

Food Security and Corruption in Nigeria: The Households' Welfare

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Abstract

The main objective of this study was to evaluate food security-corruption nexus and households' welfare in Nigeria, using Nigerian data. The study based its theoretical stand on the popular Sen's Poverty and Famine theory and utilized an expo-factor research design approach through an autoregressive distributed lags (ARDL) econometric techniques for its analysis. It was revealed that, with the interaction between corruption and the disaggregated food security components, food insecurity was prevalent. Nevertheless, when the tools for the control of corruption were made effective, food insecurity among households fell drastically. These conclusions clearly aligned with the opinions of Sen (1981), who noted that famines in many countries did not occur solely as a result of a gap in food production or supply but also as a result of some other socio-economic influences, hence this study concludes that Nigerian households were food insecure between 1999 and 2021 due to the debilitating influence of corruption on the country's economy and her food system. These suggests that for Nigeria to overcome the incidence of food insecurity, the focus should be on curtailing corrupt practices by empowering the various anti-graft agencies to live up to their biddings. Similarly, the government's current poor and uninspiring approach toward appropriated funds for agricultural development must change, hence to hedge against food insecurity; government expenditure on agriculture must be reviewed upward.

Keywords: *Food Security; Welfare; Corruption; Sen's Theory; Nigeria; ARDL*

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Background to the Study

Mankind has faced the dilemma of food insecurity from time immemorial, posing a long-term threat to the existence of countless households. The United Nations Food and Agriculture Organization views food security as a condition or a state in which every person (families, communities, state and the nation) have unhindered and unobstructed physical, social and economic access to enough, safe, and nutritionally-inclined food which guarantees their dietary requirements for an active, energetic and productive life. This implies that food insecurity refers to the absence or lack of access to enough; safe and nutritionally-inclined food which guarantees a household's nutritional needs for an active, healthy and productive life (FAO, 2002; Barrett, 2002). Food security is commonly understood to comprise four important components: food availability, food access, food consumption (usage), and constant and sustained assurance of access to it.

The United Nation's Food and Agricultural Organization (FAO, 2021) estimates revealed that between 828 million people globally were malnourished as at 2021, higher than it was in the preceding year (2020) when it was 702 persons. This connotes that hunger affected 126 million more people in 2021 compared to 2020, and a total of 150 million more people since 2019, before the COVID-19 pandemic. Out of this figure, one out of every five people or an estimated 278 million Africans was faced with hunger in 2021. However, more than half (425) of the people affected by hunger in 2021 live in Asia. Generally, food insecurity affects more than 2 billion people (29.3%) worldwide, with 1.03 billion living in Asia, 675 million spread across the Africa continent, 205 million persons distributed across Latin American countries and the Caribbean, while 88 million of these hungry people are in Northern America and Europe, with 5.9 million in the Oceania. Put succinctly, the vast majority of the world's hungry people are largely residents of poor countries, which as it were, accounts for 12.9 percent of the global population of the malnourished. Global food insecurity is further exacerbated by the ongoing conflicts between Russia and Ukraine, the two of the biggest global producers of staple cereals, oilseeds and fertilizer. The conflict is disrupting international supply chains and pushing up the prices of grain, fertilizer, energy as well as ready-to-use therapeutic food for children with severe malnutrition. Furthermore, extreme weathers, especially in low income countries are already adversely affecting supply chains with implications for global food security and nutrition (IFAD, UNICEF, WFP and WHO, 2021).

For Nigeria, food insecurity, as manifested by higher food spikes, has remained the norm, despite policies articulated by government and global food agencies such as the International Institute for Tropical Agriculture (IITA) and the International Fund for Agriculture Development (IFAD). These food policies and agricultural initiatives / interventions have been largely ineffective, given that food productivity in Nigeria has remained low, thereby undermining access, usage, and stability of access, leading to a drop in households' welfare (Babatunde, Omotesho and Sholotan, 2007). For Nigeria, the share of the population who suffered from moderate to severe food insecurity increased to 58.5 percent between 2019 and 2021 alone, compared to 15.1 percent food insecure households between 2017-2019. It was also asserted that, a record 193 million people faced food insecurity in 2021 alone. Meanwhile,

just 11.5 million Nigerians were undernourished or food insecure between 1999 and 2001. Accordingly, Nigeria was placed 103rd out of 116 nations with a weighted score of 37.1 out of 100 between 2013 and 2014 of hungry persons (Global Food Security Index (GFSI), 2021) and (FAO, 2021).

