during planting season, income from coping strategies are used to buy food from the market and also for general needs of the households while the harvest is been waited for. Moreover, head of households do not have proper records of separate income from coping strategies and farm activities due to one central pocket which they use in pursuing one goal of feeding and sustainability for the household.

Some of the coping strategies found in the study area are shown in Plates 1 to 4.



Plate 1: Tailoring shop displaying modern outfit in Awlaw (Lat 6.226128; long 7.222447)



Plate 2: Welding shop at Neke (Lat 6.791062; long 7.655346)



Plate 3: Hair dressing shop at Akpugo-eze (Lat 6.129271; long 7.232849)



Plate 4: Basket weaving in Asaba (Lat 6.744751; long 6.958949)



Plate 5: After a household interview at Asaba (lat 6.625254; long 6.225148)

5.0 FOOD SECURITY PATTERN

The result of the analysis of the distribution of food security pattern revealed that average respondents were food secure, and almost 50% were food insecure (without hunger, with moderate hunger, and with severe hunger)(Table 7). Our findings disagree with the findings of Ogechi *et al.* (2016) who found high levels of food insecurity in Enugu State. Our findings reveal that the current improved level of food security in Enugu State may be attributed to food security policy been adopted since the last five year. However, respondents resorted to nonfarm activities, subsistence farming, borrowing and Government assistant as their major strategies to cope with food security problems. The findings of this work agrees with the findings of Babatunde *et al* (2010) that skipping of meals could be an explanation to why some of the respondents were food insecure without being hungry. It had been reported that food insecure households managed to get enough to eat but may have meals of reduced quantity, variety or desirability (FOA /IFAD, 2015).

Table 7. Food security status of the respondents

Variables	Frequency	Percentage
Food secure	204	50
Food insecure without hunger	185	45.3
Food secure with moderate hunger	10	2.5
Food insecure with severe hunger	9	2.2
Total	408	100.0

Food security = < 3 positive responses

Food security without hunger = 3 – 4 positive responses

Food security with moderate hunger = 5 – 6 positive responses

Food security with severe hunger = > 7 positive responses

6.0 FEEDING PATTERN AND FOOD AVAILABILITY IN THE STUDY AREA

The feeding and food availability pattern of the respondents revealed that most (66.7%) reported they have enough to eat but not always (Table 8). Few (24.0%) have enough of the kind of food they want to eat while 9.3% reported that sometimes they do not have enough to eat. The majority (72.5%) cite a lack of money as the major reason for not having enough to eat. Most (51.5%) ate only twice in a day. Only 24.5% reported feeding three times a day, whereas 19.6% had meals once a day. The majority skipped at least one meal.

About 52% ate vegetables only once in a week, and 74.0% did not take fruits after meals. More than half of the respondents always considered cultural factors, while 53.7% sometimes considered food availability, whereas 80.8 % always considered the cost in their choice of food. Various food crops were available (grow) in the households with cassava and its products topping the list. Some of the respondents reported having to spend between N3,000.00 to N15,000.00 a week on food. Strategies for coping with

nutrition and food security included subsistence farming (52.2%) and Nonfarm activities (22.0%). We found that government assist rural communities with social programs for poverty alleviation and also provision of palliatives in coping with nutrition and food security challenges.

Table 8. Feeding pattern and food availability of the respondents

Variables		Frequency	Percentage
In the last three months			
We have enough of and the kind of food we want to eat		98	24.0
We have enough to eat but not always		272	66.7
Sometimes we do not have enough to eat		38	9.3
Skipping of meals			
Yes		322	78.9
No		86	21.0
Reasons for not having enough to eat			
Not enough money for the food		296	72.5
Too hard to get to the store		15	3.7
On diet		50	12.3
No available store		26	6.4
Not able to cook/eat due for health problems		21	5.1
Number of times food is eaten in a day			
Once		80	19.6
Twice		210	51.5
Thrice		100	24.5
More than three times		18	4.4
Major food crops produced/consumed by the households			
Yam		100	24.5
Cassava/garri		215	53.7
Maize		78	19.0
Maize		10	2.5
Others		5	1.2
Amount spent on food per week			

Less than N2,000.00		51	12.5
N3,000.00 – N15,000.00		295	73.5
Above N15,000.00		62	15.2
Coping strategies adopted for improving household food security			
Subsistence farming		213	52.2
Nonfarm activities		90	22.0
Loan		32	7.8
Government assistance		69	16.9
Others		4	0.98
Number of times vegetables are consumed weekly			
Once		212	52.0
Twice		110	30.0
Thrice		72	17.6
Rarely		14	3.4
Intake of fruits after meals			
Sometimes		45	11.0
Always		7	1.7
Rarely		59	14.5
Never		302	74.0
Reasons for choice of food			
Cultural factors	Always	240	58.8
	Sometimes	123	30.1
	Rarely	45	11.0
Food availability	Always	62	15.2
	Sometimes	219	53.7
	Rarely	127	31.0
Cost of food	Always	330	80.9
	Sometimes	63	15.4
	Rarely	15	3.7

7.0 LEVEL OF FOOD SECURITY

Recognizing and measuring the level of food security is a requisite for achieving rural food sustainability. The present study is an applied one and the procedure employed is a combination of descriptive and barometer of sustainability within food availability, food access, food utilization dimensions to measure sustainability. From the results, the obtained weight coefficient are presented in table 9 and 10 respectively.

