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Consumption Expenditure Patterns and Food Security Dynamics in Nigeria

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Abstract
Food insecurity remains a critical issue globally, as highlighted by the Sustainable Development Goals (SDG 2). In 2023, nearly 25 million Nigerians faced food insecurity due to factors like insurgency affecting agricultural activities. This, therefore, worsens the food insecurity in the country. Thus, this study investigates the dynamics between household consumption expenditure patterns and food security in Nigeria over a decade (2010-2019). This was done by analysing four waves of secondary panel data of 4,000 nationally representative households of the Nigeria General Household Survey GHS - Panel collected by the National Bureau of Statistics in four waves over ten years from 2010 to 2019. Analytical tools used were descriptive statistics and the Food Security Index. The results of the consumption patterns of the respondents showed that the majority of the respondents were in the lowest band of per capita total expenditure and sectoral expenditures. The ratio of food secure to food insecure averages around 30% to 70% with a food security (surplus) index of 1.26 and food insecurity (shortfall) index of 0.53. Nigeria was food insecure during the period. The analysis concludes that boosting agricultural productivity, improving infrastructure, and addressing corruption are essential to enhance food security in Nigeria. The government is recommended to prioritize long-term strategies for food production, support vulnerable households, and leverage technological advancements to increase agricultural productivity. This study underscores the need for comprehensive policies to address the multifaceted challenges of food insecurity in Nigeria.

1. Introduction

Food insecurity has for centuries remained a global human subsistence challenge. It was a concern as far back as the times of Batero (1557) and Malthus (1789) [8] and has refused to go. This global challenge is ranked very highly because, on the Sustainable Development Goals, it is ranked as Goal 2. This shows the importance of food security. SDG 2, aims to "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture" (UN, 2024) [17].

FAO (2023) [6] published those 691-783 million persons faced hunger in 2023 while 2.4 billion people experienced moderate or severe food insecurity. 900 million people faced severe food security and over 3.1 billion could not afford a healthy diet. These are very concerning statistics indeed, because beyond the numbers are real human beings with flesh and blood. At the national level, UNICEF (2023) [22] stated that nearly 25 million Nigerians, or 15% of the population faced food insecurity in 2023 and this was projected to increase as a result of insurgencies that have disrupted agricultural activities nationwide. So, Nigeria faced increasing food insecurity in 2023.

Household consumption expenditure is very important because according to OECD (2024) [12], it forms about 60% of the Gross Domestic Product of countries and "is therefore an essential variable for economic analysis of demand." OECD (2024) [12] defines household expenditure as "the amount of final consumption expenditure made by resident households to meet their everyday needs, such as food, clothing, housing (rent), energy, transport, durable goods (notably cars), health costs, leisure, and miscellaneous services."

Consumption patterns contain a lot of information for analysing the welfare conditions of any populace. An expansion in consumption expenditure is often indicative of national economic prosperity while a contraction often indicates a recessive economy. It is therefore a good measure of national and household economic health.

Given the emergence of Nigeria as one of the global food insecurity destinations, this study sets out to examine the dynamics and nexus between consumption expenditure patterns and food security in Nigeria in the ten years 2010 to 2019 to unravel the

nature of the challenges and what can be done to halt the downward spiral in Nigeria's food security situation so that Nigeria will no longer hold back the world in global human development.

2. Materials and Methods
2.1 Study Area
Nigeria was selected for the study because of its vast population which was 218, 541,212 in 2022. World Bank (2022). Nigeria is Africa's most populous country with one in every six African and one in every two West African being a Nigerian. (World Bank 2022). Nigeria's large population means that it is a large market with potentially big consumption expenditures to drive economic growth. Malthusian Theory of Population also means that a large population could, if not handled appropriately, portend the prevalence of food insecurity. Nigeria is located slightly above the equator, in the tropics between Latitude 4ºN and 14ºN and Longitude 3ºE and 15ºE. Nigeria's land mass is 923,768 km² and is a federation with thirty-six states and a Federal Capital Territory. The 2023 Global Hunger Index, ranked Nigeria 109th out of 125 countries. Nigeria's score of 28.3 in the Index, means Nigeria has a level of hunger that is serious. Nigeria's climate is generally clement and falls within the humid tropics, since, the country is located near the equator. According to the World Bank (2024) [27], "Nigeria is characterized by three distinct climate zones, a tropical monsoon climate in the south, a tropical savannah climate for most of the central regions, and a Sahelian hot and semi-arid climate in the north of the country." Nigeria has varied vegetation starting with the mangrove forest on the coast to savannah grass in the far north; and the arid Sahel vegetation (NBS, 2010) [10]. Nigeria has two basic seasons in Nigeria, which are the wet season extending from April to October; and the dry season which spreads from November to March. The dry season is characterized by the Harmattan, which is a dry chilly spell that lasts till February and is associated with lower temperatures, a dusty and hazy atmosphere brought about by the very dry north-easterly winds from across the Sahara; the second half of the dry season, February - March, is the hottest period of the year when temperatures fluctuate from 33°C to 38°C. The south-eastern coast is where the extreme wet season is experienced, where annual rainfall might reach a high of 330cm; while the extremes of the dry season, in terms of aridity and high temperatures, are felt in the northern third of the country. The savanna regions, particularly the Guinea savanna and Sudan savanna, are home to grains, grasses, tubers, vegetables, and cotton. The tropical evergreen rainforest zone is where timber is cultivated and it supports crops like cassava, and fruit tree plantations including citrus, oil palm, cocoa, and rubber. Nigeria is richly endowed with several resources which include agriculture, minerals, and marine and forest assets, which are complemented by a varied climate that supports a wide range of agricultural activities. More than sixty percent of Nigerians engage in arable farming of food crops like cassava, maize, rice, yams, and various beans and legumes, as well as cash crops like cocoa, cotton, groundnuts, oil palm, and rubber. The raw materials obtained from agriculture are then processed into derived products which include cocoa flour and butter, rubber crumbs, vegetable oil, cotton, fiber, and yarn. The country's rainforests are rich in exotic and popular wood species and have been harvested sustainably for several decades. Insurgency in Nigeria curtailed farming and other productive activities in the country.