In this entire gloomy picture, corruption has kept an upward trajectory in the Nigerian State as it is argued that corruption exerts a major influence on a nation's food security aspirations; especially where the efforts of government in initiating policies that are critical to any sustained food security programme come in conflict with the incidence of corruption. Corruption accentuates disparities between the affluent and the poor. It exacerbates inequality and distorts government initiatives intended to aid the poor and vulnerable in society. It may divert national and international efforts to addressing famine and hunger. Luna (2002) defines corruption as "efforts to secure riches or power by illegitimate methods for private gain at the expense of the public" or "a misappropriation of public power for private benefit."

For Mauro (1995), Tanzi (1998), Mo (2001) and Dridi (2013), corruption is commonly believed to thrive in countries with weak government institutions. It deepens the existing enormous divide that further alienates the rich from the poor in many societies, especially Sub-Saharan Africa and Latin America, thus impeding government efforts at social and economic development and jeopardizing international and regional development agencies' efforts to systematically and coherently combat the rising incidence of hunger, famine and deprivation. It also has a distorting effect on market activities as it deprives many households of benefits that should flow to them, such as hunger-free living in a prosperous era. There is therefore a widespread debate that the nexus between food security and households' welfare in Nigeria is accentuated within an environment rife with corruption— this is affirmed in studies by scholars such as Doki, Andohol and Ojiya (2020). Several studies have been carried out to investigate the relationship between food security, corruption and households' welfare, with some believing that corruption has both positive and negative impact on food security. For instance, Mauro et al (1995) asserted that corruption hurts investment, particularly in the agricultural sector, by interfering with the proper allocation of resources, resulting in a loss in output. Leff (1964), on the other hand stated that corruption might amplify the negative impacts of strict and inefficient management, hence promoting growth. This is referred to as "speed money" or "greasing the wheel effect." However, scholars, such as Doki et al (2020) have also alluded to the positives associated with corruption phenomenon, which serve as a grease that oils the bureaucracy to assist speedy up all economic transactions.

Furthermore, corruptions, as highlighted by (Nugroho; Cubillos-Tovar; Bopushev; Bozsik; Feher and Lakner (2022) accentuates developing countries malnutrition epidemic, with the probable leading effects of such distortions expressed in reduced food production, access, usage and instabilities in access; which culminates in the adoption of several food coping strategies, climaxing in food rationing, hunger and malnutrition and hence calorie deficiency among many households. However, the magnitude differs among developing countries, most notably Nigeria, which justifies this study, as stemming this cankerworm will boost food

production, which will improve citizen welfare. Hence in the light of the foregoing, the most pressing economic policy option is to evolve ways to lessen the negative consequences of food insecurity on households' welfare, and to this connection, the problematic of this research is to evaluate the extent of food security with the interactive component of corruption, and the concomitant effect this interaction has on the welfare of Nigerian citizenry. There is dearth in literature on this problematic, given that, to the best of the researcher's knowledge no such work exists in this regard for Nigeria and as such this research is undertaken to fill this knowledge gap. Deriving from the foregoing, this study's main objective is to assess food security and households' welfare in Nigeria, while addressing the following specific objectives: (i) to examine the extent to which food security, within a corruption-rife environment had significantly affected households' welfare in Nigeria; and (ii) to access the extent to which food security, operational in a corruption-free society had significantly imparted households' welfare in Nigeria.

Review of Related Literature

Sen's Theory of Poverty and Famine: An Essay on Entitlement and Deprivation

Sen's Poverty and Famine theory as propounded by Sen (1981) tied its arguments to the fact that hunger and famine for a very long time have been largely rooted in postulations made by Thomas Malthus' (1798) food availability approach. Malthus' population-food theory remained until the early 1980s, when attention was shifted from national food availability to people's access to food, as argued by Sen (1981) in a dissertation on "entitlement and deprivation". The emphasis on food security in Sen's Entitlement Discourse was an insistence on each individual's entitlements to commodity bundles, including food, by viewing famine as a result of households' failure to be entitled to the bundle(s) that assures them sufficient food to improve their welfare, but not just whether food was available. Sen's Poverty and Famine Hypothesis - An Essay on Entitlement and Deprivation, which examined the socio-economic factors that influences food insecurity among nations *is significant and best fitted for this study given its robustness in adequately assessing the food security situation in third world countries. Owing to the logicity and vigorous nature of its assumptions, the theory is thus viewed as the best for this study, given that it provides answers to the discourse on food security and households' welfare in developing countries, particularly Nigeria; hence it is adopted for this study.*

