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Review Article

Agricultural Mechanization as a Key Driver for Achieving Zero Hunger in Nigeria: A Case Study of SDG 2

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Abstract

Despite the enormous agricultural potential exhibited in the rural areas of Nigeria due to its population strength, the country is still faced with food insecurity and malnutrition problems. Viewing through the various Global Hunger Index (GHI) assessment reports, the nation often ranks among those with "serious hunger" rating scores, which reflects pervasive difficulties in reaching Sustainable Development Goal 2 (SDG 2) Zero Hunger. This review, however, looked at agricultural mechanization as a key factor in enhancing food security and accelerating Nigeria's progress towards meeting SDG 2 targets by 2030. The study examines hunger patterns in Nigeria, the historical development of agricultural mechanization, and federal and state-level mechanization projects using secondary data from global hunger indices, policy documents, government publications, and peer-reviewed literature. It also evaluates the institutional and policy frameworks that support mechanized agriculture. The review concluded that Nigeria has implemented a number of agricultural and nutrition-related policies, while efficacy has been hampered by low mechanization uptake and implementation gaps. To achieve sustainable food security and meet SDG 2 targets by 2030, it is important to scale up context-appropriate, climate-smart mechanization, develop public-private partnerships (PPP), improve policy coherence, and address governance and security problems.

Keywords: Agriculture, mechanization, zero hunger, food security and Nigeria

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Introduction

Nigeria which is Africa's most populous nation, possesses immense agricultural potential with over 70 million hectares of arable land (FAO, 2021). Despite this vast potential, food insecurity remains persistent. According to the Global Hunger Index (2023), Nigeria ranked 103rd out of 125 countries involved, indicating a serious hunger situation. The persistent challenge of hunger and malnutrition continues to undermine the nation's economic and social development, posing significant threats to achieving the United Nations Sustainable Development Goal 2 (SDG 2) Zero Hunger by 2030.

Nigeria, often referred to as the "Giant of Africa," is one of the continent's largest economies (Hannatu and Ibietan, 2021). However, the World Bank reports that a significant percentage of the population survives on less than $3.65 per day, with many falling below the $2.15 per day extreme poverty line. Poverty is heavily concentrated in the North East (71.9%) and North West (64.8%), while the South West has a lower number at (12.2%).

The number of undernourished individuals was estimated at 14 million as of 2016 (FAO, 2017). The Global Food Security Index (2025) ranked Nigeria 115th among 123 countries, with a score of 32.8, which signifies that the level of hunger in Nigeria is serious. Despite its agricultural potential, Nigeria relies heavily on the importation of grains, livestock products, and fish to meet domestic demand. The country's agricultural sector suffered a decline following the discovery of oil in 1956, and it has since struggled to regain its former productivity. This decline has contributed to persistent food inflation, which reached its highest level since 2005 in February 2021 (Gabriel, 2023).

Food security is not merely an economic concern but a fundamental human necessity. Adequate food intake is essential for sustaining life, promoting health, and maintaining productivity (Matemilola and Elegbede, 2017). Insufficient nutrition leads to malnourishment, fatigue, disease susceptibility, and decreased labour productivity, which collectively hinder national development. Abdul Manap and Ismail (2019), noted that one in four persons in sub-Saharan Africa lacks access to adequate food—translating to nearly 240 million people—and identified policy failure and poor implementation as major barriers to food security in Nigeria.

The growing insecurity across the country further exacerbates food scarcity. The Boko Haram insurgency, an incessant act of banditry across the nation, particularly in the North-East, has displaced populations and disrupted agricultural and trade activities (Adelaja and George, 2019). Similarly, herder–farmer conflicts have discouraged farming activities, especially among women, who fear violence or sexual assault. These conflicts

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restrict food supply chains, leading to increased prices (Van Den Hoek, 2017) has warned that Nigerian children are increasingly at risk of malnutrition, with many lacking adequate nutrients essential for growth and development.

In response to these challenges, the Nigerian government has implemented several agricultural policies, notably the Agricultural Promotion Policy (APP) 2016 – 2020, which built upon the Agricultural Transformation Agenda (2011 – 2014). These policies aimed to achieve food security, substitute imports, create employment, and diversify the economy (FMARD, 2021). However, progress remains limited, as millions still face hunger, malnutrition, and poverty (Otekunrin *et al*., 2022).

Globally, the 2030 Agenda for Sustainable Development, adopted by the United Nations General Assembly in 2015, underscores the urgency of addressing food insecurity and promoting sustainable agriculture. SDG 2 specifically seeks to "end hunger, achieve food security and improved nutrition, and promote sustainable agriculture" by 2030. To this end, Nigeria introduced the Plant Variety Protection Act (PVPA) in 2021, aligning with the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement to incentivise plant breeding and innovation in agriculture. The PVPA provides a legal framework to encourage investment in crop development, increase productivity, and promote sustainable agricultural practices (Ogunyemi and Olubiyi, 2023).

