



Research Paper

Analysis of Food Insecurity Multidimensional Index for Sustainable Development of Geidam Local Government Area of Yobe State, Nigeria.

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Abstract

This study analyses the Food Insecurity Multidimensional Index (FIMI) on sustainable development of Geidam Local Government Area of Yobe state. The FIMI methodology was used on survey data across the eleven political wards of Geidam Local Government Area. Result from the descriptive statistics shows a mix outcome between an extremely alarming situation and alarming state of food insecurity in Geidam Local Government Area. While, the indices of food availability and food stability are at alarming state of food insecurity, disturbingly, the indices of food accessibility and food utilisation are at extremely alarming state of food insecurity. Therefore, to curtail the myriad of problems bedeviling against the attainment of food security in Geidam local government area, policy makers and development partners at various levels of government should enact policies and programs that will promote and enhance the security of lives, food and living standards of the people for the attainment of sustainable development goal.

Keywords: Food insecurity, Food insecurity multidimensional index, Sustainable development goal, Food availability, Food accessibility, Food utilisation, Food stability.

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I. Introduction

Food insecurity is one of the most worrisome and daunting challenges of the world today especially in developing countries. The state of food insecurity shows that Nigeria was ranked third position (just after DRC and Afghanistan) among countries with number of people in acute food insecurity in hotspot countries and found to have affected nearly 18 million people in 21 states and the Federal Capital Territory (FAO, 2022). Nigeria together with Ethiopia, South Sudan and Yemen continues to be countries at the highest alert level and have been experiencing starvation and death thus, requiring the most urgent attention. In Northeast Nigeria, nearly 8.7 million people were estimated to be food insecure. Out of this number, there are 4.4 million people that are in acute hunger and about 320,000 children in the state of acute malnutrition (WFP, 2022). The term food insecurity is a multifaceted phenomenon. In the past, several indices and measures (FAO Index of Food Energy Deficiency; Household Income and Expenditure Survey; Food Intake Survey; Anthropometric Indicator; Global Hunger Index; The Action Aid Hunger Index; Qualitative Measure of Food Security) were used to capture the variant aspects of food security. However, most of these indices and measures were unable to precisely cover its different dimensions and is for this reason that there was no a comprehensive and widely acceptable definition of food security globally. This was one of the major stumbling block to the eradication of hunger and malnutrition at the global stage (Heidheus and Von Braun, 2004).

Even though, the concern about food security had being at the global discourse since 1943, the global food crises of the 1970's had exposed the weaknesses of nation-state in terms of food security and was considered as a global threat that affect the whole of mankind. This was vindicated by the 1974 World Food Conference in Rome where nation-state declared that 'every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties. Accordingly, the eradication of hunger is a common objective of all the countries of the international community, especially of the developed countries and others in a position of help' Food Security is a difficult concept to measure because it deals with the production, distribution and consumption of food. This posed a big concern while attempting to measures it. However, food insecurity deals mostly with measurement and analysis.

Therefore, FAO defined food insecurity as ‘*a situation that exist when people lack secure access to sufficient amount of safe and nutritious food for normal growth and development and an active healthy life*’. Recently attention was geared toward the use of suite of indicators that will cover all the food insecurity dimensions such as availability, accessibility, utilisation and stability. Therefore, any attempt to analyse the existence of food insecurity must take into cognisant factors such as non-availability of food, lack of access to food, improper utilisation of food and food instability over a defined time frame. In light of this, this study will adopt the Food Insecurity Multidimensional Index (FIMI) developed by Marion Napoli, 2010.