2.2 Data Source, Sampling Technique, and Sample Size
The datasets for the study were sourced from the Nigeria General Household Survey - Panel Data collected by the National Bureau of Statistics but hosted by the World Bank. The data collected by NBS was nationally representative and followed a multi-staged stratified simple design. All households in the country were surveyed to form the survey universe, the exceptions being correctional facilities, military barracks, and student hostels. The data were collected from 22,000 households surveyed but 5,000 households were chosen to form a panel, 4,000 of which were used for this study.

2.3 Data collection
The data was collected as two surveys per household per Wave. Post-planting survey took place between August and October while the second survey, the post-harvest survey was done between February and April of the ensuing year. This made each wave cover two consecutive years.

2.4 Descriptive Statistics
Descriptive statistics such as frequency, mean, minimum, maximum, variance, standard error, and standard deviation were employed to describe the consumption patterns of the sampled households in the study area.
2.4.1 Food Security Index
The literature presents various measures of food security, many of which assess it based on respondents' calorie intake. However, since the GHS did not capture calorie intake but did record household food expenditure, this study used the latter as a measure of food insecurity. Household food expenditure has been widely utilized in the literature to assess food insecurity. Consequently, the food security benchmark was established at two-thirds of the mean per capita food expenditure of households in the study area. Households were categorized as either food secure or food insecure based on this benchmark (Ogunyemi et al., 2022) [13]. Specifically, households with mean per capita food expenditure below the food security line were classified as food insecure, while those with expenditures above the benchmark were considered food secure.

$$\text{Per-capita Food Expenditure (PCFE)} = \frac{Total\ Food\ Expenditure}{Household\ Size}$$

$$\text{Mean Per-capita Food Expenditure (MPCFE)} = \sum_{i=1}^{n} \frac{PCFE}{Total\ Number\ of\ Households}$$

Food security benchmark (HFS) = 2/3 * MPCFE
Following Munonye et al. (2023) [9], the food security status benchmark (HFS) categorizes households into two groups. Respondents whose consumption was below the benchmark (HFS) scored zero (0), indicating food insecurity, while those whose consumption exceeded the benchmark scored one (1), indicating food security. The headcount ratio was used to determine the proportion of food-secure and food-insecure households relative to the total number of sampled households. The surplus/shortfall index, P, measures the degree of food security or insecurity within a household (Omotesho et al., 2016; Gazuma, 2018; Ajayi and Olutumise, 2018; Roba et al., 2019) [14, 7, 4, 18]. This is given as:

$$P = \frac{1}{m}\sum_{j=1}^{m} G_j \qquad (1)$$

Where:

$$G = \frac{HFS_i - 0.75}{0.75} \qquad (2)$$

P = surplus/shortfall index; Gj is the amount of average household food security deficiency or surplus faced by household j, using the benchmark of 0.75 as the food security line and m = number of households that are food secure (for surplus index) or food insecure (for shortfall index).

3. Results and Discussion
3.1 Consumption Expenditure Patterns of Respondents
Consumption expenditure patterns have been used often in analyzing food insecurity, poverty, and income inequality. Rashid *et al*. (2024) [16] Consumption expenditure is often used instead of income for analysis because it is assumed that consumption emanates from realized income from all sources, thus representing a de facto factual description of the respondents' true income. Even in national income accounting, Economists often use either the income approach or the expenditure approach in calculating the national income because they are equal since what is spent as expenditure by an entity in the economy is income to another entity and vice versa. This explains why consumption expenditure is used in this analysis because it is equivalent to the income approach. It was for the same reason that NBS conducted its surveys on consumption expenditures. According to the World Bank (2015) [23], "Household final consumption expenditure is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses."