Despite these initiatives, hunger persists. UNICEF (2021) reported that many Nigerian children under two years of age lack essential nutrients, causing irreversible harm. FAO (2022) estimated that about 14.4 million Nigerians, including internally displaced persons, faced food crises across 21 states. Moreover, the National Human Rights Commission highlighted the worsening food situation among vulnerable populations, particularly due to rising food prices (NBS, 2023). According to GHI (2022), which centered on Global Hunger Index from 2015 to 2022, noted that Nigeria consistently ranked among countries with "serious hunger". These challenges persist despite over 70% of Nigerians engaging in agriculture, primarily at subsistence levels (Okonkwo, 2018; FAO, 2022).

In line with continental efforts, the African Union declared 2022 as the "Year of Nutrition," with the theme "Strengthening Resilience in Nutrition and Food Security on the African Continent" (African Union, 2022). This declaration emphasizes the urgent need for African governments, including Nigeria, to strengthen agro-food systems and implement sustainable solutions to address hunger and malnutrition.

We must note that SDG 2, which is centred on alleviating hunger, is closely related and interwoven with some of the other SDGs. Hunger, which is the 'uncomfortable or painful feeling' in one's stomach, resulting from the need or lack of food, falls under SDG-2. To end hunger, either domestically or internationally, it requires a great deal of efforts to address the issues of poverty (SDG 1), health and well-being (SDG 3), quality education (SDG 4), climate change mitigation (SDG 13), inequality (SDG 10) and unemployment (SDG 8) and peace and security (SDG 16), because at some points, they either simultaneously or severally interact or interfere with the path to zero hunger. For instance, it has been noted elsewhere that the route to zero hunger had a positive interaction with SDGs 1, 3 and 4 while food production has a complex interaction with SDG 13, because agriculture contributes about 35% of global greenhouse gas, and climate mitigation constrains certain types of food production (Morton *et al.*, 2017). Another instance is that an equitable and sustainable food system helps in meeting some targets of SDG 2, improving the health and well-being of the people, addresses issues of stunting and waste, helps productivity at work and place of learning and increases access to decent work. In essence, actions that reduce poverty, inequality, unemployment and mitigate against climate change have a positive result in achieving the goals and targets of zero hunger and improving healthy living. Furthermore, innovation and technology help in the invention of seeds and plants that are resistant to harsh weather and high crop yields, storage, transportation, and help farmers to be more resource efficient. (UNCTAD, 2017).

This paper, however, reviewed Nigeria's policy framework and institutional effort towards achieving Zero Hunger, assessed their strengths, limitations, and the drive by the Federal and State Governments on mechanization in alleviating hunger and boosting food production, while recommending strategic actions to accelerate progress toward SDG 2 by 2030.

Global Index Report on Hunger in Nigeria

Despite government efforts to combat poverty and hunger in Nigeria, the country's starvation situation is depicted in a graphic global index assessment. According to the UNICEF 2021 report titled "Fed to Fail," many Nigerian children under the age of two years do not have access to the food and nutrients they need for healthy growth, which results in lasting injury (UNICEF, 2021).

About 14.4 million people, including 385,000 internally displaced people (IDPs) in 21 States and the Federal Capital Territory, Abuja, were experiencing a food crisis (FAO, 2022). In the same 2022, the National Human Rights Commission reported that Nigeria's food crisis was getting worse, especially for IDPs and other vulnerable groups. This made it harder for them to get wholesome food, which resulted in widespread hunger and a poor standard of living (The Punch Newspaper, 2022).

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According to the NBS (2023) report on Food Price, food and other commodity costs have been steadily rising over time and every month. (GHI, 2015) noted that despite Nigeria's abundance of natural and human resources, as well as a sizable amount of arable land suitable for agricultural pursuits like growing crops and raising livestock for human use, the nation continuously struggles with a fall in food sufficiency based on data from the 2015 to present Global Hunger Index study. Nigeria has continuously remained in the category of nations experiencing severe hunger. For example, Nigeria received a score of 32.8, placing it 91st on the 2015 Global Hunger Index study.

In 2018 it ranked 103 with a score of 31.1 (GHI, 2018), while in 2019, it ranked 93 with a score of 27.9. (GHI, 2019). In 2020 it ranked 98 with a score of 29.2, (GHI, 2020) while in 2021 it ranked 103 with a score of 28.3 (GHI, 2021) and in 2022 it ranked 103 with a score of 27.3 (GHI, 2022), in 2023 it ranked 109 out of 125 countries involved with a score of 28.3, in 2024 it ranked 110 out of 127 countries involved with a score of 28.8 and in 2025 it ranked 115 out of 123 countries involved with a score of 32.8. Nigeria's Global Hunger Index (GHI) ranking has worsened with the latest 2025 report. This is even though the Nigerian economy is predominantly agrarian, as over 70% of the population is engaged in the agricultural sector; however, the majority are at the subsistence level. Okonkwo (2018) noted that the majority of Nigerians are faced with the prevalence of serious hunger.