Empirical Review

Nugroho, et al (2022), in their study drew a link between the impact of corruption control on the number of undernourished people in developing countries, wherein they employed secondary data from 57 developing countries of Africa, Asia and Latin America and the Caribbean between 2002 and 2018. Utilizing a one-step and two-step generalized method of moments (sys-GMM) models, the study revealed that corruption precipitated food insecurity, and thus suggested that if there is effective and efficient control of corruption within the study areas, food insecurity would be reduced leading to reduction in the number of malnourished households.

In a similar vein, Rabbi, Olah, Popp, Mate and Kovacs (2021) in their study on food security and the COVID-19 crisis from a consumer buying behaviour perspective utilized a point-

analysis technique and concluded that the pandemic negatively impacted households income as well as triggered higher food prices, thus accentuating unavoidable food insecurity in Bangladesh. The study recommended for the strengthening of the food system to stabilize food security. Again, Fraval, Yameogo, Ayantunde, Hammond, de Boer, Oosting and van Wijk. (2020) employed a descriptive statistics approach to examine food security in rural Burkina-Faso: the importance of consumption of own-farm sourced food versus purchased food and found that households were most differentiated by their income-earning capacities which dictated their food consumption patterns. It suggested for policies aimed at strengthening off-farm income and enhancing the economy for employment opportunities for households for enhanced food security.

Additionally, Anugwa and Agwu (2019), utilizing descriptive statistics, conducted a study to identify the perceived reasons for household food insecurity in six rural districts of Kano state; with 120 sampled respondents selected through a multistage sampling technique. It was discovered that, a greater number of households remained food insecure despite the fact that they were engaged in food and cash crop production including livestock rearing. Consequently, policymakers in the state faced an urgent need to enact pro-poor agricultural policies that would lower farmers' vulnerability to food insecurity. Again, Ogunniyi, Omotoso, Salman, Omotayo, Olagunju and Aremu, (2021) examined the factors affecting household maize production in Nigeria, using a cross-sectional survey and found that the value of output sold, education, credit access, and participation in government safety nets programs all had a significant effect on food security among maize farmers in the study area. Consequently, it was advised that efforts be stepped up to increase land productivity through improved production practices.

Likewise, Godson-Ibeji, Ogueri and Chikaire (2016), utilizing a qualitative survey through descriptive statistics, took a cursory look at corrupt practices in agricultural sector and its attendant effects on food production and found that corrupt practices exerted significant negative impact on overall agricultural production, thus, the study concluded among others that to fight and eliminate corruption in the agricultural sector and achieve the objectives and goals for the implementations of the Nigerian Agricultural Transformation Agenda (ATA) as well as make agriculture demand-driven in Nigeria, all those who perpetuate the nefarious acts of corruption in the sector should be brought to book, reprimanded in accordance to the extant laws of the land, and if need be, they should be made to face the penalties, so as to serve as deterrent to other would-be treasury thieves.

Finally, Huppe, Shaw, Dion and Voora of the International Institute for Sustainable Development (IISD) undertook a literature review and utilized semi-structured interviews to examine Morocco's food security strategy and trade policy in order to ascertain the socioeconomic consequences of lowering import taxes on Canadian diets in 2013. The study concluded that meeting domestic demand for staple foods in the short to medium term would entail lowering import tariffs and other import restrictions. It also emphasized the importance of meeting domestic demand for basic necessities through the reduction of import

restrictions, while also taking into account the need to avoid unintended negative consequences of trade policy changes. Judging from the foregoing reviews, the gaps identified, either in terms of methodology, theory or empirical is covered by the ongoing research which is a quarterly data time series examination of the entire food security pairs of food availability, accessibility, utilization and sustainability of access vis-à-vis its effects on the attainment of households' welfare in Nigeria, within an environment-ridden with corruption. This is broadly expected to aid robust policy formulation.