3.1.1 Per Capita Expenditure
The per capita expenditure, being the average total expenditures per head, measures the standard of living of the respondents, that is, on average, how much is available to them (AfDB, 2017). Table 1 shows the distribution of respondents' per capita expenditure across the four Waves: 2010, 2012, 2015, and 2018. From the Table, it is obvious

that there were shifts in the economic capabilities among the sampled households, with a gradual depletion in the lowest expenditure bracket and growth in middle and higher brackets from Waves I to IV possibly as a result of inflation and availability of increased income to spend. This transition from the lowest rung to the next higher rung is desirable because it signifies either exit from poverty or reduction in the quantum of the poverty gap and this is in tandem with SDG 10.1 objective which is, to grow the income of the bottom 40%. SDG 10 Target 10.1 "By 2030, progressively achieve and sustain income growth of the bottom 40 percent of the population at a rate higher than the national average" 10.1.1 "Growth rates of household expenditure or income per capita among the bottom 40 percent of the population and the total population" The bottom rung of this survey has over 3,800 persons which more than captures 40% (1,600) of the sample (4,000). Growth has been noticed in this bottom group. The households with expenditures less than or equal to N500,000 contained the vast majority of respondents, though there was a noticeable decrease from 99.4% in Wave I to 95.3% in Wave IV. According to the result of the category of households that spent between N500,001 and N1,500,000, a significant increase in this middle expenditure range from 0.5% in Wave I to 4.4% in Wave IV indicates a growing middle economic class or improved earnings. Lastly, very few respondents fell into the higher expenditure brackets (above N1,500,000), with a consistent or slightly increasing presence over the years. The mean expenditure rose from N139,211.7 in Wave I to N203,559.8 in Wave IV, alongside increases in standard deviation and maximum expenditure values, suggesting greater variance and possibly some economic growth or inflationary impacts. This is a welcome development and the increases are in line with SDG 10:1. As to the cause of growth in per capita expenditure, this is often driven by an increase in productivity, an increase in incentives, and government policies such as tax cuts or cash transfers. AfDB (2014) [2] reported a growth in the Nigerian economy in 2014 as follows: "Nigeria has become the largest economy in Africa and 26th largest in the world following the rebasing of its Gross Domestic Product from 1990 to 2010 constant prices." The year 2014 is the midpoint of this ten-year study, therefore, the increase in the expenditure per capita can be traceable to the growth of the economy.

Table 1: Distribution of Respondents by Per Capita Expenditure

Expenditure	Wave I		Wave II		Wave III		Wave IV	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
≤ 500,000	3976	99.4	3948	98.7	3872	96.8	3812	95.3
500,001 - 1,500,000	20	0.5	49	1.3	119	3.0	177	4.4
1,500,001 - 2,500,000	3	0.1	1	0.0	4	0.1	4	0.1
2,500,001 - 3,500,000	-	-	1	0.0	4	0.1	4	0.1
3,500,001 - 4,500,000	-	-	-	-	-	-	-	-
4,500,001 – 5,500,000	-	-	-	-	1	0.0	1	0.0
5,500,001 - 6,500,000	1	0.0	1	0.0	-	-	2	0.1
Total	4000	100.0	4000	100.0	4000	100.0	4000	100.0
Mean	139,211.7		141,456.5		198,323.9		203,559.8	
SD	129,345.8		132,110.3		153,213.3		189,453.1	
Min.	7,982.4		9213.1		13,012.5		8,015.1	
Max.	5,693,438.1		5,697,534.5		5,001,432.7		6,100,221.2	

Source: Author's Computation, 2023

3.1.2 Expenditure on Education

Oseni *et al*. (2018) [15] highlighted the importance of the study of expenditure on education in food security. They remarked that "Household education expenditures are often included in consumption-based poverty and inequality measures and are a critical input in monitoring the main education financing indicator (4.5.4) of the Sustainable Development Goals (SDGs). Furthermore, information on individual education expenditure allows for micro-econometric research on intra-household resource allocation, which can provide useful insight into policy and program designs." From the foregoing, household expenditure on education can be used in assessing poverty, food security, and intra-household inequality, though the latter is not used in this study because the data being used were household data not person's data. Expenditure on education is a self-improvement expense for a person or their wards. In line with the capability theory of poverty, improvement in educational status enables a person to escape poverty through the possibility of earning a higher income. It also safeguards against generational poverty by positioning the wards to escape the poverty trap. Education, the proxy for knowledge, is one of three components used for compiling the Human Development Index, the other two being life expectancy at birth and health. UNDP (2018) defined the Human Development Index as "Human Development Index (HDI): A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living." The role of education in reducing intra-country income inequality is that the more a person is educated, the more will their earning power, ceteris paribus, all things being equal, and hence the closer will be the income gap between them and the highest earners in the society. Education provides a proven path to being lifted above the poverty line with these in mind, we now examine how the respondents performed concerning their expenditure on education.

