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PREFACE

This volume brings together a collection of scholarly contributions that examine critical issues in agricultural development, food security, and rural livelihoods in developing regions. As global challenges such as population growth, climate change, and economic inequality continue to intensify, the role of agriculture as a foundation for sustainable development has become increasingly significant.

The chapters in this book address key themes related to agricultural productivity, social inclusion, and food security. The analysis of agricultural extension programs highlights their impact on improving the livelihoods of smallholder farmers and enhancing agricultural efficiency. The discussion on gender mainstreaming in food security initiatives emphasizes the importance of inclusive approaches in achieving sustainable development goals. In addition, the examination of agricultural insecurity explores the structural challenges, vulnerabilities, and coping strategies that shape rural livelihoods in developing contexts.

By adopting a multidisciplinary perspective, this volume integrates insights from agricultural economics, rural development, and social policy. It contributes to academic discourse while also offering practical implications for policymakers, development practitioners, and researchers working to strengthen food systems and improve rural livelihoods.

It is hoped that this book will serve as a valuable resource for scholars and practitioners interested in agriculture, development, and food security, while encouraging further research on inclusive and sustainable solutions to global challenges.

Editorial Team
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CHAPTER 1
IMPACT OF AGRICULTURAL EXTENSION PROGRAMS ON THE LIVELIHOODS OF SMALLHOLDER MAIZE FARMERS IN NIGERIA: A REVIEW

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INTRODUCTION

Agriculture remains a cornerstone of the Nigerian economy, contributing significantly to employment, income generation, and food security. The sector employs a large proportion of the rural population and serves as a primary source of livelihood for millions of households. According to the National Bureau of Statistics, agriculture consistently accounts for a substantial share of Nigeria's labour force and contributes meaningfully to the country's Gross Domestic Product (National Bureau of Statistics, 2021). Similarly, the World Bank (2022) emphasizes that agriculture plays a critical role in poverty reduction and rural development in Nigeria. Despite its importance, agricultural productivity in Nigeria remains relatively low due to several structural and institutional constraints. These include limited access to improved technologies, inadequate use of quality inputs, poor infrastructure, and weak extension and support systems (World Bank, 2022; Food and Agriculture Organization, 2019). These challenges continue to hinder the ability of smallholder farmers to achieve optimal productivity and improve their livelihoods.

Among the major staple crops cultivated in Nigeria, maize occupies a prominent position due to its versatility and widespread consumption. Maize serves as a staple food for households, a raw material for agro-processing industries, and a major component of livestock feed. Its adaptability across different agro-ecological zones has made it one of the most widely cultivated crops among smallholder farmers (Food and Agriculture Organization, 2018). Consequently, improving maize productivity is essential for enhancing food security and increasing the incomes of rural farming households.

Agricultural extension services play a critical role in bridging the gap between research institutions and farmers. These services are designed to disseminate improved agricultural technologies, provide advisory support, and enhance farmers' knowledge and skills (Agwu, Ekwueme, & Anyanwu, 2008; Davis & Sulaiman, 2014). Through extension programs, farmers gain access to vital information on improved seed varieties, fertilizer application, pest and disease management, and climate-smart agricultural practices, which can significantly enhance productivity and efficiency.

The relationship between agricultural extension services and farmers' livelihoods has been widely documented. Effective extension delivery contributes to increased farm output, improved income, enhanced food security, and better living standards among rural households (Davis, 2008; Anderson & Feder, 2007). In addition, extension interventions often facilitate access to markets, credit services, and farmer-based organizations, which further strengthen livelihood outcomes and resilience. However, the effectiveness of extension services varies across regions and programs, depending on factors such as institutional capacity, funding levels, policy support, and farmers' socio-economic characteristics.

