



Nigerian Food Security Indices between the year 2012 and 2016: Where we are.

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Abstract

The paper examines the food security indices for Nigeria between years 2012 and 2016 to assess how Nigeria fared with the millennium development goal of reducing hunger and poverty. Data were obtained from The Economist Intelligence Unit. The food security indices capturing affordability show that the food consumption share of household expenditure is a modal 26.5%. A limited access to financing for farmers and a high agricultural import tariffs (an average 77.1); potentially able to hurt food security by raising the price of both domestically sourced and imported food, were observed. Sufficiency of supply index, a measure of food availability, was an average 58.22% with a sharp year on year change (YOYΔ) decline in the year 2015 (-12.7), as food loss YOYΔ also peaked at +20.3% in the same year. For Quality and safety of food indices, which are measures of food utilizations, diet diversification index was an average 27.64% and protein quality was 39.1%, indicative of low quality food intake by an average Nigerian. The paper therefore recommends a well-structured policy framework with increasing focus on the agricultural sector. Market reforms including effective import regulations are vital key strategies that will reduce food loss, improve supply and enhance affordability, and food utilization.

Keywords: Food security indices, Affordability, Availability, Quality and safety, Nigeria.

Introduction

The United Nations Millennium Development Goals are 8 goals that all 189 UN Member States agreed to try to achieve by the year 2015. The United Nations Millennium Declaration, signed in September 2000 commits world leaders to combat poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women. The MDGs are derived from this Declaration, and all have specific targets and indicators. The number one goal is to eradicate extreme poverty and hunger. The target of reducing extreme poverty rates by half is said to have been met five years ahead of the 2015 deadline, but then globally, about 795 million people are still estimated to be undernourished as more than 90 million children, under age five, are still undernourished and underweight (United Nations, 2016). Nigeria was an enthusiastic signatory to the MDGs and has claimed to pursue them vigorously since then, though with varying degrees of success.

Recent food price hikes in the country have contributed to greater public awareness of hunger related problems, calling for dedicated attention and efforts to solving the food insecurity concerns. Also, a Global Hunger Index (GHI) ranked Nigeria 40th among 79 food deficient countries in 2012, together with rising food prices, malnutrition and deaths as a result of wide-spread poverty is an indication of the prevalence of food insecurity in the country. It is also a sign of extreme suffering for millions of poor people as described by the GHI Report (2012).

Food security exists when "all people at all times have access to safe nutritious food to maintain a healthy and active life" (FAO, 1996). Food security entails ensuring sustainable access, availability and affordability of adequate quantity and quality food to all citizens to meet up with their physiological requirements (Okuneye, 2014). The main goal of food security is for individuals to be able to obtain adequate food needed at all times, and to be able to utilize the food to meet the body's needs. Food security is therefore multifaceted. The World Bank (2001), identified three pillars underpinning food security; these are food availability, food accessibility, and food

utilization.

Food access means reducing poverty. Simply making food available is not enough; one must also be able to purchase it, especially the low-income households (Sen, 1981). Food utilization means ensuring a good nutritional outcome, which is nutrition security. Having sufficient food will not ensure a good nutritional outcome if poor health results in frequent sickness. Building this pillar means investing in complementary resources such as nutrition education, health care, provision of safe water and better sanitation, instituting gender symmetry, and removal of child abuse practices (Doppler, 2002).

How Nigeria fared at the expiration year, 2015 ought to be examined so as to better understand the dynamics of national food security, a basis for monitoring future progress and assessing the impacts of various projects, programmes and policies, and forge a new and appropriate policy framework to addressing biting issues. Reliable information on food security indices is a pre-requisite for accurate and effective design, monitoring and development of projects and interventions.

This study hopes to examine the food indices in Nigeria's recent years with the need to re-focus the country's national food and agricultural policies to developing its agricultural food baskets and address a wide range of issues in meeting the food market product and utilization demands.