Beside the conflict induced by the insurgence, the biggest challenge that affect every household in North-Eastern Nigeria today is food insecurity. This is evident in the high food inflationary trend month-in-month-out since 2016. Food insecurity has been eaten up deeply into the socio-economic wellbeing of the people in the region. With the growing food insecurity, unemployment, poverty and hunger continue to increase amidst deteriorating exchange rate and incessant inflation. Moreover, the problems and attendant consequences of food insecurity has worsened due to the activities of insurgence and bandits. Recently, most peasant farmers dwelling in the rural settlement especially in North East find it difficult to farm forcing them to displace to relatively safer settlements. As a result, for example, in North East, there are over 2 million displaced people (WFP, 2022). These vast and fertile uncultivated farmlands left behind due to displacement posed a serious concern for agricultural production and food security. Also, the protectionary policies introduced by the APC led administration since 2016 by restricting the importation of basic food items leading to the closure of all land and sea borders has been escalating to the food insecurity in the country. Therefore, the main objective of the study was to assess the effect of food insecurity multidimensional index (FIMI) on sustainable development of Geidam Local Government Area. Specifically, the study assesses the impact of food availability index and food utilisation index on sustainable development of selected households in Geidam Local Government Area. The study also examines the effect of food accessibility index and food stability index on sustainable development of selected households in Geidam Local Government Area. The rest of the paper anchored on literature review, methodology, results, discussion, conclusion and recommendations.

II. Literature Review

Conceptual Literature

The term food insecurity had been a concept of political and economic discourse by nation-states, regional government, household and even individual for a very long time now. The comprehensive definition of food insecurity by the Food and Agricultural Organisation (FAO) in its 1996 World Food Summit is ‘*a situation that exist when people lack secure access to sufficient amount of safe and nutritious food for normal growth and development and an active healthy life*’. Food insecurity can be chronic when people are unable to meet their minimum requirement of food over a long term period. However, food insecurity is said to be transitory or short lived when people are in the short term experienced food scarcity and inaccessibility to food supply (Afolabi et al. 2018). WFP and FAO (2020) report shows that drivers of conflict have accounted for about 65% of acute food insecurity globally. In Nigeria, particularly North Eastern Nigeria, conflict or organised violence is the main driver of chronic food insecurity. In Borno, Yobe and Adamawa, conflict induced by Islamic militia groups (Boko Haram and ISWAP) has displaced tens of thousands of people leading to unavailability and inaccessibility of food, limiting access to agricultural activities, hampering commercial trade and services and disruption of markets (WFP and FAO, 2022). WFP and FAO (2022) reported that if urgent measures are not taken, the activities of Islamic Militias in the North East, Banditry in the North West and intercommunal clashes in the North Central will continue to disrupt agriculture and market activities in the country. The incessant high food prices and the conflict induced by the insurgences had led to the persistent of food insecurity in every part of Nigeria (FEWS NET, 2020). The situation has worsened in the North Eastern states of Borno, Yobe and Adamawa due to the aged long insurgency. The insurgences had disrupted agricultural activities which is the main source of livelihood of the people of the North Eastern states leading to the reduction in household income and lack of access to food (USAID, 2017).

Methodological Literature

There have been very many attempt by individuals, groups and organisations to define food insecurity and provide indicators for its measurement. According to Napoli (2011), there are almost 200 different definitions and 450 indicators for food insecurity. These definitions and indicators explicitly shows disagreement among individual and group as to what constitute the most appropriate definition and what should be the suitable indicator for its measurement. For example, the 1987 FAO Index of food energy deficiency which uses the proportion of the population with individual energy consumption below nutritional requirement standard to measure hunger. The index uses three parameters to measure hunger. Per capita availability of food, inequality in energy intake and country energy requirement by sex and age group. This measure is pretty good only that according to Svedberg (2002) the cut-off points used in the measurement are insensitive to distribution

across the population of interest leading to the underestimation of the under nutritious group. This is because, if the indicator is to be subjected to additional food deficiency measure on the worst affected population group, the result will not be visible on the index.

The Household Income and Expenditure Survey (HIES) was also used as a measure of household consumption by considering the amount of food needed by households rather than the amount consumed by them. This measure comprises of the food purchased by households at home and away from home, food obtained by households as a gift or as a received for payment for labour and the amount of food produced at home. Through these three items, the dietary energy available for household consumption for each day is computed by converting the food items into their kilocalorie values. After summing up the total and divided by the number of days of interest and by dividing the total obtained by the numbers of adult household members, then, the sufficiency of the dietary energy available for each household will be obtained. The beauty of this measure is that it reveals the intake of food and dietary energy distribution at the household levels. However, according to Napoli (2011) this measure can only be suitable if the estimate focuses on specially selected countries but it cannot be used in global-wide situations.