Despite numerous agricultural extension initiatives implemented in Nigeria, there is still mixed evidence regarding their actual impact on the livelihoods of smallholder maize farmers. While some studies report positive outcomes in terms of productivity and income gains, others highlight persistent challenges such as limited coverage, inadequate funding, and weak institutional coordination (Anderson & Feder, 2007; Davis & Sulaiman, 2014). This inconsistency underscores the need for a comprehensive synthesis of existing empirical evidence. Therefore, this review critically examines and synthesizes available literature on the impact of agricultural extension programs on the livelihoods of smallholder maize farmers in Nigeria, with the aim of identifying key findings, research gaps, and policy implications for improving extension service delivery.

1. CONCEPTUAL CLARIFICATIONS

1.1 Agricultural Extension

Agricultural extension refers to a system of informal education and advisory services aimed at improving farmers' knowledge, skills, and practices in order to enhance agricultural productivity and livelihoods. It functions as a critical link between research institutions and farmers by facilitating the dissemination and adoption of agricultural innovations and technologies (Agwu, Ekwueme, & Anyanwu, 2008; Davis & Sulaiman, 2014).

In the Nigerian context, agricultural extension encompasses a wide range of activities, including farmer training, demonstration of improved agricultural practices, advisory services on input use, and dissemination of market and production information. These services are essential for improving farm management decisions and increasing productivity among smallholder farmers.

Over time, the concept of agricultural extension has evolved from a conventional top-down technology transfer model to a more participatory and demand-driven approach. This modern perspective emphasizes farmer empowerment, capacity building, innovation systems, and knowledge co-creation (Davis & Sulaiman, 2014; Anderson & Feder, 2007). Extension services in Nigeria are delivered through public sector agencies, private organizations, and non-governmental institutions, all of which play complementary roles in enhancing farmers' productivity and welfare.

1.2 Livelihood (Sustainable Livelihood Framework)

The concept of livelihood is widely understood within the framework of the Sustainable Livelihood Approach, which provides a comprehensive lens for analyzing how individuals and households sustain their living. A livelihood comprises the capabilities, assets, and activities required for a means of living (Chambers & Conway, 1992). Within this framework, livelihood assets are commonly categorized into five key forms of capital: human capital (skills, education, and health), natural capital (land and water resources), financial capital (income, savings, and access to credit), physical capital (infrastructure, tools, and equipment), and social capital (networks, relationships, and institutional linkages). These assets interact within a broader vulnerability context shaped by shocks, trends, and seasonality (Scoones, 1998).

A livelihood is considered sustainable when it can withstand and recover from shocks, maintain or enhance its capabilities and assets over time, and provide opportunities for future generations (Scoones, 1998). In the context of smallholder maize farmers in Nigeria, livelihood outcomes often include increased agricultural productivity, improved income levels, enhanced food security, and accumulation of productive assets. Agricultural extension services contribute to these outcomes by strengthening farmers' access to knowledge, technologies, and institutional support systems.

Smallholder Farmers

Smallholder farmers are commonly defined as agricultural producers who cultivate relatively small plots of land, rely largely on family labour, and operate with limited access to capital, inputs, and modern technologies. In Nigeria, smallholder farmers constitute the majority of agricultural producers and contribute significantly to national food production and rural employment (National Bureau of Statistics [NBS], 2021; Food and Agriculture Organization, 2019).

Although there is no universally fixed threshold, smallholder farmers in sub-Saharan Africa typically cultivate less than 2 hectares of land. They are often characterized by low levels of mechanization, limited access to improved inputs and credit, and high vulnerability to climatic and market-related risks (Food and Agriculture Organization, 2019; World Bank, 2022). Despite these constraints, smallholder farmers play a central role in ensuring food security and sustaining rural livelihoods. Enhancing their productivity, resilience, and market participation remains a key priority for agricultural and economic development in Nigeria.