Table 2 shows the variation in household expenditure from 2010 to 2018 and reflects an increase in both the proportion of those spending higher amounts as well as the higher Naira amount spent. Since expenditure is a true reflection of the income that was available to a person, it is reasonable to say that the respondents had access to higher incomes which financed their purchases even if prices had increased through inflation. The distribution of respondents on their education spending across the four waves is reflected on the long Table 2. The majority of the respondents were in the lowest rung which spent ≤ N200,000 on education. It started with 92.7% in Wave I but by Wave IV this has reduced to 85.4%. This means that by 2018/19, 292 respondents had left the lowest rung and were then spending above ₦200,000 on education. The next higher category (₦200,001-₦400,000) experienced an increase in the number of respondents in that category. It started with 276 respondents representing 6.9% and grew by 171 respondents to 447 in the fourth wave in 2018, which is 11.2%. Growth in educational spending was also recorded, though minimally, in the higher categories (N400,001 - N600,000 and above). All of these portend a general awareness of the benefits of education at different income levels and across the waves. Anyanwu (2013) [3] observed that education had a significant impact in reducing poverty, and by extension, income inequality. Similarly, it is in line with Maslow's hierarchy of needs that as a person becomes more affluent, he will spend more on things like education, which are not basic needs like food.

Table 2: Distribution of Respondents by Expenditure on Education

Expenditure	Wave I		Wave II		Wave III		Wave IV	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	**Percent**
≤ 200,000	3708	92.7	3792	94.8	3672	91.8	3416	**85.4**
200,001 - 400,000	276	6.9	156	3.9	226	5.7	447	**11.2**
400,001 - 600,000	9	0.2	28	0.7	52	1.3	111	**2.7**
600,001 - 800,000	1	0.0	12	0.3	32	0.8	8	**0.2**
800,001 - 1,000,000	4	0.1	4	0.1	12	0.3	12	**0.3**
1,000,001 - 1,200,000	2	0.1	1	0.0	1	0.0	2	**0.1**
1,200,001 - 1,400,000	-	-	4	0.1	4	0.1	1	**0.0**
1,400,001 and Above	-	-	3	0.1	1	0.0	3	**0.1**
Total	4000	100.0	4000	100.0	4000	100.0	4000	**100.0**
Mean	27,602.5		39,274.1		69,569.1		153,045.87	
SD	71,067.6		112,459.3		134,112.8		187,876.9	
Min.	0.0		0.0		0.0		0.0	
Max.	1,197,202.2		2,761,179.1		2,532,912.9		3,021,573.8	

Source: Author's Computation, 2023

3.1.3 Health Expenditure

UNDP (2024) stated that "The HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone." The HDI underscores the fact that health is a key factor for measuring welfare. The UNDP stated further that "The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: A long and healthy life, being knowledgeable and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions." Therefore, an examination of

health expenditure follows to discern any patterns worthy of consideration. The expenditure on health showed that the majority of the respondents spent ₦50,000 or less on their health (Table 3). For the first three waves, this was 99% of the respondents and this trend dipped in the fourth wave to 85.9%. This is unlike education where the bar for the lowest rung was ₦200,000. In health, the cap for the highest rung was ₦200,000, which was the cap for the lowest rung of education. Although this may seem to suggest a higher preference for education more than health, the truth of the matter is that many people, especially those in rural areas, resorted to herbal remedies, faith-based healings, and

observed primary healthcare. The amount recorded as expenditure for health was usually spent on drugs and hospitalisation. This study seems to suggest that many people engaged in self-care and only sought expert advice in complicated cases. The policy should be to encourage the populace to have higher levels of self-care while enlightening them on the benefits of seeking proper medical care at the earliest time. The average spend on health grew by 3.54 folds from ₦3,890 to ₦13,765. The minimum spend was 0 while the maximum spend was ₦189,003. Health expenditure is one measure where higher expenditures on health are cut both ways. Higher expenditures could be a result of more health challenges, which is a negative; or they could be a result of better health awareness resulting in more expenditure on preventive healthcare. Low spend on health could equally suggest a masking of healthcare through herbal remedies or they could suggest good health because it is only the sick who seek the physician.

Table 3: Distribution of Respondents by Health

Expenditure	Wave I		Wave II		Wave III		Wave IV	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
≤ 50,000	3969	99.2	3976	99.4	3972	99.3	3436	85.9
50,001 - 100,000	24	0.6	19	0.5	23	0.6	364	9.1
100,001 - 150,000	6	0.2	4	0.1	4	0.1	168	4.2
150,001 - 200,000	1	0.0	1	0.0	1	0.0	32	0.8
Total	4000	100.0	4000	100.0	4000	100.0	4000	100.0
Mean	3,890.1		5,326.5		7,675.8		13,765.9	
SD	8,559.7		12,674.3		21,981.0		39,821.0	
Min.	0.0		0.0		0.0		0.0	
Max.	154,981.2		173,884.5		168,238.8		189,003.9	