Historical Perspective of Mechanization in Nigeria

The use of mechanization in Nigerian agriculture dates back to the colonial era, when the British introduced modern farming practices to increase agricultural productivity. During this period, large-scale plantations were established, focusing mainly on cash crops such as cocoa, palm oil, rubber, cotton, and groundnut. Farming operations relied on mechanized equipment, including tractors, planters, harvesters, and processing machines.

To further promote agricultural development, the colonial government implemented a Ten-Year Development Programme between 1946 and 1956, which emphasized mechanized farming and commodity crop production. This period marked a vibrant phase in Nigeria's agricultural sector, characterized by food self-sufficiency, minimal importation of processed food, and substantial foreign exchange earnings from agricultural exports. Revenue generated from agriculture was used to support other sectors of the economy, such as education, health, construction, and finance (Ojeka *et al*., 2016).

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After independence, the Nigerian government recognized the importance of mechanization for agricultural development and introduced several initiatives to promote its adoption. These included the establishment of agricultural mechanization departments, training centres, and research institutes aimed at improving the quality of agricultural production. The government also provided subsidies and loans to enable farmers to acquire tractors and other farming equipment.

Between 1962 and 1968, the government implemented the First National Development Plan, which focused on increasing the production of export crops through improved seed distribution and modern mechanized farming methods. Tractor hiring units were established, and agricultural extension services were expanded to support farmers (Asoegwu and Asoegwu, 2007).

In 1976, the Operation Feed the Nation (OFN) programme was launched as the first major agricultural policy aimed at addressing food shortages and encouraging Nigerians to engage in farming. The programme promoted the dignity of labour and sought to mobilize idle manpower into agricultural activities. During this period, Marketing Boards were abolished, and Production and Marketing Companies were established, including the National Grain Production Company and the National Root Crop Production Company.

Additional government interventions included the establishment of River Basin Development Authorities (RBDAs), the National Seed Multiplication Scheme, Agro-Service Centres, and Agricultural Development Projects (ADPs). Several research and tertiary institutions were also created to improve agricultural productivity. However, despite these efforts, capital allocation to agriculture by federal and state governments declined to about 7.1%, indicating insufficient financial support for effective implementation of these programmes (Asoegwu and Asoegwu, 2007).

The Green Revolution Programme was introduced in April 1980 under the administration of Alhaji Shehu Shagari. The programme aimed to strengthen the RBDAs and ADPs and increase food production, with agricultural capital allocation rising to 12.7% (Osakwe and Ojo, 1986). Despite these efforts, the programme had limited impact due to structural challenges such as policy instability, weak infrastructure, inadequate research and development, and the absence of a comprehensive mechanization policy. As a result, agriculture’s contribution to GDP declined to about 20% between 1981 and 1985 (CAADP, 2004), food imports increased, prices rose, and agricultural exports and labor participation declined.

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Between 2011 and 2015, the Agricultural Transformation Agenda (ATA) initiated by President Goodluck Jonathan aimed to modernize Nigeria's agricultural sector, with mechanization as a core component. The programme supported farmers' access to machinery through initiatives such as the Growth Enhancement Support Scheme (GESS), which introduced the e-Wallet system for efficient input distribution (The Presidency, 2013).

Under President Muhammadu Buhari, agricultural mechanization efforts focused on boosting production through large-scale initiatives. These included the Green Imperative Programme in partnership with Brazil, which facilitated the deployment of over 1,000 tractors and the establishment of about 700 Agricultural Equipment Hiring Enterprises (AEHEs) nationwide. In 2022, the government approved the establishment of six Agricultural Machinery and Equipment Development Institutes (AMEDIs) across Nigeria's geopolitical zones to strengthen local manufacturing and repair capacity. Other initiatives included the National Tractor Recovery and Refurbishment Project supported by NASENI, as well as the Renewed Hope National Agricultural Mechanization Programme, which was built upon the foundation laid during the Buhari administration to advance mechanization in Nigerian agriculture.

An Overview of Some State Government Support to Farmers on Mechanization

Aside from the Federal Government initiatives on mechanization of agriculture in Nigeria, some State governments have taken bold steps in encouraging farmers in their states to embrace mechanised farming in order to boost food production and alleviate hunger in various States of the federation.

In order to increase agricultural production in the State, the Ekiti State government supported mechanization by providing farmers with subsidized mechanical land preparation and cultivation services. This ensured that farmers had access to better farming methods.

Also, a memorandum of understanding (MoU) was signed by the Kano State government and the Sasakawa Africa Association (SAA) Nigeria to establish mechanization centres across the State so as to give farmers access to improved agricultural equipment, and reduce drudgery associated with agriculture in the State.