Material and Methods

Nigeria is a federal constitutional republic in West Africa, bordering Benin in the west, Chad and Cameroon in the east, and Niger in the north. Its coast in the south lies on the Gulf of Guinea in the Atlantic Ocean. The total land area is 923,768 square kilometers and lies between longitude 2⁰ to 15⁰ east of the Greenwich meridian and latitude 4⁰ and 14⁰ north of the equator. It comprises 36 states and the Federal Capital Territory, where the capital, Abuja is located. Its largest cities include: Lagos, Kano, Ibadan, Benin City and Port Harcourt. Nigeria is officially a democratic secular country. Nigeria is often referred to as the "Giant of Africa", owing to its large population and economy (Holmes, 1987). With approximately 184 million inhabitants, Nigeria is the most populous country in Africa and the seventh most populous country in the world. Nigeria has one of the largest populations of youth in the world (CIA, 2013). The country is viewed as a multinational state, as it is inhabited by over 500 ethnic groups, of which the three largest are the Hausa, Igbo and Yoruba; these ethnic groups speak over 500 different languages, and are identified with wide variety of cultures (Otite, 2015). Agriculture is one of the most important sectors of the Nigerian economy, it contributes more than 40% of the total annual GDP in 2010 (NBS, 2012). The sector employs about 70% of the labour force and accounts for over 70% of the non-oil exports and, perhaps most importantly, provide over 80% of the food needs of the country (Adegboye, 2004 and NBS, 2012).

Indices Measurement and Analysis Methods

Table 1: Indicator definitions and construction of food security indices

Indices measurement	Indicator definitions and construction
1. Affordability	
<i>1.1 Food consumption as a share of household expenditure</i>	A measure of the percentage of household expenditure that is spent on food at a national level.
<i>1.2 Proportion of population under global poverty line</i>	A measure of the prevalence of poverty, calculated as the percentage of the population living on less than US\$2/day in purchasing power parity.
<i>1.3 Gross domestic product per capita (PPP)</i>	A measure individual income and, hence, affordability of food, calculated in US dollars at purchasing power parity.
<i>1.4 Agricultural import tariffs</i>	Measured as the average applied most-favoured nation (MFN) tariff on all agricultural

1.5 Presence of food safety net programmes

imports.

A measure of public initiatives to protect the poor from food-related shocks. This indicator considers food safety net programmes, including in-kind food transfers, conditional cash transfers (i.e., food vouchers), and the existence of school feeding programmes by the government, NGOs or the multilateral sector. Measured on a 0-4 scale based on the prevalence and depth of food safety net programmes:
 0=Minimal evidence of food safety net programmes or programmes run only by NGOs or multilaterals. Emergency food aid programmes funded by multilaterals are not considered;
 1=Moderate presence of food safety net programmes, but mainly run by NGOs or multilaterals. Depth and/or prevalence is inadequate;
 2=Moderate prevalence and depth of food safety net programmes run by the government, multilaterals, or NGOs;
 3=National coverage, with very broad, but not deep coverage of food safety net programmes;
 4=National government-run provision of food safety net programmes. Depth indicates the quantity of funds available to recipients. Breadth indicates the range of services available.

1.6 Access to financing for farmers

A measure of the availability of financing to farmers from the public sector. Measured on a 0-4 scale based on the depth and range of farmer financing:
 0=No access to government or multilateral farmer financing programmes (typically, but not necessarily a developing economy);
 1=Limited multilateral or government farmer financing programmes (typically, but not necessarily a developing economy);
 2= Some multilateral or government financing (typically, but not necessarily an emerging-market economy);
 3= Broad, not deep farmer financing (typically, but not necessarily a developed economy)
 OR
 well-developed multilateral farmer financing programmes (typically, but not necessarily an emerging market economy);
 4=Access to deep farmer financing (typically, but not necessarily an advanced economy)
 Depth indicates the quantity of funds available.
 Range covers credit and insurance.

2. Availability

2.1 Sufficiency of supply

A composite indicator that measures the availability of food. It is comprised of the following sub-indicators:

- Average food supply in kcal/capita/day; • Dependency on chronic food aid

2.1.1 Average food supply

An estimate of the per-capita amount of food available for human consumption in kilocalories/ capita/day.