Agricultural Extension Programs in Nigeria

Agricultural extension programs refer to organized interventions aimed at improving agricultural productivity and farmers' livelihoods through the provision of advisory services, dissemination of innovations, and facilitation of access to inputs and institutional support (Anderson & Feder, 2007; Davis & Sulaiman, 2014). In Nigeria, several major extension initiatives have been implemented to support smallholder farmers. One of the most prominent public extension systems is the Agricultural Development Programme (ADP), which was established to promote integrated rural development. The ADP system focuses on the delivery of extension services, input support, and rural infrastructure development through a network of extension agents who engage farmers via regular farm visits, training sessions, and demonstration plots (World Bank, 2012).

Another important initiative is the Fadama Project, a World Bank-assisted program designed to improve the livelihoods of rural households through a community-driven development approach.

The program emphasizes increased access to productive resources such as irrigation facilities, agricultural inputs, rural infrastructure, and advisory services, particularly for smallholder crop and livestock farmers (World Bank, 2016).More recently, the Agro-Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) Project has been implemented to strengthen agricultural value chains, improve productivity, and enhance farmers' incomes. The project focuses on capacity building, access to improved technologies, and market linkages, especially for smallholder farmers (World Bank, 2020). These extension programs play a significant role in strengthening farmers' capacities and improving livelihood outcomes. However, their effectiveness varies across regions and over time due to differences in implementation strategies, funding levels, institutional capacity, and policy support.

2. THEORETICAL FRAMEWORK

This study is anchored on two key theoretical perspectives: the Diffusion of Innovations Theory and the Sustainable Livelihood Framework. These frameworks provide a robust basis for understanding how agricultural extension services influence technology adoption and livelihood outcomes among smallholder maize farmers in Nigeria. While the Diffusion of Innovations Theory explains the process of technology uptake, the Sustainable Livelihood Framework provides insight into how such adoption translates into improved livelihood outcomes.

Diffusion of Innovations Theory

The Diffusion of Innovations Theory, developed by Everett M. Rogers, explains how new ideas, technologies, and practices spread within a social system over time. According to Rogers (2003), diffusion is the process by which an innovation is communicated through specific channels among members of a social system.

The theory identifies five key attributes of innovations that influence their rate of adoption: relative advantage, compatibility, complexity, trialability, and observability.

It also classifies adopters into five categories innovators, early adopters, early majority, late majority, and laggards—based on their willingness and speed of adopting new technologies.

In the context of agricultural extension, this theory is highly relevant because extension agents act as change agents who facilitate the dissemination of improved agricultural technologies. Through training, demonstrations, and advisory services, extension programs enhance farmers' awareness and understanding of innovations, thereby influencing their adoption decisions (Agwu, Ekwueme, & Anyanwu, 2008; Rogers, 2003). For smallholder maize farmers in Nigeria, the adoption of improved seeds, fertilizers, and modern farming practices depends largely on how effectively extension services communicate these innovations and address farmers' perceptions and constraints. Thus, the Diffusion of Innovations Theory provides a useful framework for explaining the role of extension services in promoting technology uptake and improving agricultural productivity.

Sustainable Livelihood Framework

The Sustainable Livelihood Framework offers a comprehensive approach to understanding how households utilize available resources to achieve desired livelihood outcomes. The framework emphasizes the interaction between livelihood assets, institutional processes, and external factors such as policies, shocks, and trends (Chambers & Conway, 1992; Scoones, 1998). It identifies five key categories of livelihood assets: human capital (skills, knowledge, and health), natural capital (land and environmental resources), financial capital (income, savings, and access to credit), physical capital (infrastructure and productive assets), and social capital (networks and institutional relationships). These assets shape the livelihood strategies that households adopt.

Agricultural extension services play a critical role in strengthening these livelihood assets. For instance, extension enhances human capital through knowledge dissemination, improves access to inputs and technologies (physical capital), facilitates linkages to credit sources (financial capital), and promotes farmer organizations and networks (social capital).

In the context of smallholder maize farmers in Nigeria, the framework helps to explain how participation in extension programs can lead to improved livelihood outcomes such as increased income, enhanced food security, and asset accumulation. Beyond promoting the adoption of improved technologies, extension services also strengthen farmers' capacity to cope with risks and adapt to changing environmental and economic conditions.