In an effort to rebuild the State's standing as the nation's food basket, the Benue State administration started a pilot programme called the Agricultural Mechanization Outgrower Programme. Ten farm clusters and roughly 300 farmers will benefit from the initiative, which is in partnership with the Bureau for Agricultural Development and

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Mechanization, Mass International Limited, and SABASPAC International Limited under the Benue Agribusiness and Mechanization Centre (BAMC). It aimed to give farmers access to agricultural equipment, inputs, improved seeds, modern best practices, and technical support to increase productivity.

The Niger State government placed an order with John Deere for a thousand tractors. In February 2024, the first batch of 300 tractors equipped with handheld farm tools were delivered. The State government and John Deere entered into a $650 million collaboration agreement to purchase the tractors. The programme's objectives were to increase food production and meet the State's food sufficiency target.

Through programmes like the national Renewed Hope National Agricultural Mechanization Programme, comprehensive farming assistance, and the resuscitation of abandoned tractors, the Borno State administration obtained help for agricultural mechanization. The goal of this endeavor was to improve food security, decrease manual labour, and raise productivity by providing access to high-quality inputs, machinery, and training.

Overview of Nigeria's Policy to Eradicate Hunger By 2030

Nigeria has initiated several strategic plans, policies, and programmes aimed at addressing malnutrition, improving food security, and promoting sustainable agricultural practices. Some of these frameworks precede the adoption of the Sustainable Development Goals (SDGs) in 2015, while others were established afterwards. Following the adoption of the SDGs, the Federal Government has made concerted efforts to align its National Development Plans with the global agenda (Office of the Senior Special Assistant to the President on SDGs (OSSAP–SDGs). In pursuit of SDG 2 (Zero Hunger), Nigeria has implemented key programmes and policies, including the National Policy on Food and Nutrition otherwise known as (NPFN, 2001), Agricultural Transformation Agenda (ATA, 2011–2015), National Strategic Plan of action for Nutrition (NPAN, 2014–2019), Growth Enhancement Support Scheme (GESS), Nigeria Incentive-Based Risk-Sharing System for Agricultural Lending (NIRSAL), Agricultural Promotion Policy (APP, 2016–2020), and the National Social Investment Programmes (N-SIP, 2016–present). They are briefly discussed as follows:

I. National Policy on Food and Nutrition (NPFN, 2001)

In 2001, the National Planning Commission's National Committee on Food and Nutrition developed the NPFN. Its objectives were to promote women's access to productive resources, boost social sector investment, and improve the socioeconomic well-being of Nigerians, especially vulnerable populations.

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Among the main goals were to reduce poverty by 10% in 2010, minimize chronic hunger, reduce undernutrition in women and children by 30%, and reduce vitamin and mineral deficiencies by 50%. However, execution was hampered by insufficient finance, poor coordination, and inadequate monitoring, which resulted in its amendment in 2016 (NPC, 2016).

II. Agricultural Transformation Agenda Support Programme (2011 – 2016)

The African Development Bank (AfDB) provided funding for the Agricultural Transformation Agenda (ATA), which was started in 2011 during President Goodluck Ebele Jonathan's administration and carried out by the Federal Ministry of Agriculture and Rural Development. Its goals were to increase revenue across important agricultural value chains like rice and cassava, improve food and nutrition security, create jobs, and improve rural infrastructure (African Development Bank, 2016). Farmers' productivity and income increased as a result of ATA's better input supply to smallholder farmers through subsidies and easier access to fertilizers and other agricultural inputs which enhance farmers' income and productivity. Additionally, it helped reestablish commodity marketing boards and recapitalize the Bank of Agriculture (FMARD, 2016).

III. National Strategic Plan of Action for Nutrition (NPAN, 2014 – 2019)

In order to improve the government's ability to provide efficient nutritional interventions, especially for vulnerable populations, the NPAN was created under President Goodluck Ebele Jonathan administration. It sought to improve nutrition delivery research, monitoring, and evaluation while addressing diet-related non-communicable diseases (NPC, 2016). The National Multi-Sectoral Plan of Action for Food and Nutrition (NMPFAN, 2021–2025) was authorized by the Vice President-chaired National Council on Nutrition when NPAN expired. This new strategy aims to reduce child stunting to 18%, boost exclusive breastfeeding among nursing mothers by 65%, and reduce malnutrition by 50% (FGN, 2021).

IV. Agricultural Promotion Policy (APP, 2016 – 2020)

The APP was built on the successes of ATA and was created by the Federal Ministry of Agriculture and Rural Development. Its goals were to support agricultural exports, meet domestic food demand, bolster Nigeria's agribusiness industry, and maintain sectoral growth (FMARD, 2016). Three tenets served as the foundation for the policy: food as a human right, agriculture as a business, and agriculture as a driver of long-term growth.