Study Methodology

This study, which is secondary-data based is a quarterly time series analysis between 1999 to 2021. Data for the study emanated from the publications of World Bank Development Indicators (WBDI), National Bureau for Statistics (NBS) and World Governance Indicators (WGI) respectively. The study utilized the Auto-Regressive Distributed Lag (ARDL) technique for its analysis, given that it is secondary database analysis with an finite sample size. Pesaran, Shin and Smith (2001) further alluded to the gains of this technique as it utilizes mixed order of integration but not of I(2) and beyond.

Model Estimation

Conceptual Model

To aptly and clearly capture the effect of food security on household's welfare in Nigeria, two conceptual models are designed in tandem with the two objectives of the study. This is to clearly depict the relationship and interaction between the dependent variable (households' welfare) and the independent variables. The models are intended to demonstrate how food security within a corrupt environment vis-à-vis food security in corruption-free society affects the welfare of a typical Nigerian household.

Model 1: Food Security And Households' Welfare In Nigeria Within A Corrupt System

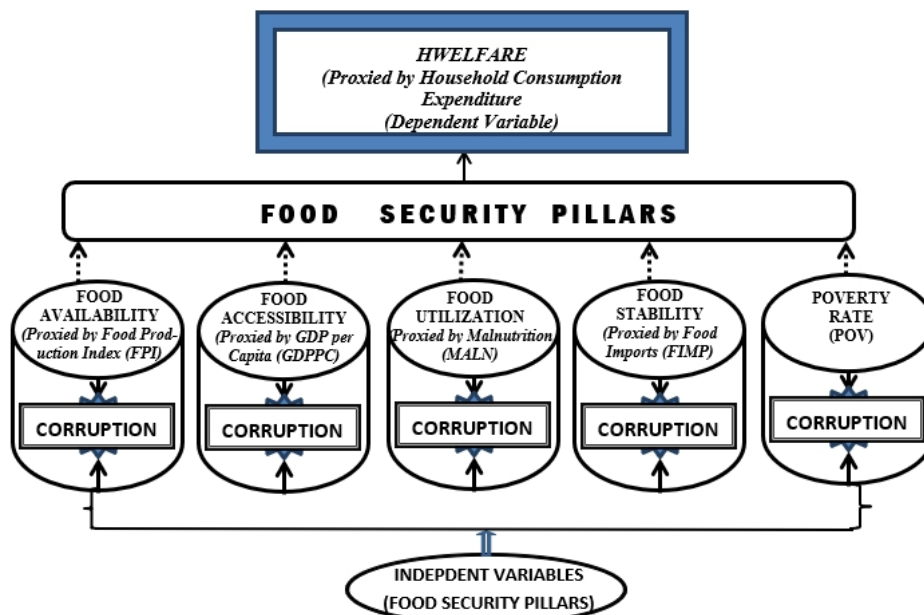


Figure 1: Food security and households' welfare in Nigeria within a corrupt system

The nexus between food security, corruption and households' welfare in Nigeria is modelled using households' welfare as the dependent variable, which is proxied by household final consumption expenditure in Nigeria. The use of household consumption spending as a proxy for household welfare is predicated on the theoretical maxim that consumption is income-dependent. Furthermore, only the portion of income spent on consumption ensures welfare. Thus, the amount of income spent on utility maximization by a consumer is what constitutes welfare. It encompasses all purchases made by resident households for daily necessities such as food, clothing, electricity, and transportation. This assumption is supported by the well-known Keynesian consumption function (Keynes, 1939).

On the other hand, the study adopted proxies for each of the food security pillar of availability, accessibility, utilization, and stability of access vis-a-vis their impact on the welfare of Nigerian households. Given the conceptual model, it is assumed that the parameter estimates for each variable will be skewed in favour of ensuring welfare gains for an average Nigerian household. This, however, is entirely contingent on the ceteris paribus assumption that all conditions surrounding the food security equation would optimally contribute to household welfare enhancement. However, in the real world, conditions have never been any perfect; thus, the researcher anticipates that, given the current circumstances in Nigeria and also taking into account the effect of poverty and corruption, the majority of variables' behaviors might not conform to a priori expectations; thus, welfare losses are not unexpected in the Nigerian food security discourse.

