Feed the Future Innovation Lab for Food Security Policy

Policy Research Brief 99 September 2019

Nigeria Agricultural Policy Project

Transforming Agriculture to Improve Food and Nutrition Security in Nigeria

Olivier Ecker and Adam Kennedy

Introduction

The current agricultural strategy of the Federal Government of Nigeria—the Agricultural Promotion Policy 2016-2020—carries forward the revitalization of the agricultural sector as outlined in the preceding strategy—the Agricultural Transformation Agenda 2011-2016. The Agricultural Promotion Policy aims to increase agricultural production to meet the food needs of the country's rapidly growing population and transform agriculture from subsistence to commercial and export-oriented production. The complementary Agricultural Sector Food Security and Nutrition Strategy 2016-2025 declares improved food security and nutrition as main goals of the intended agricultural transformation and identifies priority areas that should guide the activities of the Federal Ministry of Agriculture and Rural Development (FMARD) and aligned stakeholders to achieve these objectives. Both strategy documents emphasize the importance of policy-relevant and rigorous agricultural and nutrition research to inform policy priority setting and support decision-making processes. This policy note summarizes findings from a recent study by International Food Policy Research Institute (IFPRI) researchers that seeks to inform Nigerian policymakers and donors about the effects of agricultural transformation on food and nutrition security of farm households in Nigeria (Ecker et al 2018).

Urgent Action is Needed to Improve Food and Nutrition Security

Despite its vast agricultural potential, Nigeria imports large quantities of food for domestic consumption. Many Nigerians, including a large proportion of the farming population, experience food shortages, lack access to a diversified diet, and suffer from undernutrition. An estimated 34 percent of Nigerian children aged less than five years are stunted, and, among farm households, the rate is 38 percent. The Global Hunger Index ranks Nigeria 103rd out of 119 countries and describes the severity of the problem in Nigeria as 'serious'. Disruption of household food and nutrition security due to food price shocks are common. Households typically respond to food price spikes by reducing their food consumption, particularly of relatively expensive foods rich in micronutrients and high-quality protein such as animal-source foods, vegetables, and fruits. Yet even transitory food shortages and poor dietary quality can have irreversible nutritional consequences, especially for children.

Key Policy Recommendations

- Published child undernutrition rates for Nigeria, particularly at subnational levels, should be interpreted cautiously because of the poor quality of the underlying anthropometric data that are currently available.
- Priority should be given to the collection of high-quality data, necessary for effective policy and program design and implementation.
- It is fundamental that, in future surveys, measurement and standardization protocols for anthropometry and other nutrition and dietary variables are followed strictly, and survey design and implementation comply with international standards.
- The decline in real income that farm households experienced during Nigeria's recent economic recession was associated with reduced household dietary diversity highlighting the importance of household income growth, as well as the important role of social protection programs to mitigate the impact of income shocks on food and nutrition security.

FEED THE FUTURE The U.S. Government's Global Hunger & Food Security Initiative
USAID FROM THE AMERICAN PEOPLE
MICHIGAN STATE UNIVERSITY
INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE IFPRI
FMARD FEDERAL MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

The severity of Nigeria's undernutrition problem calls for urgent and decisive action by the federal and state governments and their development partner organizations. Nutrition-specific interventions, such as programs for micronutrient supplementation, food fortification, and treatment of acute child undernutrition, can make an important—though limited—contribution to reduce undernutrition substantially and sustainably. Effective approaches that address the underlying causes of undernutrition, including household food insecurity are also urgently needed. Nutrition-sensitive agricultural policies and programs are particularly promising for reducing undernutrition over the long-run. This is because many of Nigeria's food-insecure population are farmers that are net food consumers for most times of the year and rely on local markets for most of their food.

Poor Nutrition Data Quality Undermines Effective Policy and Program Implementation and Research

Reliable nutrition indicators are crucial for designing, targeting, implementing, and upscaling effective nutrition-related policies and programs. The most common metrics to assess the severity and prevalence of undernutrition in a population are child anthropometric indicators, especially height-for-age z-scores (HAZ) for children age less than five years and derived child stunting rates. These anthropometric indicators are standard indicators in the Nigerian Demographic and Health Survey (DHS) and are increasingly used in other nationally and regionally representative household surveys.