Relevance of the Theories to the Study

The integration of the Diffusion of Innovations Theory and the Sustainable Livelihood Framework provides a comprehensive understanding of the role of agricultural extension programs in rural development. While the Diffusion of Innovations Theory explains the processes through which farmers become aware of, evaluate, and adopt improved agricultural technologies (Rogers, 2003), the Sustainable Livelihood Framework highlights how such adoption translates into improved livelihood outcomes through enhanced access to assets and opportunities (Chambers & Conway, 1992; Scoones, 1998). Together, these frameworks demonstrate that effective agricultural extension services not only promote the adoption of improved technologies but also contribute to broader livelihood improvements among smallholder farmers. They further underscore the importance of strengthening extension systems, institutional support, and farmer capacity to achieve sustainable agricultural development in Nigeria.

3. OVERVIEW OF AGRICULTURAL EXTENSION PROGRAMS IN NIGERIA

Agricultural extension service delivery in Nigeria has evolved through various institutional arrangements involving public sector agencies, donor-supported initiatives, and, more recently, private sector participation. These programs are designed to improve agricultural productivity, enhance farmers' access to innovations, and strengthen rural livelihoods (Anderson & Feder, 2007; Davis & Sulaiman, 2014). This section provides an overview of major agricultural extension programs in Nigeria.

3.1 Agricultural Development Programmes (ADPs)

The Agricultural Development Programmes (ADPs) represent one of the most prominent public sector extension systems in Nigeria. Established in the 1970s with support from the World Bank, the ADPs were designed to provide integrated agricultural services, including extension delivery, input support, rural infrastructure development, and farmer training (World Bank, 2012).

The ADP system adopted the Training and Visit (T&V) extension approach, which involves regular and structured interactions between extension agents and farmers. Through farm visits, demonstrations, and training sessions, extension agents disseminate improved agricultural technologies and provide advisory services aimed at enhancing productivity (Anderson & Feder, 2007; Agwu, Ekwueme, & Anyanwu, 2008). This approach strengthened communication between extension personnel and farmers and contributed to increased awareness and adoption of innovations, particularly during its early years of implementation. Despite its initial successes, the effectiveness of ADPs has declined over time due to several challenges, including inadequate funding, weak logistical support, and a high extension agent-to-farmer ratio (World Bank, 2012; Anderson & Feder, 2007). These constraints have limited the coverage and efficiency of extension service delivery. Nevertheless, ADPs remain a central institutional framework for agricultural extension in Nigeria and continue to play an important role in supporting smallholder farmers.

Fadama Projects

The Fadama Projects represent some of the most significant donor-funded agricultural development initiatives in Nigeria. Supported by the World Bank, the three phases Fadama I, Fadama II, and Fadama III were designed to improve the livelihoods of rural households through a community-driven development approach (World Bank, 2016). The projects focus on enhancing farmers' access to productive resources such as irrigation facilities, improved inputs, rural infrastructure, and advisory services. Unlike conventional top-down extension systems, the Fadama approach emphasizes participatory development, where beneficiaries are actively involved in identifying their needs, planning interventions, and managing resources.

This participatory model strengthens local ownership and improves the relevance of interventions to farmers' socio-economic conditions.

Empirical evidence from project evaluations indicates that the Fadama initiatives contributed to increased agricultural productivity, higher household incomes, and improved welfare among participating farmers (World Bank, 2016; World Bank, 2008). However, concerns have been raised regarding the sustainability of project outcomes, uneven access to benefits, and the capacity of local institutions to maintain gains after project completion.

APPEALS Project

The Agro-Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) Project is a more recent agricultural intervention aimed at strengthening agricultural value chains and improving farmers' livelihoods in Nigeria. The project, supported by the World Bank, targets key value chains such as maize, rice, and livestock, with a focus on enhancing productivity and promoting agribusiness development (World Bank, 2020). The APPEALS Project integrates agricultural extension services with capacity building, access to improved technologies, and market linkages. It emphasizes value addition, innovation platforms, and inclusive participation, particularly among youth and women. By fostering linkages among farmers, processors, and markets, the project seeks to enhance efficiency across agricultural value chains and increase farmers' incomes.