The Food Intake Surveys (FIS) was established to examine the quantity of food consumed by household members over a given period of time. The survey shows the energy and nutrient contents of each food taken. The superiority of the FIS over HIES is that the former include information about the nutrient consumption and occasionally attempted to measure the requirement and energy expenditure for households. Even though, this measure is a breakthrough but still failed to explicitly identify hunger. The 2006 Global Hunger Index (GHI) was institutionalised to assess three key areas- the level of hunger at the global scale, monitor the MDG's progress with respect to the eradication of hunger and provide interpretation to trends within causal models (Weismann, 2006). The GHI considers hunger as a multidimensional phenomenon and used three indicators-the FAO estimates of the proportion of the population with inadequate access to food, WHO's estimates for underweight children below five years and UNICEF's estimates of mortality rate for children below five years. After taken the average of the data, countries are classified under one of the three situations- serious, alarming or extremely alarming. The strength of the indicators is the use of the three different aspects of hunger and the data are reliable and can be applied at global-wide situations. However, critique observed similarity among the index and worried that the result might be double counted. This study will adopt the Food Insecurity Multidimensional Index (FIMI) developed by Napoli (2011). FIMI has netted all the four major pillars of food security-availability, access, utilisation and stability into a single comprehensive indicator.

III. Materials and Method

The methodology used in this study is Food Insecurity Multidimensional Index (FIMI) developed by Napoli, (2011). This index was chosen because of its superiority over other measures of food insecurity. Another advantage of this method is that it can fit both macro and micro study of food insecurity. The population of this study is the entire population of Geidam Local Government, Area. Out of the population of Geidam Local Government Area based on 2022 estimate of 221,000 people, the total sample of 872 have been generated using Yamane (1967). The selection process was spread across the eleven political wards. The systematic random sampling technique was used whereby from the eleven wards; the sample were drawn across identified enumeration areas (EAs). The systematic random sampling was used because of its advantages in reducing the sampling bias and to ensure inclusiveness of the settlements in the sample. The questionnaire method of data collection covers a wide range of demographic, food availability, food accessibility, food utilisation and food stability that are relevant for this study. At the disaggregated level, the study used the Food Availability Index, the Food Accessibility Index, Food Utilisation Index and Food Stability Index. These indicators were analysed for each ward at the disaggregated levels and later the combination of each disaggregated data produced an aggregated information representing the food insecurity position of the entire Geidam Local Government Area. The essence of disaggregating the data down to the community levels is to get the micro representativeness of the food insecurity components for accurate and valid policy analysis. The Food Insecurity Multidimensional Index (FIMI) was based on a weighted arithmetic mean which shares the dimension weights according to the number of indicators in each of the four dimensions. Therefore, in the FIMI model, the dimension index for each food insecurity was computed as follows:

$$\text{Dimension index} = \frac{\text{sum of food insecurity scores}}{\text{total number of indicators}} \dots\dots\dots 3.1$$

Hence, the four indicators of food availability, food accessibility, food utilisation and food stability was calculated as follows:

$$\text{AVI} = \text{AVIs}/8 \dots\dots\dots 3.2$$

ACI = ACIs/43.3

UTI = UTIs/3.....3.4

STI = STIs/5.....3.5

Where, AVI, ACI, UTI and STI represent the food insecurity index for availability, accessibility, utilisation and stability respectively. Whereas, AVIs, ACIs, UTIs and STIs denote the insecurity score for availability, accessibility, utilisation and stability respectively. To aggregate the insecurity index for availability, accessibility, utilisation and stability in order to arrive at the FIMI at the aggregate level for the Geidam local government area, the FIMI value ranges between 0 and 1 representing the absence and presence of food insecurity respectively.

IV. Results and Discussion

The summary result of food availability index generated from the questionnaire administered to the 11 political wards of Geidam Local Government area is presented in table 1.