Table 9: Weight coefficient of different dimension

Food security	Weight coefficient
---------------	--------------------

Food availability	0.33
Food access	0.419
Food utilization	0.25

Table 10: Sustainability level in different dimensions

Food security	Index
Food availability	0.418
Food access	0.574
Food utilization	0.496

The result in table 5 and 6 respectively shows that the obtained values for weight coefficients, and also sustainability levels are close. These results indicate more effectiveness of food utilization and then food access elements in sustainability of these areas. In view of this, despite the fact that weight coefficients are bigger, in order of, food access, food availability, and food utilization dimensions, the sustainability level in different order is conversely smaller.

Across the villages, food access value is high. This is because there is an ongoing shift in the economic mainstream of rural areas into diversification. Similarly, in Asaba it was found that food available has the highest value while the food availability sustainability in Akpugo-eze has the lowest (see figure 7 and 8 respectively). This is because Asaba has not experienced any form of attack by Fulani herdsmen unlike Akpugo-eze that has recorded several attacks by the Fulani herdsmen during harvest and post harvests periods.

Table 11: Sustainability status of Asaba

Rural community	Food security	Score
Asaba	Food availability	0.412
	Food access	0.542
	Food utilization	0.463

Table 12: Food security Sustainability status of Akpugo-Eze

Rural community	Food security	Score
Akpugo-Eze	Food availability	0.523
	Food access	0.372
	Food utilization	0.443

Table 13: Sustainability status of sampled communities

Rural community	Food security	Index
	Food availability	0.567

Awlaw	Food access	0.364
	Food utilization	0.431
Umualor	Food availability	0.561
	Food access	0.402
	Food utilization	0.421
Akpugo Ezedike	Food availability	0.551
	Food access	0.391
	Food utilization	0.474
Neke	Food availability	0.561
	Food access	0.402
	Food utilization	0.421

However, the general sustainability level of different villages was shown in Figure 11. Figure 11 shows that Akpugo-eze has the highest sustainability status and this can be attributed to their source of livelihoods which are largely non-farm activities. This shows that access to food is not a significant problem.

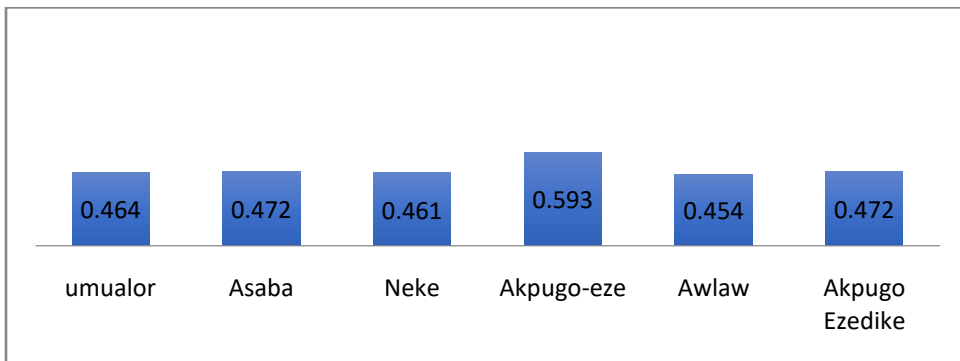


Figure 11: Sustainability level of different rural communities

The sustainability status of villages in different dimension shows that food access is the highest across the villages (see figure 11).The above findings are justifiable with regard to the ongoing rural diversification, making each household not to depend on farm output alone for feeding and catering for the household.

Table 14: Weight Coefficients and Level of Sustainability of Indices (Weights in descending order)

Index	Weight Coefficient(w)	Sustainability(f)
Non-food expenditure	0.087	0.350
Transport	0.085	0.341

Health	0.085	0.253
Education	0.085	0.256
Food expenditure.	0.083	0.419
Government institution	0.083	0.579
Gifts	0.082	0.573
Water resource availability	0.082	0.326
Social capital	0.082	0.655
Farm size	0.082	0.815
Environmental hygiene	0.082	0.653
Non-farm income	0.081	0.655

Source: Authors computation (2021)

The results show the highest level of sustainability in farm size followed by non-farm income and social capital, environmental hygiene, Government institution and gifts while the lowest levels of sustainability are observed in health, education, water resource availability, transport, non-food expenditure, and food expenditure. The above findings are also justifiable with regard to the observed unsteady power supply, rural neglect by the relevant authorities as summarized in Figure 10.