V. National Social Investment Programmes (N-SIP, 2016 – Present)

President Muhammadu Buhari launched the N-SIP in 2016 to address hunger, poverty, and unemployment by combining a number of social welfare programmes. Over four million Nigerians have benefited from the initiative, which focused on vulnerable populations, especially women, children, and young people (FGN, 2022). The National Social Investment Programme Bill was adopted by the Federal Executive Council in September 2022 and signed into law in May 2023. There are four main clusters in the N-SIP:

i. National Cash Transfer Programme (NCTP)
This programme also called the Household Uplifting Programme (HUP), gives the poorest households monthly cash transfers of ₦5,000 and those with school-age children or pregnant women ₦10,000. It seeks to enhance human capital, household consumption, and improve nutrition (National Social Investment Office [NSIO], 2018).

ii. National Home-Grown School Feeding Programme (NHGSF)
In order to fight hunger and enhance learning results, this programme gives primary school pupils one wholesome meal every day. It also strengthens agricultural value chains by sourcing food locally from smallholder farmers. By 2018, almost $183 million had been spent, benefiting almost nine million pupils in 26 States (UNICEF, 2019).

iii. N-Power Programme
This empowerment initiative, which targets unemployed youth between the ages of 18 and 35, offers participants a ₦30,000 monthly stipend while training them for 12 months in a variety of fields, including technology, health, agriculture, and taxation. With a target of training 10 million youth by 2023, more than 500,000 have benefited (NSIO, 2022).

iv. Government Enterprise and Empowerment Programme (GEEP)
Through the MarketMoni, TraderMoni, and FarmerMoni programmes, this component offers collateral-free loans to micro, small, and medium-sized businesses (MSMEs). All the 36 States must have disbursed more than 308,000 loans by 2018 (Bank of Industry [BOI], 2018).

Other Related Initiatives
In addition to the stated programmes under N-SIP, other programmes such as the *Zero Hunger Initiative (ZHI)* and the *National Multi-Sectoral Plan of Action for Food and Nutrition (2021–2025)* have been introduced to further tackle food insecurity and malnutrition in Nigeria (Ayoola *et al.*, 2018).

Zero Hunger Initiative (ZHI)
In addition to programmes such as the National Strategic Plan of Action for Nutrition (NPAN) and the Agricultural Promotion Policy (APP), Nigeria also joined the global campaign toward achieving Zero Hunger (SDG 2) through the Zero Hunger Initiative (ZHI)**.** The ZHI aims to provide a strategic framework for achieving food and nutrition

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security through a multi-sectoral and multi-stakeholder approach**,** where all sectors define specific, measurable goals aligned with the SDG 2 targets (IITA, 2017).

The Nigeria Zero Hunger Strategic Review**,** the flagship activity under the ZHI, was convened in 2017 by former President Olusegun Obasanjo, with support from the Federal Government and international partners, including the International Institute of Tropical Agriculture (IITA), World Food Programme (WFP), and the African Development Bank (AfDB). The review sought to evaluate and accelerate the implementation of Nigeria's agricultural and nutritional policies while focusing on the attainment of SDG 2 by 2030 (IITA, 2017).

Policy And Institutional Support for Agricultural Mechanization in Nigeria

Agricultural mechanization in Nigeria has been a key focus of both government policies and institutional initiatives, aimed at improving productivity, reducing post-harvest losses, and enhancing food security. Over the years, various policies, programmes, and institutional frameworks have been implemented to promote mechanization and support smallholder farmers.

National Agricultural Mechanization Policy

In order to modernize agriculture, the Nigerian government has placed a strong emphasis on mechanization. The Federal Ministry of Agriculture and Rural Development (FMARD) created the National Agricultural Mechanization Policy (NAMP), which seeks to expand access to machinery, encourage private sector involvement in mechanization, and offer farmers and operators technical training (FMARD, 2021). NAMP aims to increase productivity at every level of agricultural production and lessen reliance on labour-intensive farming.

Tractor Hiring and Distribution Programmes

To make machinery available to smallholder farmers who cannot afford to purchase equipment outright, the Federal and State Governments have set up tractor hire and distribution programmes. Farmers can get subsidized tractors, tools, and maintenance assistance under the Presidential Fertilizer Initiative (PFI) and Tractor Intervention Programme under FMARD and the Central Bank of Nigeria (CBN, 2021; FMARD, 2021). These programmes promote mechanization while opening doors for the private sector to participate in the lease of machines.

Anchor Borrowers' Programme (ABP)

The ABP, initiated by the CBN, is a flagship intervention that indirectly supports mechanization by providing smallholder farmers with access to finance for inputs and

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machinery hire. Over 3.8 million farmers have benefited from the ABP, improving their capacity to adopt mechanized practices in crop production, particularly for rice, maize, and wheat (CBN, 2021).

Growth Enhancement Support Scheme (GESS)
GESS enabled mechanized operations, particularly for small-scale farmers, by offering subsidies for farm equipment and fertilizers.

Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL)
In a similar vein, the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) increases farmers' access to mechanization inputs by offering them financial and technical assistance (NIRSAL, 2020).