2.1.2 Dependency on chronic food aid

Measures whether a country is a recipient of chronic food aid. For the purpose of this index, chronic aid recipients are defined as those countries that have received non-emergency food aid over a five-year time span. It is measured on a 0-2 scale: 0=Received chronic food aid on an increasing basis over the last five years; 1=Received chronic food aid on a decreasing basis over the last five years; 2=Receives little to no food aid or only on an emergency basis

2.2 Agricultural infrastructure

This is a composite indicator that measures the ability to store and transport crops to market. Sub-indicators include:

- Existence of adequate crop storage facilities; • Road infrastructure; • Port infrastructure

2.2.1 Existence of adequate crop storage facilities

This binary indicator assesses the presence of sufficient crop storage facilities based on size of agricultural sector and population. It is measured on a 0-1 scale: 0=No; 1=Yes

2.2.2 Road infrastructure

This qualitative indicator measures the quality of road infrastructure and is measured on a 0-4 scale, where 4=best.

2.2.3 Port infrastructure

This qualitative indicator measures the quality of port infrastructure and is measured on a 0-4 scale, where 4=best.

2.3 Volatility of agricultural production

This indicator measures the standard deviation of the growth of agricultural production over the most recent 20-year period for which data are available.

2.4 Political stability risk	A measure of general political instability. Political instability has the potential to disrupt access to food through such avenues as transport blocks or reduced food aid commitments.
2.5 Urban absorption capacity	This indicator measures the capacity of a country to absorb the stresses placed on it by urban growth and still ensure food security. It does so by evaluating a country's resources (real GDP) against the stress of urbanization (urban growth rate). It is calculated as the percentage of real change in GDP minus the urban growth rate.
2.6 Food loss	A measure of post-harvest and pre-consumer food loss as a ratio of the domestic supply (production, net imports and stock changes) of crops, livestock and fish commodities (in tonnes).
3. Quality and Safety	
3.1 Diet diversification	A measure of the share of non-starchy foods (all but cereals, roots and tubers) in total dietary energy consumption. A larger share of non-starchy foods signifies a greater diversity of food groups in the diet. This is a composite indicator that measures government commitment to increasing nutritional standards. It is comprised of the following binary sub-indicators: • National dietary guidelines; • National nutrition plan or strategy; • Nutrition monitoring and surveillance
3.2.1 National dietary guidelines	This is a binary indicator that measures whether the government has published guidelines for a balanced and nutritious diet: 0=No; 1=Yes
3.2.2 Nutrition plan or strategy	This is a binary indicator that measures whether the government has published a national strategy to improve nutrition: 0=No; 1=Yes
3.2.3 Nutrition monitoring and surveillance	This is a binary indicator that measures whether the government monitors the nutritional status of the general population. Examples of monitoring and surveillance include the collection of data on undernourishment, nutrition-related deficiencies, etc. 0=No; 1=Yes
3.3 Micronutrient availability	A composite indicator that measures the availability of micronutrients in the food supply. Sub-indicators include: • Dietary availability of vitamin A; • Dietary availability of animal iron; • Dietary availability of vegetal iron
3.3.1 Dietary availability of vitamin A	The dietary availability of vitamin A is calculated by converting the amount of food available for human consumption (as estimated by the FAO Food Balance Sheets) into the equivalent of vitamin A. This indicator is expressed in micrograms of retinol activity equivalent/capita/day on a 0-2 scale. 0= less than 300 mcg RAE/capita/day; 1= 300-600 mcg RAE/capita/day; 2= more than 600 mcg RAE/capita/day
3.3.2 Dietary availability of animal iron	The dietary availability of iron is calculated by converting the amount of food available for human consumption (as estimated by the FAO Food Balance Sheets) into the equivalent of iron. Animal iron is obtained from products such as meat, milk, fish, animal fats, eggs. This indicator is expressed in mg/capita/day.
3.3.3 Dietary availability of vegetal iron	The dietary availability of iron is calculated by converting the amount of food available for human consumption (as estimated by the FAO Food Balance Sheets) into the equivalent of iron. Vegetal iron is obtained from products such as cereals, pulses, roots and tubers, vegetable oils, fruits, vegetables, etc. This indicator is expressed in mg/capita/day.
3.4 Protein quality	This indicator measures the grams of quality protein using the methodology of the Protein Digestibility Corrected Amino Acid Score (PDCAAS). The PDCAAS methodology assesses the presence of nine essential amino acids in the average national diet. The inputs of this calculation include: the amino acid profile, protein digestibility value and the average grams consumed of each food item that contributes a minimum of 2% to protein consumption.
3.5 Food safety	This is a composite indicator that measures the enabling environment for food safety. Sub-indicators include: • Agency to ensure the safety and health of food; • Percentage of population with access to potable water; • Presence of formal grocery sector