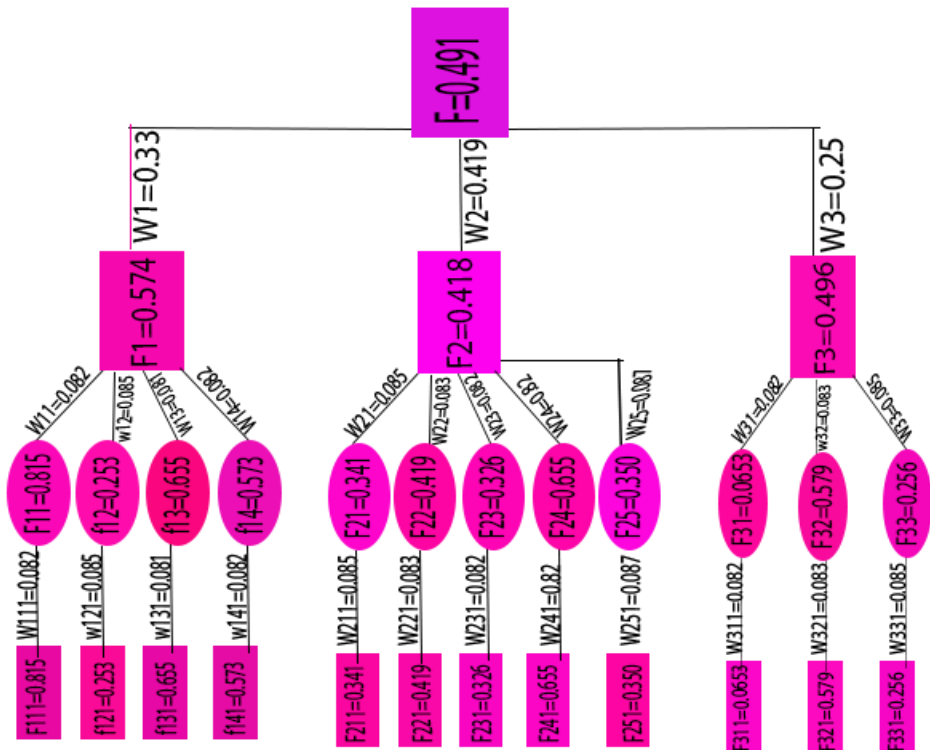


Fig. 10: Sustainability indices in food security of human well-being

Similarly, considering sustainability value of 0.496 in Food security of Human Well-being, using barometer of sustainability, it can be concluded that the study area in general have normal sustainability status(see Figure 11 and 12)