Research and Training Institutes
Farmers receive technical assistance, research, and extension services from organizations like the National Centre for Agricultural Mechanization (NCAM), the International Institute of Tropical Agriculture (IITA) and state agricultural development programmes (ADPs). NCAM plays a crucial role in machinery fabrication, adapting imported machinery, and training of tractor operators.

Public Private Partnerships (PPP)
The Nigerian government encourages PPPs to enhance mechanization by enabling private companies to provide machinery leasing, maintenance, and fabrication services. This reduces government's direct financial burden while improving access and efficiency for farmers (FAO, 2021).

International Institution Support and Collaboration
To support Nigeria's mechanization efforts, international institutions including the World Bank, IFAD, and FAO offer financial assistance, technical assistance, and capacity-building initiatives. These collaborations boost climate-smart and mechanized agriculture research, encourage best practices, and make machinery more accessible (FAO, 2021; IITA, 2017).

Benefits of Agricultural Mechanization in Line with Zero Hunger (SDG 2)

Benefits of Agricultural Mechanization for SDG 2 in Nigeria
Agricultural mechanization has the potential to significantly accelerate the achievement of SDG 2, (Zero Hunger) by improving productivity, reducing post-harvest losses, enhancing food availability, and increasing household income. The benefits of mechanization in the Nigerian context are discussed as follows:

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Increased agricultural productivity

Mechanized farming reduces the need for labour-intensive methods, thereby enabling farmers to quickly cultivate larger areas efficiently and within shorter period of time. Tractors, planters, and harvesters improve the timeliness and precision of farming operations, directly increasing crop yields (Otekunrin *et al.*, 2022). Increased productivity guarantees an adequate supply, a critical step toward reducing hunger and malnutrition.

Reduction of post-harvest losses

Mechanization contributes to improved harvesting, threshing, and storage practices, thereby minimizing losses that occur due to pests, spoilage, or inefficient manual handling. FAO (2021) emphasizes that post-harvest losses in Nigeria can reach up to 30% for key staple foods like maize and rice; mechanization can significantly reduce these losses, enhancing food availability.

Improved food security and availability

Mechanized farming enables consistent production of staple crops such as rice, maize, cassava, and vegetables, ensuring stable food supply at the household and national level. This directly supports SDG 2 targets by reducing undernourishment and hunger (Matemilola and Elegbede, 2017).

Staple crops including rice, corn, cassava, and vegetables can be produced consistently through mechanized farming which guarantees a steady supply of food for both households and the country. By reducing hunger and undernourishment, this directly helps SDG 2 targets (Matemilola and Elegbede, 2017).

Enhanced income for farmers

By adopting mechanized technologies, farmers reduce labour costs and improve operational efficiency, leading to increased farm income. The Anchor Borrowers' Programme (ABP) and other mechanization initiatives have been shown to increase smallholder farmers' productivity and income, enhancing their economic capacity to purchase nutritious food (CBN, 2021).

Farmers can raise agricultural income by reducing labour expenses and increasing operational efficiency through the use of mechanical techniques. It has been demonstrated that the Anchor Borrowers' Programme (ABP) and other mechanisation programmes boost smallholder farmers' incomes and productivity, thereby increasing their ability to afford wholesome food (CBN, 2021).

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Support for women and youth in agriculture
Mechanization reduces the physical burden of farm work, making agriculture more accessible for women and youth. This contributes to inclusive growth, poverty reduction, and improved household nutrition, key components of SDG 2 (FAO, 2021; Otekunrin *et al*., 2022).

Mechanization makes agriculture more accessible to women and young people by lessening the physical strain of farm labour. This helps achieve SDG 2's main objectives of inclusive growth, poverty alleviation, and better household nutrition (FAO, 2021; Otekunrin *et al*., 2022).

Promotion of climate-smart agriculture
Mechanized operations, when combined with precision agriculture and conservation practices, can reduce input wastage (fertilizers, seeds, pesticides) and reduce greenhouse gas emissions. This supports sustainable agricultural production, ensuring long-term food security in the face of climate change (FMARD, 2021).

Mechanized operations can cut greenhouse gas emissions and input waste (fertilizers, seeds, and pesticides) when paired with precision farming and conservation techniques. In light of climate change, this promotes sustainable agricultural output and long-term food security (FMARD, 2021).

Strengthening agricultural value chains
Mechanization enhances efficiency across all stages of the value chain, from land preparation to processing and storage. Efficient mechanized supply chains reduce food losses, increase marketable surplus, and improve access to local and international markets.

From soil preparation to processing and storage, mechanization improves efficiency at every level of the value chain. Food losses are decreased, marketable surplus is increased, and access to domestic and foreign markets is enhanced by effective mechanized supply chains (Otekunrin *et al*., 2022).

Facilitation of policy and programme implementation
Mechanization supports the objectives of national policies such as the Agricultural Promotion Policy (APP), Agricultural Transformation Agenda (ATA), and the National Social Investment Programmes (NSIP), by enhancing farmers' productivity and enabling large-scale agricultural interventions (FMARD, 2021; Otekunrin *et al*., 2022).