The most recent Nigerian DHS was conducted in 2013. A General Household Survey with a household panel component (GHS-Panel) also collected child anthropometry measurements, the latest round of which was conducted in 2016. The analysis of these datasets suggests that child anthropometric indicators from both surveys suffer from serious measurement errors. Even after dropping data with biologically implausible values from the samples, the standard deviations for HAZ for children are still very high and even exceed a value of 2 (Table 1). Validation studies show that such large HAZ standard deviations likely indicate serious data quality issues (most plausibly due to poor survey implementation) and can lead to significant misrepresentation of the prevalence of child stunting.[1] Standard deviations tend to be larger for the regions in the North, where the estimated child stunting rates in both surveys are also considerably higher, than the South (Table 1). The higher concentration of child stunting in the North is consistent, however, with regional patterns of other development indicators, including, most notably, poverty.

While the differences in the estimated national child stunting and severe child stunting rates between the DHS 2013 and GHS-Panel 2016 are within a very reasonable range and indicate a small reduction in the prevalence of chronic child undernutrition nationwide, there are considerable discrepancies at the regional level that cannot be explained by changes in children's nutritional and health conditions of the implied magnitude in a period of only three years (Table 1). The differences in the estimated child stunting and severe child stunting rates between the two datasets are largest for the North-West and South-East regions. Notably, these are not the regions most affected by civil conflict, hampering survey data collection. At the state level, the largest differences in the child stunting rates occur for the states belonging to the North-West region, with Kebbi, Jigawa, and Kaduna states as well as Plateau state in the North Central region showing stunting rate differences of more than 20 percentage points (Figure 1).[2] On the other end, the differences in the child stunting rates are less than 2 percentage points for Cross River and Rivers states in the South-South region, Imo state in the South-East region, Lagos state in the South-West region, and Taraba and Yobe states in the North-East region. Kebbi, Kaduna, and Cross Rivers are focus states of USAID's Feed-the-Future (FtF) initiative.

[1] This finding equally holds for child weight-for-height z-scores (WHZ) and derived child wasting rates.

[2] The GHS-Panel is not designed to yield representative estimates at the state level. Nevertheless, it is assumed that estimates based on a large number of observations yield good approximations.

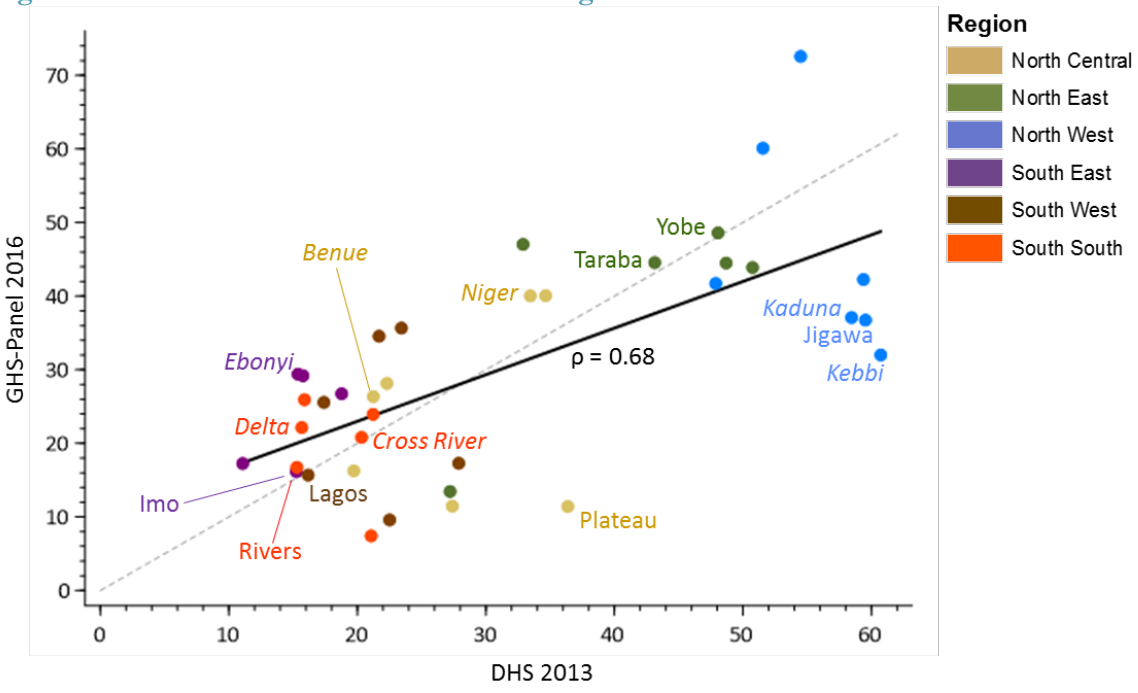
Table 1: Comparison of child HAZ and child stunting rates