Source: Author's Computation, 2023

3.1.4 Total Non-Food Expenditure
Expenditure on non-food items can help in indicating poverty and income inequality prevalence among a group. This follows Maslow hierarchy of needs. Food, being a basic need, will tend to be fulfilled first before secondary considerations will be entertained. Non-food items, which are secondary, include as its name implies, expenditure on other things than food. In the NBS (2019) [11] survey, in the national category, transport, and health were the two big items in this category. At the urban level, the two big items were education and transport. At the rural level, health and transport were dominant. Transport is featured in all the levels be they national, urban, or rural. The analysis in this study does not feature such decomposition of non-food items but it observed the trend in expenditure values over the four waves. The distribution of respondents by non-food expenditure showed significant dynamism in all the waves and across different strata of expenditure levels. The lowest strata, which is ≤ 500,000 started with 3,830 respondents representing 95.6% of the respondents (Table 4). This number kept decreasing reflecting the movement of respondents to higher levels of expenditures. In Wave II it was 93.1% then 85.5% in Wave III and 69.8% in Wave IV. The number of transitions from the lowest strata to higher expenditure levels was 1,038 respondents. This means that more than 25% of the total sampled 4,000 experienced an upward shift in their expenditure level on non-food consumption. The next higher strata, 5,001-1,500,000 benefitted from the upward movement of respondents from the lowest strata. These strata started with 160 respondents representing 4% of those sampled but it kept increasing to 6.1% in Wave II; 13.2% in Wave III and 26.9% in Wave IV. It gained 916 respondents from the lowest rung. This represented a 6.7-fold growth and is indicative of a growing middle class. It would be observed that the number of exits from the lowest strata was not absorbed fully by the next strata. This suggests that some respondents leapfrogged that second strata into the higher strata than the second one. That stratum is 1,500,001-2,500,000, a medium middle class. The strata started with only 9 respondents or 0.2%, increased to 20 or 0.5% in the second wave, then 0.9 in Wave III before breaking into 80 or 2% in Wave IV. The difference between Wave I, 9 respondents, and Wave IV, 80 respondents is 71. It showed an almost 9-fold increase, which is high. Other strata experienced increases too like the 2.5million-3.5million, upper-middle-class bracket, which grew from 1 respondent in Wave I to 40 respondents in Wave IV, a 40-fold increase. The next higher strata, the lower upper class, started with no respondents but by Wave IV there were 9 respondents in the 3,500,001-4,500,000 bracket. The highest bracket, the upper-income class, of above 6.5 million started with no respondents but ended with 3 respondents. This and the bracket below it suggest the emergence of an affluent class among the respondents. The mean non-food expenditure grew from ₦129,121 to ₦445,875 representing a 3.45-fold growth in expenditure. This shows growth in the welfare of the respondents. It must be clarified that these growths may not translate to exiting poverty which some would do, they may also mean reducing the poverty gap to the poverty line. Other analyses will reveal the true picture of what took place. The differential between the minimum in Wave I, ₦2,675.9 is wide when compared to the maximum in Wave IV, ₦8,985,943.0, a difference of ₦8,983,267.1. These disparities show why the food security status of respondents based on affordability differs significantly. It should be highlighted that the transition from the lowest rung to the middle and upper rungs has been observed in the preceding discussions on per capita expenditure, education, and health. This means that there was a consistent income/expenditure expansion or growth which could indicate transitions away from poverty or from its depth. It could also indicate a narrow reduction in income inequality.

Table 4: Distribution of Respondents by Non-Food Expenditure

Expenditure	Wave I		Wave II		Wave III		Wave IV	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
≤ 500,000	3830	95.6	3725	93.1	3423	85.5	2792	69.8
500,001 - 1,500,000	160	4.0	244	6.1	528	13.2	1076	26.9
1,500,001 - 2,500,000	9	0.2	20	0.5	36	0.9	80	2.0
2,500,001 - 3,500,000	1	0.0	8	0.2	8	0.2	40	1.0
3,500,001 - 4,500,000	-	-	2	0.1	3	0.1	9	0.2
> 6,500,000	-	-	1	0.0	2	0.1	3	0.1
Total	4000	100.0	4000	100.0	4000	100.0	4000	100.0
Mean	129,121.0		189,786.2		299,572.1		445,875.2	
SD	145,982.1		276,121.4		401,324.7		650,771.0	
Min.	2,675.9		4,561.2		8,510.7		9,349.2	
Max.	2,882,122.7		7,243,938.3		7,432,985.1		8,985,943.0	

Source: Author's Computation, 2023

3.1.5 Total Food Expenditure
Total food expenditure is a measure of both poverty and food security. Food is a basic need, a basic human right on which households spend their money as a first charge. As household income grows, expenditure on food will likely grow too but at a lesser rate than expenditure on non-basic things. The distribution in Table 5 shows the distribution pattern of consumption expenditure from ≤₦500,000 to above ₦6.5 million. As usual, the highest concentration is in the lowest rung of ≤500,000. It opened with 75.8% in Wave I, reduced slightly to 74.4% in Wave II, and increased very marginally to 75.4% before taking a big dip to 67.6% in Wave IV. Between Wave I and Wave IV, 328 respondents moved to higher food expenditures. The second strata, 500,001-1,500,000 started at 23.5% finishing at 29.7% at