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Challenges of Achieving Zero Hunger (SDG 2) in Nigeria

Despite the existence of numerous agricultural and nutrition-related policies, Nigeria continues to face severe challenges in achieving the Sustainable Development Goal 2 (SDG 2), Zero Hunger by 2030. The problem does not stem from a lack of policies or institutional frameworks but rather from a combination of economic, environmental, social, and governance factors that impede effective implementation (IITA, 2017).

Economic Challenges

The key economic issues affecting food accessibility and affordability are still inflation, unemployment, and poverty. Many Nigerians are unable to afford essential food items due to the high rate of inflation, which has reduced household purchasing power. Hunger and poverty are closely related since access to sufficient nourishment is hampered by low income. According to studies, 133 million Nigerians, or 63% of the country's population, live in multidimensional poverty, and the rising unemployment figure has made it harder for households to satisfy their food demands (NBS, 2022).

Inadequate Funding

Majority of Nigeria's agriculture and nutrition policies are still underfunded. Nigeria's financial allocation continuously falls short of the 2014 Maputo Declaration's goal to devote at least 10% of yearly national budgets to agriculture (CAADP, 2019). As a result, resource limitations hinder the efficacy of important agricultural programmes like the Anchor Borrowers' Programme (ABP) and other rural development initiatives (CBN, 2021; NIRSAL Microfinance Bank, 2022).

Weak Institutional Coordination and Framework

Policy implementation gaps are caused by institutional inefficiencies and inadequate coordination between Federal, State, and Local Government entities. Duplication of effort and resource waste result from overlapping mandates and a lack of cooperation among parties. According to Osabohien *et al*. (2018), poor institutional quality has a detrimental impact on food security, impeding efforts to achieve zero hunger.

Corruption and Governance Deficits

Nigeria's agricultural growth and food security are still severely hampered by corruption. The goals of food security efforts are frequently undermined by the diversion of funds and resources intended for agricultural development for personal benefit. Food security is positively correlated with effective corruption control, according to empirical research (Osabohien *et al*., 2019). In a similar vein, (Olomola, 2017) noted that poor resource management and a lack of transparency impair program results and public confidence in food security initiatives.

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Insecurity and Conflict

Agricultural production has been badly hampered by widespread instability, especially in the North-East, North-West, and North-Central regions. Farmers have been unable to reach their farmlands due to the actions of kidnappers, bandits, and rebels. For example, recipients of the Anchor Borrowers' Programme (ABP) blamed displacement brought on by insecurity for their incapacity to repay loans (Nnodim *et al*., 2021). According to reports gathered by (Ewing-Chow, 2022; Okojie, 2022; Shiklam, 2022 Benjamin, 2023), bandits frequently impose fees on farmers before granting them access to their properties; noncompliance leads to kidnapping or even death. As a result, food shortages and increased hunger have resulted from a sharp decline in agricultural productivity.

Internal Displacement and Food Losses

Due to insecurity, millions of farmers have been forced to leave their homes and land, becoming internally displaced people (IDPs). Poverty and hunger are made worse by displacement, which results in a loss of access to farms, food production, and livelihoods. It is challenging for IDPs to buy food and proper nutrition since they frequently lack access to steady income (Dooshima *et al*., 2022). This makes the cycle of food insecurity among disadvantaged groups even more entrenched.

Environmental and Climate Change Challenges

Nigeria's food production is seriously threatened by climate change. Droughts, desertification, and flooding are examples of extreme weather occurrences that have drastically decreased agricultural production. Thousands of hectares of cropland are still destroyed by annual floods, and protracted dry spells impede crop growth. These climate-related shocks worsen hunger nationwide and jeopardize the viability of agricultural livelihoods (Nugroho *et al*., 2022).

Population Growth

Nigeria's food supply systems are under tremendous strain due to the country's fast population increase. In order to explain the discrepancy between Nigeria's exponential population growth and its arithmetic increase in food production, Osabohien *et al*. (2019) used the Malthusian theory of population. Because of this, food demand continuously exceeds supply, resulting in shortages and the rising cost of food.

Way Forward in Achieving Zero Hunger (SDG 2) in Nigeria

Despite the significant challenges to achieving SDG 2 in Nigeria, there exist multiple opportunities to strengthen food security, enhance nutrition, and promote sustainable agriculture. These opportunities can be leveraged through targeted policies, institutional reforms, and strategic partnerships.

Strengthening Agricultural Productivity
Increasing agricultural output is still essential to guaranteeing food security. Yields can be greatly increased by investing in climate-resilient technologies, mechanization, and contemporary farming methods. Productivity and earnings can be further increased by providing smallholder farmers with subsidies, access to high-quality inputs, and extension services. To guarantee sustained growth, initiatives like the Growth Enhancement Support Scheme (GESS) and the Anchor Borrowers' Programme (ABP) could be extended to incorporate mechanized assistance and advanced farm training (CBN, 2021; FMARD, 2016).