3.5.1 Agency to ensure the safety and health of food	Binary indicator that measures the existence of a regulatory or administrative agency to ensure the health and safety of food: 0=No; 1=Yes
3.5.2 Percentage of population with access to potable water	Access to potable water is the proportion of people using improved drinking water sources: household connection; public standpipe; borehole; protected dug well; protected spring; rainwater.
3.5.3 Presence of formal grocery sector	Qualitative indicator measuring the prevalence of a formal grocery sector measured on a 0-2 scale: 0=Minimal presence; 1=Moderate presence; 2=Widespread presence

Source: The Economist Intelligence Unit (2014)

Result and Discussions

Affordability Indices

The capacity to afford quality food without undue stress is a crucial aspect of food security. Here, affordability is looked through two primary lenses—whether an average individual in a country has sufficient means to purchase food, and the public structures that have been established to respond to personal or societal shocks. Together these provide a holistic treatment of affordability, exploring elements of ability to pay and cost under a broad array of environmental conditions. Affordability is measured across six indicators: Food consumption as a share of household expenditure, Proportion of population under global poverty line, Gross domestic product per capita (at purchasing power parity, or PPP, exchange rates) and Agricultural import tariffs, Presence of food safety net programmes, and Access to financing for farmers. These indices are presented in Table 2. It can be seen that the country is still where developed countries like the USA were in the 1930 (Perry, 2014), where the food consumption share of household expenditure is a modal 26.5%. This index attempts to capture the relative importance of food in household budgets. The lower the relative household expenditure on food, the easier it is for a household to respond to price increases and shocks. It is however worthy to note that this is a national average, which may differ much from regional or state averages. For instance, in a study by Ojeleye (2015), the share of food expenditure was found to be 52.6% in Kaduna state, Nigeria. Also, Index 1.6 presents in Table 2, a limited access to financing for farmers who are the primary producers of food. This index provides another perspective on food costs. It is a feature that will undoubtedly hamper food production and pricing, and invariably, food affordability by the populace. The indicator for agricultural import tariffs is measured as the average applied most-favoured nation (MFN) rate on all agricultural imports. Higher tariff rates can hurt food security by raising the price of both domestically sourced and imported food. Top-performing countries have rates below 6%, and the situation range of 75.6-78.2% presents the country with high risks of food price inflation, which is the current problem in the country.

Availability Indices

Affordable food has minimal value if access is difficult, volatile or uncertain (Economist Intelligence Unit, 2014). This category assesses factors that influence the supply of food and the ease of access within the country. It examines the structural aspects determining the capacity within the country to produce and distribute food, and explores elements that might create bottlenecks or risks to robust availability. As can be seen in the Table 3, the sufficiency of supply, which is a composite indicator that examines the average food supply and the dependency on chronic food aid to assess the core question of availability: Is there enough food?; has been on the decline over the years. This is the effect of the loss of almost the entire north-east region to the

Boko haram insurgency. The farmers in this region were internally displaced and of course, no meaningful food production activities were going on there

Table 2: Food affordability indices

	Score / 100					Year on Year Change (YOYΔ)			
	2012	2013	2014	2015	2016	2012	2014	2015	2016
OVERALL SCORE	37.9	37.3	39.0	37.7	39.4	-0.6	+1.7	-1.3	+1.7
1. AFFORDABILITY	21.4	20.8	24.5	24.5	24.2	-0.6	+3.7	—	-0.3
1.1 Food consumption as a share of household expenditure	26.5	26.5	26.5	26.4	26.4	—	—	-0.1	—
1.2 Proportion of population under global poverty line	21.1	17.7	17.7	17.7	17.7	-3.4	—	—	—
1.3 Gross domestic product per capita (US\$ PPP)	3.4	3.5	3.6	3.7	3.7	+0.1	+0.1	+0.1	—
1.4 Agricultural import tariffs	76.8	76.9	78.2	78.0	75.6	+0.1	+1.3	-0.2	-2.4
1.5 Presence of food safety net programmes	0.0	0.0	25.0	25.0	25.0	—	+25.0	—	—
1.6 Access to financing for farmers (Scored on a scale 0-4)	1	1	1	1	1	—	—	—	—

Source: The Economist Intelligence Unit (2016).