Wave IV. This showed the influx of 248 new entrants from the lowest rung. It meant that 80 respondents from the lowest rung leapfrogged to higher spending levels. The next level also grew from 0.6% in Wave I to 2.1% in Wave IV. The other higher levels experienced growth as well. The mean food expenditure grew from ₦392,354.8 to ₦487,968.2, a 1.24-fold growth. It should be observed that while expenditure on food increased it only increased moderately, not astronomically as other items like non-food items increased. This is consistent with the literature (Anyanwu, 2001; Schanzenbach, 2015) [19]. The range between the minimum spend on food ₦3,213.4 and the maximum spend ₦27, of 751,236 is the biggest so far and is a clear pointer to income inequality and food insecurity at the lower end while the upper end is food secure.

Table 5: Distribution by household Food Expenditure

Expenditure	Wave I		Wave II		Wave III		Wave IV	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
≤ 500,000	3032	75.8	2976	74.4	3016	75.4	2704	67.6
500,001 - 1,500,000	940	23.5	1003	25.1	945	23.6	1188	29.7
1,500,001 - 2,500,000	24	0.6	15	0.4	20	0.5	84	2.1
2,500,001 - 3,500,000	4	0.1	4	0.1	4	0.1	12	0.3
3,500,001 – 4,500,000	-	-	-	-	8	0.2	4	0.1
4,500,001 – 5,500,000	-	-	-	-	4	0.1	4	0.1
5,500,001 - 6,500,000	-	-	1	0.0	2	0.1	3	0.1
> 6,500,000	-	-	1	0.0	1	0.0	1	0.0
Total	4000	100.0	4000	100.0	4000	100.0	4000	100.0
Mean	392,354.8		408,872.3		443,867.7		487,968.2	
SD	653,281.9		521,987.1		753,854.3		932,213.7	
Min.	3,213.4		4,359.1		5,985.0		4,129.0	
Max.	2,457,657.1		27,751,236.0		17,003,932.0		21,201,385.0	

Source: Author's Computation, 2023

3.1.6 Total Household Expenditure
Total household expenditure is the money available to a household to spend on all its needs and luxuries. As such, it is a measure of living standards because higher total expenditure means that a household has more money to spend for meeting its needs than a household with a lower amount to spend. Total Household Expenditure also contains information about monetary inequalities in the system. Table 6 shows the distribution of total household expenditure at the different strata of expenditure. The lowest strata started with 2,052 respondents, that is 51.3% which contained more than the lowest 40% of the sample population. This number decreased consistently over the next three Waves being at 43.2% in Wave II, 26.4% in Wave III, and finally 25.6% in Wave IV. At Wave IV, the

number of residents at the lowest strata had halved, 0.497 showing that 1,031 respondents had ported leaving 1,021 as the remaining respondents. The next higher income level absorbed many of the respondents who left the lowest strata. This category started with 1772 or 44.7% but kept on increasing finishing at 2,384 respondents or 59.5%. All the other strata above that equally showed expansion of their numbers. This meant that on average, households had increased incomes to spend. This period coincided with an increase in the minimum wage from ₦7,500 to ₦18,000 in 2010, the starting year of this study. This was a 140% increase in wages across the nation. This wage level held until 2019 when there was another increase in the minimum wage to ₦30,000, an increase of 67% nationally. These wage increases are reflected in the expenditures of the

respondents as has been shown. In addition, the economic growth that Nigeria witnessed followed the rebasing of the economy in 2014. Nigeria became the largest economy in Africa, overtaking South Africa; and became the fastest-growing economy in Africa and the third fastest-growing economy in the world. The increase in expenditure was also occasioned by inflation in the country. With these insights in view, policymakers can be in a position to craft people-centric policies that will target the right people with the right initiatives.

Table 6: Distribution by Total Household Expenditure

Expenditure (N)	Wave I		Wave II		Wave III		Wave IV	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	**Percent**
≤ 500,000	2052	51.3	1728	43.2	1059	26.4	1021	**25.6**
500,001 - 1,500,000	1772	44.7	2019	50.5	2552	63.8	2384	**59.5**
1,500,001 - 2,500,000	152	3.8	204	5.1	284	7.1	452	**11.3**
2,500,001 - 3,500,000	12	0.3	28	0.7	68	1.7	80	**2.0**
3,500,001 - 4,500,000	5	0.2	12	0.3	20	0.5	36	**0.9**
4,500,001 - 5,500,000	4	0.1	4	0.1	12	0.3	20	**0.5**
5,500,001 - 6,500,000	1	0.0	1	0.0	3	0.1	4	**0.1**
> 6,500,000	2	0.1	4	0.1	2	0.1	3	**0.1**
Total	4000	100.0	4000	100.0	4000	100.0	4000	**100.0**
Mean	558,568.1		682,874.9		898,321.9		923,876.1	
SD	654,321.9		743,865.7		832,435.0		901,328.2	
Min.	3,7642.9		18,022.0		35,130.8		32,095.4	
Max.	17,021,321.0		34,185,208.0		21,345.987.0		35,985,321.1	