Enhancing Social Protection Programmes
Social protection programmes like the Home-Grown School Feeding Programme (HGSFP) and Conditional Cash Transfer (CCT) improve nutrition results and give poor communities instant relief. The impact of these initiatives can be increased by growing them, enhancing their targeting strategies, and guaranteeing steady funding. To close the most important gaps in food security, special measures for women, children, the elderly, and displaced people are necessary (World Bank, 2022).

Promoting Sustainable Practices
To lessen the negative effects of climate change on food supply, sustainable agricultural techniques are essential. Resilience can be increased through climate-smart agriculture, the use of renewable energy in farming, and better soil and water management. Food availability and affordability can also be enhanced by policies that minimize food waste along the supply chain, improve storage facilities, and reduce post-harvest losses (Nugroho *et al*., 2022).

Collaboration among Multiple Stakeholders
Strong cooperation between the government, businesses, civil society organizations, and international development partners is necessary to achieve zero hunger. The implementation of national initiatives can be supported and progress tracking improved by utilizing international funds, technical know-how, and knowledge-sharing platforms. A helpful paradigm for organizing multi-stakeholder action is offered by forums like the Nigeria Zero Hunger Forum (IITA, 2017).

Strengthening Policy Coherence
To avoid policy fragmentation, existing agricultural and nutrition policies should be harmonized under a unified food systems approach. This will reduce duplication, foster synergy, and enhance the efficiency of interventions across sectors (FMARD, 2016).

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Investing in Agricultural Research and Extension
To spur innovation, enhance crop varieties, and advance climate-resilient farming practices, investments in agricultural research and extension services are essential. Farmers can embrace best practices and increase productivity by strengthening knowledge transfer systems (Osabohien *et al*., 2018).

Empowering Women and Youth
Household food security can be increased by focused interventions that increase women and youth access to markets, loans, land, and education. Since they make up a sizable section of Nigeria's agricultural labour force and are disproportionately impacted by hunger and poverty, empowering these groups is essential (Olomola, 2017).

Scaling Up Nutrition-Sensitive Interventions
Malnutrition can be more successfully addressed by integrating nutrition-sensitive measures into the fields of agriculture, health, and education. Initiatives for food production should be complemented by mainstreaming programmes that support nutrition education, micronutrient supplementation, and dietary diversity (FAO, 2021).

Public-Private Partnerships (PPP)
Promoting private sector involvement in agriculture, food processing, logistics, and storage facilities can strengthen supply chains, lower post-harvest losses, and increase the supply of reasonably priced, nutrient-dense foods. Additionally, public-private partnerships can encourage innovation in agro-processing and make investments in rural development easier (World Bank, 2022).

Conclusion

This review process has shown that agricultural mechanization is a key strategy for tackling Nigeria’s current hunger problem and accelerating the achievement of Sustainable Development Goal 2 (Zero Hunger). Nigeria frequently performs poorly on global hunger indices, indicating that food insecurity and malnutrition are pervasive despite the country’s vast agricultural workforce, abundance of arable land, and multiple policy interventions. The analysis made available from several research works show that poor implementation, insufficient funding, restricted access to suitable mechanization, insecurity, and institutional inefficiencies rather than a lack of policies or programmes are the main problems.

In the past, increased investments in infrastructure, mechanization, and concerted governmental action were strongly linked to periods of improved agricultural performance in Nigeria. Although recent government and state initiatives such as

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mechanization centres, tractor hiring programmes, and public-private partnerships show a renewed commitment, their scope and durability are still insufficient in light of Nigeria's fast expanding population and food needs. Increasing productivity, lowering post-harvest losses, boosting farm incomes, encouraging women's and young people's involvement, and bolstering agricultural value chains are all benefits of mechanization that have been shown to be essential to reaching zero hunger.

However, economic volatility, insecurity, shocks connected to climate change, deficiencies in governance, and inadequate institutional coordination limit the realization of these advantages. Mechanization initiatives by themselves won't have the revolutionary effect needed to eradicate hunger if these systemic obstacles aren't addressed. Therefore, achieving SDG 2 in Nigeria necessitates a comprehensive and integrated strategy to food systems, one that incorporates robust social protection programmes, increased policy coherence, sustained finance, efficient monitoring and evaluation of projects and programmes, inclusive stakeholder cooperation, and scaled-up, climate-smart mechanization.

In conclusion, agricultural mechanization is non-negotiable as a major driver of sustainable agricultural development and ending hunger in Nigeria, but this cannot stand-alone remedy except there is a strict compliance of implemented laws by stakeholder, government and NASS. Hence, mechanization can make a substantial contribution to sustainable food security, better nutrition, poverty reduction, and national development when it is integrated into a supportive policy framework, stronger institutions, enhanced security, and inclusive economic growth. If Nigeria wants to fulfill its SDG 2 obligations by 2030 and ensure that its people will not go hungry in the future, these reforms must be implemented.

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