		Child height-for-age z-scores (HAZ)				Child stunting rate (%)		Severe child stunting rate (%)		Observations	
		DHS 2013		*GHS-Panel 2016*		*DHS 2013*	*GHS-Panel 2016*	*DHS 2013*	*GHS-Panel 2016*	*DHS 2013*	*GHS-Panel 2016*
		Mean	SD	Mean	SD						
Total		-1.37	2.03	-1.20	2.10	36.8	34.4	21.0	19.8	24,221	2,802
Regions	**North-Central**	-1.05	1.88	-0.63	2.22	28.8	24.2	13.9	11.5	3,771	378
	North-East	-1.47	2.09	-1.54	2.15	42.2	41.3	23.7	24.3	4,835	579
	North-West	-2.17	2.04	-1.65	2.24	54.9	45.8	36.0	29.9	7,074	979
	South-East	-0.48	1.64	-0.74	1.79	15.3	23.4	5.4	11.2	2,238	291
	South-South	-0.50	1.87	-0.55	1.76	17.8	20.7	8.2	7.9	3,000	295
	South-West	-0.79	1.66	-0.82	1.61	21.9	21.5	7.9	8.6	3,303	280

Source: Authors' estimation, based on DHS 2013 and GHS-Panel 2016 data.

These findings advise caution when interpreting published child undernutrition rates for Nigeria, particularly at subnational levels, because of the poor quality of the underlying anthropometric data. The apparent large measurement errors in the anthropometrics of the DHS and GHS-Panel datasets also compromise the results of individual and household-level analyses. The use of the child anthropometric data from the GHS-Panel is further limited by the relatively small sample size. Furthermore, the DHS dataset is not useful for socioeconomic analyses of food and nutrition security because it lacks key economic variables, including on household income, food expenditures, food prices, and agricultural production.

Figure 1: Association of state-level child stunting rates



Source: Authors' estimation, based on DHS 2013 and GHS-Panel 2016 data.
Note: States in italics are FtF focus states. ϱ is the cross-state correlation coefficient.

Agricultural Production Diversity (Still) Matters for Food and Nutrition Security of Farm Households

The food and nutrition security policy strategies of the Nigerian federal government aim at leveraging agricultural transformation for improved food security and nutrition especially among Nigeria's farming population (Box 1). Against this backdrop, econometric analysis was undertaken to estimate the effects of farm production specialization/diversification and food price changes on food and nutrition security of farm households.[3] The analysis uses data from the GHS-Panel (which tracks farm households' agricultural production and food consumption over time) and specifically from the post-planting and post-harvest rounds conducted in 2010-11 and 2015-16.

Because of the lack of reliable nutrition data described above, the analysis focuses on household dietary diversity as proxy of food and nutrition security. Dietary diversity is a strong predictor of diet quality for macro and micronutrient content. It is usually measured as the number of different food items or food groups consumed over a given reference period. Both a food item-count indicator, often referred to as household food variety score (HFVS), and a food group-count indicator, often referred to as household dietary diversity score (HDDS), are used in the analysis. The analysis also stops at household dietary diversity because the links from improved household diets to individual nutrition outcomes are complex and often not direct, especially for physical growth of children and reduction in child stunting.