Source: Author's Computation, 2023

3.1.7 The Consumption Expenditure Profile of the Average Respondent

Going by the preceding analyses on consumption expenditure, the consumption expenditure profile of the average respondent would be someone who experienced consistent and considerable growth in income/ expenditure across all indices of measurement. This reflected growing income and transition from the lowest class to the next higher sometimes jumping over intermediate classes. This is a representative inference as some were still stuck at the lowest rung. In particular, between Waves I and IV, he experienced a 165% growth (expansion) in total household expenditure. This lowest category saw 1,031 people transit from the lowest rung to the middle-class categories. As for the destination of the new income/expenditure, the average respondent's expenditure on education experienced the largest relative expansion, that is, a 7-fold increase in expenditure on education. This is a significant investment which suggests that the respondents were interested in breaking out of the vicious cycle of poverty and were not interested in perpetuating generational poverty. Expenditure on health was the second destination, which witnessed a 3.53-fold expansion in health spending. Following closely was Non-food expenditure which grew by 3.45 fold relatively. The last was expenditure on food which grew by only 1.24-fold. This is consistent with Maslow's theory of needs that as income increases people will reach for higher or luxurious things while basic things like food will take lesser prominence.

3.2 Changing Food Security Status of the Households

Table 7 shows the food security status of the sampled households in all four waves. The table shows the percentage of households which are food secure vis-a-vis those that are food insecure, and the quantitative indices used to measure food security. In Wave I, the proportion of food-secure households to food-insecure households was split almost in a 30 to 70 ratio. 30.4% of households were food secure while 69.6% were food insecure. This has grave implications for the Nigerian state because it meant that over two-thirds of Nigerians were not food secure, that Nigeria

was a net importer of food and this had implications for national security. A measurement of the percentage of surplus or shortfall showed that those who were food secure had an index of 1.19 signifying that the food surplus proportion above the cut-off line was 0.19. This does not portray a high enough security. On the other hand, the food shortfall for the food insecure was more pronounced than the food surplus because it had an index of 0.30, which is quite deep. If we were to net the surplus index by the shortfall index, we would be left with a net aggregate shortfall of 0.11. The import of this was that the sampled households were net food insecure, which if projected nationally would mean a national net food insecurity. This picture was masked because Nigeria had the means to import food to complement national production. FAO (2022) [5] observed that Nigerian food imports more than quadrupled in the decade 1995 to 2016. It noted that Nigeria was a net importer of food with food imports in 2016, (which was part of Wave I of this study), reaching USD 4.57 billion which resulted in a substantial trade deficit in the agri-food sector. The food security situation in the country worsened in Wave II with 26.5% as food secure while 73.5% was food insecure. The mean food security index was 1.12 for food security versus 0.83 for food insecurity. This means that the food surplus index was 0.12, barely over the food security line. The food shortfall was 0.17 which was closer to the line than in Wave I. Food was more equitably distributed in Wave II than in Wave I. This is substantiated by the net aggregate shortfall index which was - 0.05 (0.12 - 0.17 = -0.05). Although the households were still net food insecure, and by extension, Nigeria was still food insecure, the depth of the insecurity had reduced by 0.06 points. This improvement was probably due to higher production due to agricultural inputs supply; and better distributing methods. The improvement experienced in Wave II continued to Wave III where the percentage of food insecure soared, almost reaching the half mark. 40.6% of households were food secure as against 59.4% who were food insecure. The mean food security index was 1.26 for the food-secure households. This was the highest index among the four waves, and it signified a time of relative plenty when the

surplus index was over a quarter, that is it was 26%. The food insecurity index was 0.53, which was the lowest among the four waves. The shortfall index was 0.47, which showed a very deep shortfall, the highest among all the waves. When the net shortfall was computed it gave a shortfall value of -0.21 for Wave III. Wave IV had a headcount ratio of 0.26 food secure to 0.74 food insecure. The mean food security index for the food secure was 1.09 while the food insecurity index was 0.89. The food surplus index was 0.09, which was barely over the food security line. The food shortfall index was 0.11 which was the smallest value of shortfall among the four waves. The net aggregate shortfall was 0.02 which showed that it was pretty close to the food security line. This wave showed the fairest and most equitable distribution of food followed by Wave II. Notwithstanding, it should be noted that the households remained cumulatively food insecure. By inference, it would be safe to say that Nigeria was food insecure during the ten

years of study. This position is validated by the African Union (2023) [1] which observed that "Nigeria's food imports are growing at an unsustainable rate of 11% per annum, yet relying on the importation of expensive food from the global market fuels domestic inflation. In this context, Nigeria is essentially importing what it can produce domestically." Sohn (2023) [20] projected that Nigeria would be a net importer of food into 2050, and the paper wondered whether Nigeria would be able to finance its food imports in 2050 going by its population growth and its overreliance on a mono product, crude oil, for its revenue. FAO (2022) [5] identified several critical factors that require urgent attention and resolution in Nigeria's food systems. These are heavy reliance on oil revenue and food imports to feed its population; high poverty with concurrent regional inequalities; and reliance on rainfed and subsistence agriculture among others.