Available evidence from implementation reports suggests that the project has contributed to improvements in productivity, skills development, and market access among participating farmers. However, the extent of its impact varies across participating states, largely depending on differences in implementation effectiveness, institutional capacity, and stakeholder coordination (World Bank, 2020).

3.2 Non-Governmental Organizations (NGOs) and Private Extension Services

In addition to public sector programs, non-governmental organizations (NGOs) and private sector actors play an increasingly important role in agricultural extension service delivery in Nigeria.

These organizations provide advisory services, farmer training, input support, and market information, often focusing on underserved and hard-to-reach rural communities (Davis & Sulaiman, 2014; Food and Agriculture Organization, 2019). Private extension services including agro-dealers, consulting firms, and agribusiness companies have emerged to complement public extension systems. These actors frequently utilize digital technologies such as mobile phones, radio platforms, and internet-based tools to disseminate agricultural information and improve farmers' access to extension services (Food and Agriculture Organization, 2019; World Bank, 2022). The integration of digital tools has enhanced the efficiency, timeliness, and reach of advisory services, particularly among younger and more market-oriented farmers.

NGOs and private extension providers are often effective in introducing innovative approaches, promoting participatory learning, and addressing specific constraints along agricultural value chains. Their interventions typically emphasize capacity building, market linkages, and inclusive development. However, their operations may be constrained by issues such as high service costs, questions of long-term sustainability, and uneven geographic coverage, which can limit their overall impact relative to public extension systems (Davis & Sulaiman, 2014; Anderson & Feder, 2007).

4. REVIEW OF EMPIRICAL STUDIES

Empirical evidence on the impact of agricultural extension programs on smallholder farmers' livelihoods in Nigeria presents mixed but generally positive outcomes. Existing studies indicate that extension services contribute to improvements in productivity, income, and food security, although the magnitude of these effects varies depending on access to resources, institutional support, and local conditions. This section reviews relevant empirical literature across key livelihood dimensions, including productivity, income, and food security.

Impact on Productivity

Agricultural extension services play a critical role in improving farm productivity through the dissemination of improved technologies and best management practices.

Empirical studies consistently show that farmers who participate in extension programs are more likely to adopt improved seed varieties, fertilizer use, and crop management techniques, resulting in higher crop yields (Agwu, Ekwueme, & Anyanwu, 2008; Anderson & Feder, 2007). Evidence from sub-Saharan Africa further indicates that extension-supported adoption of improved agricultural practices, including climate-smart agriculture, can significantly enhance productivity among smallholder farmers (Davis, 2008; World Bank, 2022). However, the extent of productivity gains is often constrained by limited access to inputs, inadequate credit facilities, and weak extension coverage, particularly in rural areas (Food and Agriculture Organization, 2019).

For smallholder maize farmers in Nigeria, productivity challenges such as pest infestations (including fall armyworm), declining soil fertility, and limited access to quality seeds remain critical. Extension services that provide targeted advisory support on pest management, soil fertility improvement, and the use of improved maize varieties have been shown to enhance yields and reduce production risks.

Impact on Income

Agricultural extension services influence farm income by promoting efficient production practices, facilitating market access, and improving farmers' access to inputs and information (Anderson & Feder, 2007; Davis & Sulaiman, 2014). Farmers with access to extension services tend to achieve higher productivity, which translates into increased income levels. In addition, extension programs often support linkages to markets, agribusiness actors, and value chain participants, enabling farmers to obtain better prices and reduce post-harvest losses. However, empirical evidence suggests that income gains are sometimes modest and uneven due to high production costs, price volatility, weak market infrastructure, and broader institutional constraints (Food and Agriculture Organization, 2019; World Bank, 2022).