Furthermore, the index for agricultural infrastructure, which examines crop storage facilities necessary to minimize food loss, facilitate the movement of goods and provide buffers in case of shocks to the food supply, were equally on the decline over the years, with a substantial reduction noted in the year 2015 (-9.3 YOYΔ). This can also be linked to the unset of economic recession the country is facing, as it impacts on agricultural infrastructure and food security issues. It has been noted in the Economist Intelligence Unit (2014), that the domestic food supply also is partially determined by the volatility of agricultural production. Highly volatile output can have detrimental effects on food security by making it difficult to manage food supply. Higher volatility can potentially create unneeded surpluses or shortages that severely impact food availability. While volatility of agricultural production reflects potential problems at the beginning of the food supply chain, food loss examines the share of food that is lost post-harvest and before it gets to the consumer. A higher share of food that is lost during processing, production, transport and storage often indicates meaningful structural problems within the supply chain. The share of food loss has suddenly increased between 2015 and 2016. The incessant herdsmen attacks can explain some of these losses, notwithstanding, the index of political instability as it affects food security has improved in general. High political stability risk can limit access to food through such avenues as transport blockages or reduced international food aid commitments. It can also create interruptions in the supply chain, as uncertainty or outright conflict diminishes the ability and willingness of individuals to supply food products (The Economist Intelligence Unit, 2014).

Quality and Safety of Food Indices

This section explores the nutritional quality of average diets and the food safety environment within the country. This category is sometimes referred to by other commentators as “utilization”. Food quality and safety is measured across five indicators: Diet diversification, Nutritional standards, Micronutrient availability, Protein quality, and Food safety. The Quality & Safety category separates the concept of food security from more traditional welfare metrics, such as poverty, which are often linked to considerations of access. This category moves beyond such a

focus to explore the overall quality of food supplies, based on the understanding that food security requires access to “nutritious food that meets [individuals’] dietary needs” (The Economist Intelligence Unit, 2014; Ojeleye, 2015).

Table 3: Food availability indices

	Score / 100					Year on Year Change (YOYΔ)			
	2012	2013	2014	2015	2016	2012	2014	2015	2016
2. AVAILABILITY	49.3	48.4	48.3	45.4	49.4	-0.9	-0.1	-2.9	+4.0
2.1 Sufficiency of supply	64.3	63.6	63.6	50.9	48.7	-0.7	—	-12.7	-2.2
2.1.1 Average food supply	51.3	50.4	50.4	51.2	48.3	-0.9	—	+0.8	-2.9
2.1.2 Dependency on chronic food aid (Scored on a scale 0-2)	2	2	2	1	1	—	—	-1.0	—
2.2 Agricultural infrastructure	41.7	41.7	41.7	32.4	32.4	—	—	-9.3	—
2.2.1 Existence of adequate crop storage facilities (A binary score of scale 0-1)	1	1	1	1	1	—	—	—	—
2.2.2 Road infrastructure (Scored on a scale 0-4)	1	1	1	1	1	—	—	—	—
2.2.3 Port infrastructure	1	1	1	0	0	—	—	-1.0	—
2.3 Volatility of agricultural production	90.3	90.3	91.7	89.5	88.0	—	+1.4	-2.2	-1.5
2.4 Political stability risk	27.8	27.8	27.8	27.8	38.9	—	—	—	+11.1
2.5 Urban absorption capacity	78.7	71.3	67.9	58.1	68.7	-7.4	-3.4	-9.8	+10.6
2.6 Food loss	49.7	49.7	49.7	70.0	70.6	—	—	+20.3	+0.6

Source: The Economist Intelligence Unit, (2016).