Table 7: Indices of Household Food Security Status

Estimate	Wave I		Wave II		Wave III		Wave IV	
	Food secure	Food insecure	Food secure	Food insecure	Food secure	Food insecure	Food secure	**Food insecure**
% of household	30.4	69.6	25.5	73.5	40.6	59.4	26.9	**74.1**
No. of household	1216	2784	1060	2940	1624	2376	1036	**2964**
Mean/food security index	1.19	0.67	1.12	0.83	1.26	0.53	1.09	**0.89**
Headcount ratio	0.30	0.70	0.26	0.74	0.41	0.59	0.27	**0.74**
Shortfall index	-	0.30	-	0.17	-	0.47	-	**0.11**
Surplus index	0.19	-	0.12	-	0.26	-	0.09	**-**

Source: Author's Computation, 2023

4. Conclusion and Recommendations

The study investigated the dynamics of household consumption expenditure and food security in Nigerian households. This was done through a longitudinal dataset spanning four survey periods: 2010, 2012, 2015, and 2018. The study concluded that there were significant variability and movements in consumption expenditures and food security measurements, which signified the dynamism of both measures. This meant that there were transient statuses on both the consumption expenditure patterns and the food security situations of the respondents. The transition in consumption expenditure patterns from lower to higher brackets over the survey waves pointed to an improving economic condition favourable to the transient poor and transient food insecure. It also possibly reflected the impacts of inflation and economic growth on household incomes and spending behaviours. The fluctuating levels of food security across the four waves, with improvements in some periods, indicated conclusively that food availability and affordability were heavily influenced by external economic and environmental factors, as well as the effectiveness of agricultural and food subsidy policies. It also led to the conclusion that Nigerian households were deeply affected by food insecurity through internal dynamics and external socioeconomic factors. There was government intervention as well which affected the food security situation, especially for households with school-going children. For example, the government rolled out the National Social Investments Programme, a poverty-alleviating and food security-enhancing plan, in 2016.

The findings concluded that the critical factors discussed above contributed to food security in Nigerian poor households. The food expenditure complex nature and its dependencies on economic and demographic factors are

demonstrated clearly. Nigeria needs to adopt a long-term approach to eradicating food insecurity, which would include boosting agricultural productivity, especially for rural dwellers, and putting in place local business enterprise enhancement strategies. The provision of socioeconomic infrastructure and public goods like power, water, and roads, have the potential to boost food security and should, therefore, be a top priority for consolidating food security. Macroeconomic growth often enhances increased consumption expenditures and food security, the government should, therefore, give attention to macroeconomic growth and long-term stability. Corruption often short-circuits the trickling down of economic growth into improved food security, therefore corruption should be tackled decisively.

The study has shown clearly the dynamics of food insecurity and shown that there were respondents who remained chronic food insecure because they did not experience any movement out of food insecurity in all four waves or spells. For such people, ad hoc or short-term palliatives would not solve their food insecurity status; the government would need to do specific targeting and long-term solutions to eradicate such lifetime or even generational food insecurity than the government is doing currently.

The following policy recommendations are proffered based on the findings of this study:

1. The government should give top priority attention to eradicating extreme food insecurity, which has for many years turned Nigeria into an unsustainable net importer of food. Food security should be considered strategic and tackled accordingly with focused short and long-term strategies.
2. Priority attention should be given to food production, storage, processing, and conservation. Nigeria should

make efficient use of its vast arable land, multiple vegetation, and multiple climates to advantage.

3. The existing social safety net programs should be strengthened to support big-size households and those with high numbers of dependents, which are more vulnerable to food insecurity than others.

4. The existing Homegrown School Feeding Programme, a component of the National Social Investments Programme, should be improved upon and used to combat undernourishment among under ten pupils in schools.

5. Comprehensive food security initiatives that stabilize food prices and increase food availability should be developed and implemented among households. The government should solve the insurgency problem which has reduced access to farms and productive enterprises. Support to rural farmers could involve subsidies for farmers, strategic food reserves to buffer against price spikes, and investments in agricultural technology, especially the use of artificial intelligence (AI) to increase productivity.

6. There should be improved agricultural loan schemes and microfinance schemes for rural agribusinesses aimed at boosting agri-processing.

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