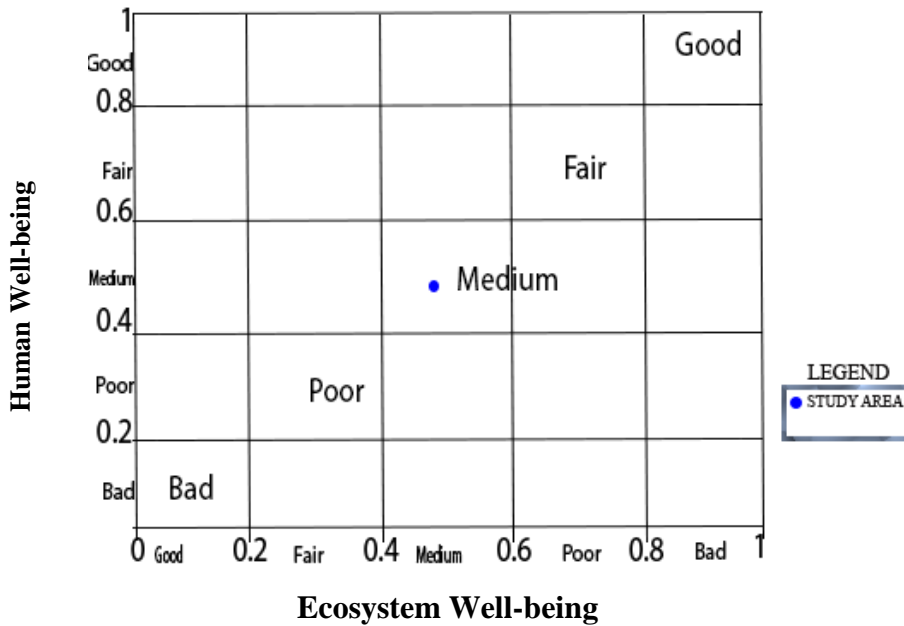


Figure 11: General sustainability status of the study area

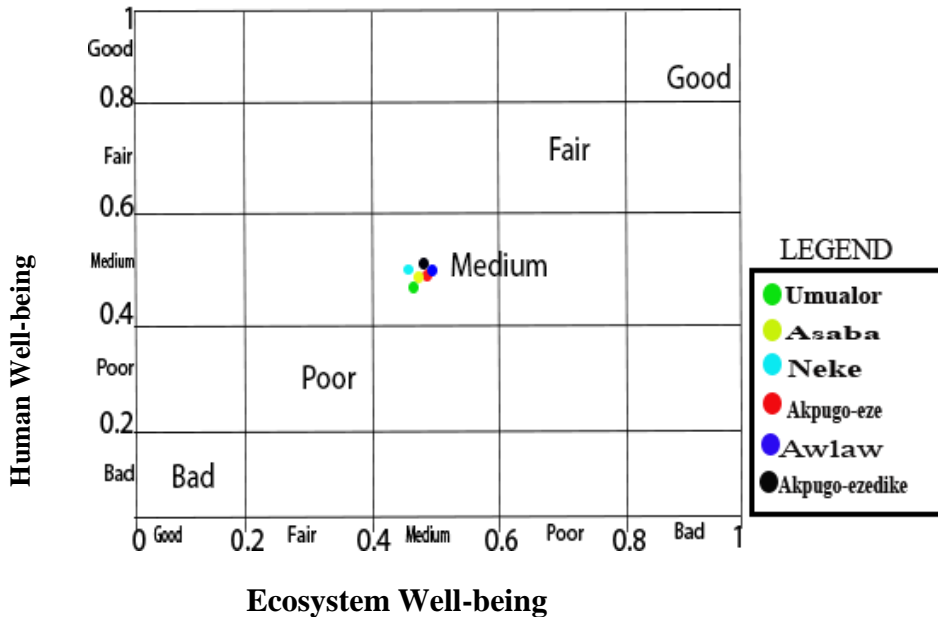


Figure 12: sustainability status of different villages

To prioritize the indices for assessment in the study area, the product of the value of weight coefficient and reverse value of sustainability level for different indices were calculated. The results indicate that feeding, food expenditure, education, environmental hygiene, health, non farm income, water resources availability, Government institution took top priority for planning in the area, respectively (Table 15).

Table 15: Priority of index in Planning for Sustainable Food Security

Rank	Index(f, w)	Priority(p)
1	Feeding	0.5
2	Food expenditure	0.333
3	Education	0.333
4	Environmental hygiene	0.25
5	Health	0.25
6	Non-farm income	0.20
7	Water resources availability	0.142
8	Government institution	0.142
10	Transport	0.141
11	Gifts	0.125

12	Farm size	0.125
13	Social capital	0.1

Source: Authors computation (2021)

7.0 RECOMMENDATIONS

Based on the findings of this study, we recommend establishment of sustainable food security strategic office in each LGA of the state. The office will conduct an unbiased assessment of urgent rural food insecure areas, food access and food utilization across the rural areas in the state. This office will link the actual voice of rural households to the relevant development authorities within the state or federal. In fact, unbiased output from this proposed office will speed rocket foreign aids, private sector or individuals to make food available as palliatives, cash gifts and loan without waiting for any outbreak of disease or disaster like fire or flooding. Similarly, this will fast track the support of state Government and other agencies to close the gap of food insecurity in the rural communities.

Moreso, efforts should be made to improve the skill and knowledge of household heads through provision of training because educational status of household heads affects the level of nutrition and food security. This study has identified medium level of food security sustainability in the area. Consequent upon this finding, it is suggested that food security in the rural communities should be given equal attention as urban development. This research particularly recommends that coping strategies involving non-farm activities require deliberate policies to boost these activities since they complement agricultural income which has positive relationship with food security.

8.0 CONCLUSION

The study assessed non farm activities and their contributions to the sustainability of food security in rural communities in Enugu State, Nigeria. With a sustainability value of 0.496 in human well-being, the communities have a medium sustainability status which indicates that the communities are on average food secure. The sustainability status of communities using different food security dimensions, shows that food access is the highest, and this implies that access to food is not a significant across the communities. Akpugo-eze community was found to have the highest sustainability status, and this has been attributed to their sources of livelihoods which are largely non-farm activities.

The study concludes that non-farm activities are significant coping strategies which require policies to boost them since these activities complement agricultural income which has positive relationship with food security. Boosting non-farm activities will assist households in rural communities live healthy and eat nutritious food at all time, thereby helping to achieve the Sustainable Development Goals 2 and 3 which lay emphasis on zero hunger, and good health and well being. However, with regards to the various food security dimensions and the sustainability status, the food security status in rural communities of Enugu State can be classified as "Medium Sustainable".

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