The first, diet diversification, measures the share of non-starchy foods in total dietary energy consumption. Diets that consist of higher percentages of non-starchy foods, which include all but cereals, roots and tubers, tend to be more nutritious, given the prevalence of vegetables, dairy and meat products. Unsurprisingly, there are tremendous differences in diets across regions and states in the country, even among countries (Okafor *et al.*, 1994; Okeke, 1996; Adio, 2000; Olarinde and Kuponiyi, 2005; Kushwaha *et al.* 2007; National Bureau of Statistics, 2007; Oluwatayo 2008; Akinyele, 2009). Those with the highest levels of diversification tend to be well-developed European countries, led for instance by Switzerland, where 76% of the diet comes from non-starchy foods based on 2014 survey. By contrast, low-income, Sub-Saharan African and Asian countries dominate the bottom ranks. Bangladesh has the lowest share of non-starchy foods, at just 20%. From Table 4, the Nigerian national average for diet diversification median 25.0%, with higher score for the earlier years, 2012 and 2013 and 2016 to be the least year. This is indicative of low quality food intake by an average Nigerian. Furthermore, the micronutrient composite indicator considers three distinct micronutrients—vitamin A, animal iron and vegetal iron. These indices also show low quality food intake as presented in Table 4. Protein quality is the final nutrition-focused indicator. It measures the grams of quality protein consumed, based on the presence of nine essential amino acids. As with diet diversification, The Economist Intelligence Unit (2014), have noted that there is a strong relationship between income level and protein quality. This index, as presented in Table 4 for the years have remained low but with positive YOYΔ in 2016.

Table 4: Food quality and safety indices

	Score / 100					Year on Year Change (YOYΔ)			
	2012	2013	2014	2015	2016	2012	2014	2015	2016
3. QUALITY AND SAFETY	47.7	48.0	49.6	49.8	49.9	+0.3	+1.6	+0.2	+0.1
3.1 Diet diversification	29.8	29.8	26.8	26.8	25.0	—	-3.0	—	-1.8
3.2 Nutritional standards (A binary score of scale 0-1)	1	1	1	1	1	—	—	—	—
3.2.1 National dietary guidelines (A binary score of scale 0-1)	1	1	1	1	1	—	—	—	—
3.2.2 National nutrition plan or strategy (A binary score of scale 0-1)	1	1	1	1	1	—	—	—	—
3.2.3 Nutrition monitoring and surveillance (A binary score of scale 0-1)	1	1	1	1	1	—	—	—	—
3.3 Micronutrient availability	44.3	44.3	44.3	44.3	44.3	—	—	—	—
3.3.1 Dietary availability of vitamin A (Scored on a scale 0-2)	1	1	1	1	1	—	—	—	—
3.3.2 Dietary availability of animal iron	7.1	7.1	7.1	7.1	7.1	—	—	—	—
3.3.3 Dietary availability of vegetal iron	75.7	75.7	75.7	75.7	75.7	—	—	—	—
3.4 Protein quality	38.1	38.7	38.8	39.3	40.5	+0.6	+0.1	+0.5	+1.2
3.5 Food safety	46.0	46.7	59.9	60.5	61.0	+0.7	+13.2	+0.6	+0.5
3.5.1 Agency to ensure the safety and health of food (A binary score of scale 0-1)	1	1	1	1	1	—	—	—	—
3.5.2 Percentage of population with access to potable water	32.4	33.9	35.5	37.0	38.2	+1.5	+1.6	+1.5	+1.2
3.5.3 Presence of formal grocery sector (Scored on a scale 0-2)	0.0	0.0	1	1	1	—	+1.0	—	—

Source: The Economist Intelligence Unit, (2016).

Conclusion and Recommendation

Food security is a complex and nuanced issue, which can be analyzed through many viewpoints. The indices afore presented have shown that not much has been achieved to answer the food security concerns of the country. Of particular mention is that political unrest and armed conflict continue to affect food supply in the country and as such resulting in restricted access to agricultural land and food distribution, and internally displaced local populations with the growing exposure to intense food insecurity. Addressing these concerns will require a well-structured policy framework with increasing focus on the agricultural sector, to somewhat bolsters food affordability and availability. Market reforms and renewed interest of private-sector investors in agriculture, which supports rural incomes and encourages agricultural production and productivity gains, are the right way to go. In the encouragement of agricultural production, farming methods, structural infrastructure and the operating environment are key sectors for focus. Improved farming methods, including increased mechanization and the use of fertilizers and improved seeds, result in increased efficiency during the early stages of the supply chain and minimize losses. Advanced

structural infrastructure, including transport and storage systems and processing facilities, mitigates food loss. Finally, the country's operating environment needs to be robust enough to facilitate efficient markets. Proper regulations, including effective import and export systems, stable political environments are vital key strategies that will reduce the likelihood of food loss, improve supply and enhance affordability, and food utilization.

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