Theoretical Framework / Model Specification

This research model is based on Sen's (1981) theory of Poverty and Famine that gives credence to food crisis and welfare losses by households in developing countries. Two theoretical models were specified for this study to provide answers to the research objectives outlined in the first section of the study. The theoretical models are as represented below:

Model 1(a): Food security and households' welfare in Nigeria in a corrupt system:

$$HW = f(FS) \quad \dots \quad (Eqn \ 1)$$

But

$$FS = f(FAV, FAC, FUT, FST) \quad \dots \quad (Eqn \ 2)$$

Substituting eqtn 1 into eqn 2, we have

$$HW = f(FAV, FAC, FUT, FST) \quad \dots \quad (Eqn \ 3)$$

Therefore, deducing from Sen (1981) theory of Poverty and Famine, which stipulates that the causes of food crisis and famine among households in many developing nations around the world is not strictly a result of food supply–demand gap but as a result of several other socio-economic factors, thus this study adopts the corruption index, which is one of the several socio-economic factors alluded to by Sen (1981). This is given the preponderance of corrupt activities in the Nigeria as justified in studies by Andohol, Doki and Ojiya (2020).

Therefore,

$$FS = f(Corr) \quad \dots \quad (Eqn \ 4)$$

Adding eqn 3 and 4, we have

$$HW = f(FAV, FAC, FUT, FST, Corr) \quad \dots \quad (Eqn \ 5)$$

The explicit form of eqn 5 becomes

$$HW = \alpha_0 + \beta_1 FAV + \beta_2 FAC + \beta_3 FUT + \beta_4 FST + \beta_5 Corr + \mu_t \quad \dots \dots (Eqn \ 6)$$

However, given Sen's allusion of socio-economic factors impeding food security, and given that poverty is one of the greatest determinant of households' food security, it is further included in this study as a control variable, hence eqn 6 is reformulated with 'poverty' included as follows:

$$HW = \alpha_0 + \beta_1 FAV * Corr + \beta_2 FAC * Corr + \beta_3 FUT * Corr + \beta_4 FST * Corr + \beta_5 POV * Corr + \mu_t \quad \dots (Eqn \ 7)$$

Where;

- HW = Household Welfare, proxied by households final consumption expenditure Sen's (1981) and Keynes (1936) works confirms the adoption of households expenditure as a proxy for welfare. An individual welfare is a function of how much portion of his money income used to procure the goods and services that guarantees him satisfaction.
 - FAV = Food availability, with food production index (FPI) used as a proxy.
 - FAC = Food accessibility, with GDP per capita (GDP-PC) used as a proxy.
 - FUT = Food utilization, with prevalence of malnutrition (MALN) used as a proxy
 - FST = Food stability, with food imports (FIMP) used as a proxy
 - POV = Poverty rate included here as a control variable
 - Corr = Corruption, with the index for control of corruption (Corr) used as a proxy
 - μ_t = Stochastic error term / time trend
- While $\alpha_0, \beta_1, \beta_2, \beta_3, \beta_4,$ are parameters estimates respectively.

Substituting the proxies into eqn 7, we have,

$$HW = \alpha_0 + \beta_1 FPI * Corr + \beta_2 GDP - PC * Corr + \beta_3 MALN * Corr + \beta_4 FIMP * Corr + \beta_5 POV * Corr + \mu_t \quad (Eqn \ 8)$$

Given that the unit root results have portrayed mix-order of integration, the research utilizes the Autoregressive Distributed Lags (ARDL) model in its analysis of objective one of the studies. To this extent, the re-specified version of eqn 8 will become

$$\Delta HW = \alpha_0 + \beta_1 FPI_{t-1} * CORR + \beta_2 GDP - PC_{t-1} * CORR + \beta_3 MALN_{t-1} * CORR + \beta_4 FIMP_{t-1} * CORR + \sum_{j=1}^p \pi_1 \Delta FPI_{t-j} * CORR + \sum_{j=1}^p \phi_1 \Delta GDP - PC_{t-1} * CORR + \sum_{j=1}^p \theta_1 \Delta MALN_{t-1} * CORR$$

$$+ \sum_{j=1}^p \delta_1 \Delta FIMP_{t-1} * CORR \quad \sum_{j=1}^p \delta_1 \Delta POV_{t-1} * CORR + \mu_t$$