Table 1. Food Availability Index Result

Description	Number of household with food availability	Percentage of households with food availability	Number of Household with food unavailability	Percentage of households with food unavailability
Available arable land for cultivation	592	67.9%	280	32.1%
Bags of cereal cultivated per season	126	15.7%	678	84.3%
Bags of cereal consumption from domestic supply	402	50%	402	50%
Bags of cereal consumption from foreign aid	72	8.3%	792	91.7%
Available permanent crop land for cultivation	456	53.1%	402	46.9%
Available land exclusively for cereal cultivation	288	32.2%	606	67.8%
Edible and nutrient food consumption	252	30%	588	70%
Balance proportion of food consumption daily	348	39.5%	534	60.5%
Mean scores	279.75	36%	498	64%

Source: survey report, 2023.

Result presented in table 1 shows the magnitude of food availability index obtained from the sample of household across the 11 political wards of Geidam Local Government Area. From the result, the average number of household with food availability scores is 279.75 representing the average of 36% that have available food. However, the average of 498 household representing the average of 64% do not have available food. Specifically, 84.3% of the households do not have available cereal from domestic supply for consumption. That is why a whopping 91.7% of cereal consumed by the households obtained from foreign aid. Worryingly, 70% of the households do not have edible and nutrient food for consumption. It can be deduced from this result that the food availability index obtained indicates an alarming food unavailability in Geidam Local Government Area within the study period.

The food accessibility survey index has been carried out on the 11 political wards of Geidam Local Government Area and the results obtained from the households are presented in table 2.

Table 2. Food Accessibility Index Result

Description	Number of household with food accessibility	Percentage of households with food accessibility	Number of Household with food inaccessibility	Percentage of households with food inaccessibility
Physical access to food	228	36.5%	396	63.5%
Financial access to food	246	29.5%	588	70.5%
Socio-cultural access to food	528	62.4%	318	37.6%
Access to healthy source of water for consumption	18	2.2%	804	97.8%
Mean scores	255	32.6%	527	67.4%

Source: survey report, 2023

The result of the food accessibility index presented in table 2 indicates an average of 255 households representing an average of 32.6% that have access to food while the average of 527 households representing an average of 67.4% do not have access to food in Geidam Local Government Area. The major factors contributing to food inaccessibility are absence of healthy source of water for consumption and lack of financial access to food which represent 97.8% and 70.5% respectively.

The result of the survey conducted across the 11 political wards of Geidam Local Government Area on the state of food utilisation index has been presented in table 3.

Table 3. Food Utilisation Index Result

Description	Number of household with food accessibility	Percentage of households with food accessibility	Number of Household with food inaccessibility	Percentage of households with food inaccessibility
Intake of nutritious and safe food	276	31.5%	600	68.5%
Source of healthy drinking water	42	4.7%	846	95.3%
Procedures for food preparation and storage	342	37.5	570	62.5%
Mean scores	220	24.6%	672	75.4%

Source: survey report, 2023.

The summary of result on food utilisation index generated from the questionnaire administered to the sample of 11 political wards of Geidam Local Government Area presented in table 3 clearly shows an average of 220 households representing an average of 24.6% have favourable food utilisation scores. Meanwhile, the average of 672 households which represent an of 75.4% do not have favourable food utilisation scores. This result is quite alarming looking at the 95.3% of food non-utilisation emanates from lack of sources for pure drinking water. This problem requires immediate government intervention to ensure people have access to clean source of purified water for drinking. Also, government should enact policies and programmes to improve the standard of living of the people thereby addressing the abysmal 68.5% of the households that could not have access to nutritious and safe food.

The summary of the responses emanating from the 11 political wards of Geidam Local Government on the state of food stability index has been presented in table 4.