Farm production diversity is derived from the agricultural module of the GHS-Panel and is measured using two indicator sets. The first set includes the number of crops and the number of crop groups that farm households cultivated during the main agricultural season matching the food (group) categories of the HFVS and HDDS. The second set includes the respective Simpson diversity indices that account for the evenness of land allocation to different crops and crop groups in addition to the richness of crop cultivation. Other time-varying household explanatory variables are total household expenditure per capita (as proxy for real income) and several farm household characteristics such as farm size, livestock ownership, non-farm employment, and standard household demographics. Food price data are taken from a market price database of the Nigeria National Bureau of Statistics (NBS) that provide state-level prices for main food items.

Box 1: Linkages between agricultural transformation and food and nutrition security

Agricultural transformation is characterized by the commercialization of farming systems and can improve food security and nutrition. At the household level, increased commercialization among smallholder farmers is often accompanied by specialization in the production of a few marketable crops or livestock products and increased concentration of farm resources into the production of these products. This leads to more effective resource allocation and production intensification, and usually tends to increase on-farm productivity and income from farming. Higher income allows households to afford a larger and more diverse diet, increasing households' food and nutrition security. Higher incomes also allow households to spend more on basic health services and better living conditions that contribute to improved nutrition outcomes.

However, production specialization can lead to declining levels of household food self-sufficiency. This may be accompanied by reduced dietary diversity if the diversity of foods consumed from own-production is not compensated for with market purchases. This especially applies in more remote areas where farm households face severe market failures and high transportation costs, which can cause seasonal shortages of a wide variety of foods in the local market, (temporarily) high prices of nutritious foods, and poor market access in general. Thus, agricultural commercialization and farm production specialization, especially into non-food cash crops, can also have adverse nutritional effects in the short- and medium-terms. Yet, in the process of transformation, agricultural commercialization is usually accompanied by greater integration of rural food and agricultural markets. This tends to stabilize and reduce food prices and increase the availability of diverse foods in the local market. Improved access to marketed foods allows rural farm and non-farm households to increase their food consumption and diversify their diets.

[3] The analysis applies household random-effects and fixed-effects models. The latter specification is the preferred regression model because it controls for time-constant heterogeneity across households (over the observation period), including households' location, market access, and agricultural seasons.

Descriptive statistics show that the average dietary diversity of farm households significantly increased between 2011 and 2016, indicating improving food and nutrition security. Interestingly, household production diversity also increased on average over the five-year period. This implies that most Nigerian farmers did not begin to specialize their production during the lifetime of the Agricultural Transformation Agenda. Results from the econometric analysis suggest that farm production diversification was the dominant strategy for farm households to diversify their diet between 2011 and 2016 (Table 2). The linkage between farm production diversity and household dietary diversity is driven by the direct production-consumption effect and not by a possible indirect income effect from changes in agricultural production diversification.

The apparent lack of agricultural transformation may be explained by an absence of an enabling economic environment. Farm households may be faced with severe market failures that do not allow them to separate agricultural production from food consumption decisions. Because most farm households suffer from food and nutrition insecurity and lack economic and physical access to a diversified diet from food purchases, they prioritize meeting their dietary needs through own-production over farm income generation, even if it means sacrificing income gains that are typically associated with farm production specialization and commercialization. Thus, production specialization and commercialization appear to have been too risky for most Nigerian farm households between 2011 and 2016.

The estimation results also show that the loss in real income that farm households experienced between 2011 and 2016 due to Nigeria's economic recession was associated with reduced household dietary diversity. This result points to the importance of household income growth for improving dietary diversity, as well as the important role of social protection programs to mitigate the impact of income shocks on food and nutrition security during economic crises. The estimated dietary diversity effects of food price changes differed in direction and size across foods. Between 2011 and 2016, the average prices of the main staple foods (rice and gari), palm oil, and beef significantly declined across states, while the state-level prices of the main pulse (brown beans) and the main vegetable (tomatoes) did not change significantly. Declines in local rice and palm oil prices were associated with increases in dietary diversity, whereas, likely because of reverse substitution effects, declining prices of imported rice were associated with reduced dietary diversity. The heterogeneity in dietary response to food price changes warrants more in-depth research into food demand dynamics and substitution effects due to food price changes.