A general error-correction representation of the equations above is formulated as follows:

$$\Delta HW = \alpha_0 + \sum_{j=1}^p \pi_1 \Delta FPI_{t-j} * CORR + \sum_{j=1}^p \pi_1 \Delta GDP - PC_{t-j} * CORR + \sum_{j=1}^p \pi_1 \Delta MALN_{t-j} * CORR \\ + \sum_{j=1}^p \pi_1 \Delta FIMP_{t-j} * CORR + \sum_{j=1}^p \pi_1 \Delta POV_{t-j} * CORR + \delta_i ECM_{t-j} + \mu_t \quad (Eqn \dots 9)$$

***A priori* expectation:**

On *a priori* basis, it is expected that,

$$\beta_1 < 0, \beta_2 < 0, \beta_3 < 0, \beta_4 < 0,$$

This expectation is predicated on the understanding that the incidence of corrupt tendencies in the Nigerian economy has the potential to negatively impact households' food security, leading to welfare losses.

For model 2, the corruption variable is dropped, consequently, equation (9) without interacting with 'corruption' represents model 2.

A priori expectation

On *a priori* basis, it is expected, all things being equal, that the explanatory variables in model two would reveal the following:

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0,$$

Similarly, the above expectation is predicated on the belief that in an environment devoid of corrupt practices, all dimensions of food security viz: food availability, food accessibility, food usage and access stability would exhibit positive trajectory, hence households' welfare would be guaranteed.

Results and Discussion

Augmented Dickey-Fuller (ADF) and Philips-Perron Unit Roots Tests

This study utilized the Augmented Dickey Fuller and Philips-Perron unit root tests to examine the stationarity of the model variables. Enders (1995) indicated that a prudent choice would be to employ both types of unit root testing — the Augmented Dickey–Fuller (ADF) (1981) and the Phillips–Perron (PP) (1988) tests and if they are mutually reinforcing, we can have faith in the findings. Thus, the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests are used in this study. The following table summarizes the results of the ADF/ PP unit root testing.

Table 1: Augmented Dickey Fuller and Phillips-Perron Unit Root Test:

Variable		Level t-statistic value	1 st Difference t-statistic value	5% critical value	Order of Integration
HW	ADF	****	-4.557921	-2.893956	I(1)
	P-P	****	-4.572839	-2.893956	I(1)
FPI	ADF	****	-4.083222	-2.897223	I(1)
	P-P	****	-4.306370	-2.893956	I(1)
GDPPC	ADF	****	-4.358357	-2.893856	I(1)
	P-P	****	-4.303926	-2.893956	I(1)
MALN	ADF	****	-4.644023	-2.893956	I(1)
	P-P	****	-4.617795	-2.893956	I(1)
FIMP	ADF	-3.554862	****	-2.893956	I(0)
	P-P	-4.074697	****	-2.893589	I(0)
POV	ADF	****	-3.535334	-2.897223	I(1)
	P-P	****	-5.953477	-2.893956	I(1)

Source: Extracts from E-views 10

As shown in Table 1, the unit root test confirms that the variables in the model are a mixture of order zero I(0) and order I(1). It is thus concluded that the variables examined above have met the stationarity condition for empirical analysis.

Cointegration Testing Using ARDL Bounds

The ARDL Bounds Testing for cointegration is used to determine the longrun relationship between food security and household welfare in Nigeria. The results are as summarized in Table 2

Table 2: ARDL Bounds Testing for Food Security and Households' Welfare in Nigeria

Test Statistic	Value	K
F-Statistic	3.806186	5
Critical Value Bounds		
<i>Significance</i>	<i>I(0) Lower Bounds</i>	<i>I(1) Upper Bounds</i>
1%	3.41	4.68
5%	2.62**	3.79
10%	2.45	3.52

Note: ** signifies rejection of the null hypothesis at 5 per cent level of significance

Source: Author's Extract from E-views 10

The Wald Test F-statistics computed using the ARDL Bounds Testing yielded a value of 3.81, which is greater than the upper and lower bounds of the 95 percent critical value interval (2.62

– 3.79). This gives room for the rejection of the null hypothesis that there is no long-run link between the variables, hence it is concluded that there is evidence of a unique long-run cointegrating relationship between food security and household welfare in Nigeria from 1999 to 2021.