Table 4. Food Stability Index Result

Description	Number of household with food stability	Percentage of households with food stability	Number of Household with food instability	Percentage of households with food instability
Presence of armed conflict that affects farming	186	21.2%	690	78.8%
Presence of drought that affects yields	354	40%	534	60%
Prevalence of diseases or pests of crop plant	378	43.8	486	56.2%
Prevalence of natural disaster that affects farming	402	50%	402	50%
Presence of political instability	588	66.2%	300	33.8%
Mean scores	381.6	44.2%	482.4	55.8%

Source: survey report, 2023

The result of food stability index presented in table 4 indicates an average of 382 households that have food stability. This figure represents 44% of the households who are considered to have food stability. Meanwhile, an average of 482 households representing 56% of the respondents are considered to be food instable. Out of this number, 79% of the food instability was due to the presence of arm conflict which hampered farming activities in Geidam Local Government Area. It is noteworthy that Geidam Local Government is an agrarian community where majority of its inhabitants are farmers. However, the activities of armed militias and armed robbers who have been terrorising the farmers and herders by enforcing levies and fines as well as abducting and sometimes killing the farmers especially in an event of noncompliance posed a big threat to food security. The activities of these armed groups increasingly instilled fear on the farmers and herders which resulted to fleeing to safer areas living behind vast and fertile land uncultivated. This situation if not addressed will aggravate the food insecurity not only in Geidam Local Government area but the entire northeast and the country at large.

Food Insecurity Multidimensional Index

The food insecurity multidimensional index which accommodate all the four indices of food insecurity on the state of food insecurity in Geidam Local Government area has been presented in table 5.

Table 5. Summary of Food Insecurity Multidimensional Index (FIMI)

Description	Mean scores		Percentage of mean scores		Remarks
	Favourable	Unfavourable	favourable	unfavourable	
Food availability	279.75	498	36%	46%	Alarmingly food insecure
Food accessibility	255	527	32.6%	67.4%	Extremely alarming food insecure
Food utilisation	660	672	24.6%	75.4%	Extremely alarming food insecure
Food stability	381.6	482.4	44.2%	55.8%	Alarmingly food insecure

Source: survey report, 2023

The summary of the Food Insecurity Multidimensional Index (FIMI) presented in table 5 shows that food accessibility and food utilisation are in the state of extremely alarming food insecurity. This is because, the FIMI scores in these indices exceeded 60%. The result indicates that food accessibility and food utilisation have FIMI scores of 67.4% and 75.4% respectively. Moreover, the state of food availability and food stability reported in table 5 showed an alarming food insecurity condition for Geidam Local Government Area. Notably, food availability and food stability are reported to have FIMI scores of 46% and 55.8% respectively. Therefore, government and all other stakeholders' must work together to address the core issues that led to these terrible scenarios.

V. Conclusion and recommendations

This study was carried out to examine the level of food insecurity in Geidam Local Government Area with a view to enable policy makers at three levels of the government to come up with strategies that will ameliorate the prevalence of food insecurity in Geidam Local Government Area in specific and Nigeria at large to achieve the sustainable development goal set for 2030. The study applied the Food Insecurity Multidimensional Index (FIMI) by Napoli (2011) where the survey results were analysed using simple descriptive statistics. Major finding reveals a worrying state of food insecurity in Geidam Local Government Area since two of the four indices of food accessibility and food utilisation exceeded the 60% FIMI scores implying an extremely food insecurity condition while the remaining two indices of food availability and food stability reported an alarming food insecurity situation. To addressed this abysmal state, this study recommends government intervention in the provision of requisite security of lives and properties of farmers and herders thereby paving the way for a sustained farming activities which is a prerequisite for attaining food security. In addition, the presence of drought has affected farm yield over the years, hence, government should intervene in the provision of drought resistant seeds and seedlings. Moreover, government should empower the farmers on irrigation farming system along the river Yobe wetland through the provision of farm inputs, fuel and fertilizers at subsidized rate. Government should also provide agricultural loans to farmers at zero interest rate as well as ensuring that the farmers insures their crop plants with agricultural insurance companies to guard against any associated risk. Furthermore, government should enact an exclusive social security initiative that is capable of addressing poverty and hunger, promulgation of job creation initiative to empower the citizens economically and enactment of policies towards ensuring the provision of clean water for consumption among others. It is expected that these government interventions should be made by all levels and be coordinated with the required synergy and vigour from the members of the farming communities. If these and other interrelated policies and programmes of the government are duly undertaken, there will be sustained food security in Geidam Local Government Area and beyond.

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Declaration of Competing Interest

The authors declared no conflicts of interest with respect to the research, authorship, and/or publication of the article.

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