Table 2: Results of the household fixed-effects model for dietary diversity indicators

		HFVS		HDDS	
Number of cultivated crops or crop groups		0.255***		0.101***	
Simpson diversity index for crops or crop groups			0.600*		0.319***
Per capita expenditure (Naira/d; log)		2.504***	2.521***	0.801***	0.810***
Prices ('00 Naira/kg)	**Local rice**	-2.100***	-2.300***	-0.580*	-0.600*
	Imported rice	2.008***	2.005***	0.712***	0.697***
	White gari	-0.623	-0.621	-0.030	-0.057
	Brown beans	0.298	0.251	-0.463**	-0.452**
	Palm oil	-4.530***	-4.454***	-1.363***	-1.322***
	Tomatoes	-1.072***	-1.015***	-0.334***	-0.337***
	Beef	0.135	0.108	0.023	0.017
R-sq.		0.243	0.239	0.137	0.138

Source: Authors' estimation, based on GHS-Panel 2010-11 and 2015-16 data and NBS food price data.
Note: HFVS is the household food variety score, HDDS is the household dietary diversity score. Only coefficient estimates for select variables are presented due to space limitations.
***, **, * Coefficient is significant at the 1%, 5%, and 10% level, respectively. Standard errors are clustered at the household level.

High-quality Data Collection and Evidence-based Policymaking Should be Promoted

The study findings have two important policy implications. First, the lack of nutrient intake data and the poor quality of available nutrition outcome data calls for greater efforts in data collection. The FMARD and the Federal Ministry of Health, in collaboration with international development partners, plan to implement the National Food Consumption and Nutrition Survey in 2020. To ensure that the data from this survey are of high quality and suitable for policy and research purposes, it is fundamental that measurement and standardization protocols for anthropometry and other nutrition and dietary variables are followed strictly and that survey design and implementation comply with international standards. Moreover, a timely (and full) release of the collected data is critical to be able to analyze current development challenges, respond to policy research requests, and design policy interventions that target the most urgent issues.

Second, the results of the econometric analysis demonstrate that agricultural transformation and agricultural policy critically influence food and nutrition security beyond the standard parameters of agricultural productivity and farm income. The effects tend to be complex, and the potential impact is often context-specific. To design and implement effective policies and programs that are conducive to both Nigeria's agricultural transformation and food and nutrition security goals, policymaking should be more evidence-based and better supported by rigorous research. Large knowledge and evidence gaps remain, especially regarding the relative effectiveness of different agricultural policy and investment options in improving dietary quality.

About the Authors Olivier Ecker is a Senior Research Fellow with the Development Strategy and Governance Division (DSGD) of the International Food Policy Research Institute (IFPRI), based in Washington, DC, USA.

Adam Kennedy is a Senior Program Manager and Senior Research Analyst with DSGD of the International Food Policy Research Institute (IFPRI), based in Washington, DC, USA.

Key References

1. Ecker, Olivier; Hatzenbuehler, Patrick L.; and Mahrt, Kristi. 2018. Transforming agriculture for improving food and nutrition security among Nigerian farm households. NSSP Working Paper 56. Washington, DC: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/132881

This paper has been prepared as part of the Feed the Future Nigeria Agricultural Policy Project through the Nigeria Strategy Support Program managed by the International Food Policy Research Institute (IFPRI). The research presented here was conducted as part of the CGIAR Research Program on Policies, Institutions and Markets (PIM) which is led by IFPRI. This Research Paper was prepared under the USAID/Nigeria funded Food Security Policy Innovation Lab Associate Award, contract number AID-620-LA-15-00001.

This research is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the Feed the Future initiative. This publication has not been independently peer-reviewed and the contents are the responsibility of Michigan State University and IFPRI. Any opinions expressed here belong to the authors and do not necessarily reflect those of MSU, IFPRI, PIM, CGIAR, USAID or the United States Government.

Published by the Department of Agricultural, Food, and Resource Economics, Michigan State University, Justin S. Morrill Hall of Agriculture, 446 West Circle Dr., Room 202, East Lansing, Michigan 48824