The Longrun and Shortrun ARDL Estimates:

After satisfying the fundamental pre-testing requirements for regression analysis, the study proceeds to estimate the long-run relationship and associated short-run dynamics, using autoregressive distributed lags (ARDL) technique.

Regression Results for Model (1) and (2)

Objective one: To interrogate the extent to which food security, within a corruption-rife environment had significantly affected households' welfare in Nigeria;

Table 3: Model (1): Food Security and Households' Welfare in a Corrupt Society

Dependent Variable: HW				
Variable	Coefficient	Std Error	t-statistic	P-value
A: Longrun Estimates				
FPI*Corr	-0.180089	0.343842	-0.523755	0.6022
GDPPC*Corr	0.577788	0.195634	2.953415	0.0044
Pov*Corr	0.010957	0.003129	3.501678	0.0000
Constant	-12.864137	3.157032	-4.074756	0.0001
B: Shortrun Estimates				
D(FPI*Corr)	-3.700919	0.689755	-5.365555	0.0000
D(GDPPC*Corr)	-2.011956	0.452425	-4.447044	0.0000
D(FIMP*Corr)	0.601089	0.093599	6.421978	0.0000
D(Pov*Corr)	0.003967	0.001805	2.197987	0.0315
ECM(-1)	-0.334476	0.073170	-4.571205	0.0000

Source: Author's computation from E-views 10

Objective Two: To interrogate the extent to which food security operational within a corrupt-free society affected households' welfare in Nigeria;

Table 4: Model (2): Food Security and Households' Welfare in Corrupt-free Society

Dependent Variable: HW				
Variable	Coefficient	Std Error	t-statistic	P-value
A: Longrun Estimates				
GDPPC	1.217871	0.080937	15.047157	0.0000
MALN	0.032331	0.014845	2.177942	0.0330
Constant	17.330762	1.590213	10.898390	0.0000
B: Short-Run Estimates				
D(FPI)	1.462519	0.616597	2.371922	0.0208
D(GDPPC)	0.787075	0.166523	4.726518	0.0000
D(MALN)	0.055300	0.015653	3.532759	0.0008
D(FIMP)	-0.078022	0.034309	-2.274082	0.0264
ECM(-1)	-0.165144	0.035938	-4.595274	0.0000

Source: Author's computation from E-views 10

Error Correction Mechanism for Models (1) and (2)

The slope coefficient of the error correction term (-0.334476) and (-0.165144) revealed that in a corruption-rife environment, and given the effectiveness of government policies in place, the error correction term will take approximately 33.4 percent every year for adjustment to attain equilibrium in the system. While for food security under a corrupt-free society, it was revealed that, given innovation in policy, the error correction term will take about 16.5 percent annually for convergence to equilibrium path. Additionally, the adjusted R-squared of 73 percent and statistically significant F-statistics at the 1% level indicate that the model is well fitted and explained. This means that the food security-corruption nexus and household welfare model is adequately explained by the predictors or independent variables.

Major findings from models 1 and 2 and their implications

By and large, some salient observations and differences between models (1) and (2) is worth pointing out. One of such striking difference is the fact that, for a country-prone to corruption, such as Nigeria, food insecurity loomed larger as revealed by the coefficients of food production index which was negative both in Panels A&B of model one. This implied a situation of general or abysmal food output– that is, a case of apparent and manifest food deficit was the norm during the referenced period in Nigeria as the trajectory of corruption thrived or increased without any appreciable level of control in place. Additionally, under a corruption-prone Nigeria, rising poverty incidence played a debilitating role on the attainment of households' food security as it weakened their engagement in profitable and sustainable food production. Thus, households' income (consumer purchasing power) remained very low, leading to a corresponding decline in households' ability to access their required food needs for enhanced welfare. These findings are buttressed by views expressed by Nugroho, et al (2022) who found in their studies that corruption precipitated food insecurity in many developing countries. It is also bolstered by Godson-Ibeji, et al (2016)'s findings that corrupt practices exerts significant negative impact on a country's overall agricultural production.

On the contrary, for a corrupt-free system, there appeared a marked difference in the regression output, given that the index of food production (FPI) appeared positively related to households' welfare in model two, which was devoid of the type of corruption that was evident in model one. This is indicative of the fact that average food production in a corrupt-free Nigeria was more impressive than it was in an environment laden with corrupt practices, lacking in control or checks. Similarly, it was shown in Table 3, model two, Panels A & B that, under a corruption-free Nigeria, households' income, that is, per capita income, which is proxy for food accessibility revealed a statistically significant positive relationship with the dependent variable and hence had a considerable impact on households' food security during the quarters examined. The positive relationship showed that each additional dollar rises in the income of households exerted a proportionate increase in their ability to access food, leading to improved welfare gains. The preceding conclusion is supported by Fraval, et al (2020)'s assertion that households were most differentiated by their income-earning capacities which dictated their food consumption patterns.

However, it was revealed during the period that, households experienced increased malnourishment as evidenced by the positive link between the coefficient for malnutrition and household's welfare. This finding is supported by views expressed by Anugwa, et al (2019), who found that, despite the fact that a greater number of households were engaged in food, cash crop production and livestock rearing, they remained food insecure. It also corroborates Fawole et al. (2015)'s assertion that the prevalence of malnutrition, food inadequacy, and the number of undernourished persons in Nigeria were increasing due to inadequate calorie consumption. Be that as it may, it is argued that malnourishment among households during the study period could have occurred due to inadequate or lack of food imports to augment local food production.

This is clearly revealed Table 3 (model two), wherein the coefficient value of food imports appeared inversely related to the dependent variable, implying that, every one-unit decline in food imports, grossly impacted aggregate food stock available for households' access, thereby occasioning welfare losses. This is, however, arguable from the point of view of government policy on closure of borders particularly by the administration of President Muhammadu Buhari, a policy which has in no small measure hampered the importation of food items that were dearly required to augment local production. The foregoing is equally bolstered by the findings of Huppe et al (2013), that achieving domestic demand for staple foods in the short to medium term will require lowering import tariffs and other import restrictions to give room for additional food stock from abroad to augment the locally produced food which, often than not, remained abysmally inadequate and insufficient to cater for local needs.

Conclusion and Policy Recommendations

The main objective of this study was to undertake an empirical investigation of the effect of food security-corruption nexus and households' welfare in Nigeria. The study based its theoretical stand on the popular Sen's Poverty and Famine theory and utilized econometric techniques and found that with the interaction between corruption and the disaggregated food security components, food insecurity was prevalent. Nevertheless, when the tools for the control of corruption were made effective, households' welfare improved in some measure.

These conclusions clearly aligns with the opinions of Sen (1981), who noted that famines in many countries did not occur solely as a result of a gap in food production or supply but also as a result of some other socio-economic influences, hence this study concluded that Nigerian households were food insecure between 1999 and 2021, especially when judged from the perspective of a corrupt system. The findings of this study are therefore consistent with Sen's postulations, hence in the light of the foregoing, a pressing economic policy concern, moving forward is to identify ways to mitigate the negative effects of food insecurity on household welfare in Nigeria; thus, relying on the study's theoretical and empirical findings, the following recommendations are made for policy implementation.

- (i) The incidence of rising and unmitigated corruption must be taken seriously in Nigeria as the connections between corruption and food insecurity arise when the risk of corruption is high and public institutions are weak and non-transparent in curbing same. The supposition of this research is that institutional failure and weak governance culture may result in increased corruption, which can strongly influence food security and enforce an unstable food supply situation. To this end, the various anti-corruption agencies such as the EFCC, ICPC must live up to their biddings for a saner society;
- (ii) Discipline precedes deterrent, thus, corrupt public officials, contractors, and bureaucrats who divert and misappropriate monies designated for growth in the agricultural sector must be penalized to serve as deterrent to would-be treasury looters. To do this, the various financial crime agencies should be strengthened to adequately punish all deviants to discourage continuous indulgence;
- (iii) For enhanced food production, the Nigerian government should in deference to global benchmarks improve on its budgetary allocation to the agricultural sector for improved performance.
- (vii) Creating formal employment opportunities and income-generating activities for all qualified Nigerians holds the potential for empowering households to have adequate access to nutritious food, thus making them food secured.
- (viii) To address the current challenge of rising poverty, which has harmed households' expectations for food security, the government is advised to develop more effective poverty reduction policies that would mitigate the effect of poverty on Nigerian households.

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