Among smallholder maize farmers, participation in extension programs has been associated with improved income through increased yields, better post-harvest handling, and enhanced access to market information. Effective extension support enables farmers to make informed production and marketing decisions, thereby improving profitability and economic resilience.

Impact on Food Security

Participation in agricultural extension programs contributes to improved household food security by increasing agricultural output and enhancing income, which in turn improves food availability and access (Davis, 2008; Food and Agriculture Organization, 2019). Extension services also promote improved agronomic practices and diversification strategies that enhance the stability of food production systems. However, the relationship between extension participation and food security is influenced by external factors such as climate variability, post-harvest losses, and inadequate storage infrastructure. These challenges may limit the extent to which increased production translates into sustained food security outcomes (World Bank, 2022).

Given that maize is a major staple food in Nigeria, improvements in maize productivity have direct implications for household food security. Extension interventions that focus on improved seed varieties, pest management, post-harvest handling, and storage technologies are particularly important in ensuring stable and adequate food supplies for smallholder households throughout the year.

Impact on Assets and Livelihoods

Agricultural extension programs influence broader livelihood outcomes beyond productivity and income, particularly in terms of asset accumulation and overall household welfare. Participation in extension services enhances farmers' knowledge and access to improved technologies, which can lead to increased investment in productive assets such as farm tools, equipment, and storage facilities (Anderson & Feder, 2007; Davis, 2008). Extension interventions also facilitate access to information on markets, credit, and input use, thereby enabling farmers to make more informed economic decisions and diversify their income sources. This, in turn, contributes to improved household welfare, including better access to education, healthcare, and improved living conditions (Food and Agriculture Organization, 2019).

Furthermore, extension-supported innovation platforms and farmer organizations help strengthen social capital and enhance farmers' resilience to economic and environmental shocks (Davis & Sulaiman, 2014).

However, the extent of asset accumulation among smallholder farmers is often constrained by low income levels, limited access to credit, and broader structural challenges within the agricultural sector (World Bank, 2022). For maize producers in Nigeria, access to extension services facilitates investment in key inputs such as improved seed varieties, fertilizers, and post-harvest storage technologies. These investments enhance resilience to pests, climate variability, and market fluctuations, thereby contributing to more stable livelihoods and gradual asset accumulation.

5. CHALLENGES OF AGRICULTURAL EXTENSION IN NIGERIA

Despite the recognized importance of agricultural extension services in enhancing agricultural productivity and improving rural livelihoods, extension delivery in Nigeria continues to face significant structural and institutional challenges. These constraints limit the effectiveness, coverage, and sustainability of extension services, particularly for smallholder farmers.

Poor Funding

One of the most critical challenges facing agricultural extension services in Nigeria is inadequate and inconsistent funding. Public extension systems, particularly the Agricultural Development Programmes (ADPs), depend largely on government budgetary allocations, which are often insufficient to meet operational needs (World Bank, 2012; Anderson & Feder, 2007).

Limited funding has resulted in poor logistics, restricted mobility of extension agents, and inadequate provision of training materials and demonstration inputs. In addition, the decline in external donor support, which played a significant role during the early establishment of ADPs, has further weakened the financial capacity of extension systems. As a result, many extension programs struggle to maintain regular contact with farmers and to deliver effective advisory services.

Inadequate Extension Agents and Weak Farmer–Extension Agent Ratio

The shortage of qualified extension personnel remains a major constraint in Nigeria's agricultural sector. Available evidence indicates that the number of extension agents is insufficient relative to the large farming population, resulting in a high extension agent-to-farmer ratio (Agwu, Ekwueme, & Anyanwu, 2008; Food and Agriculture Organization, 2019). Although precise estimates vary, studies consistently show that the ratio of extension agents to farmers in Nigeria is far above the recommended levels for effective service delivery. While an ideal ratio is often suggested to be within the range of 1:800 to 1:1,000, actual ratios in many parts of Nigeria are significantly higher, sometimes reaching several thousand farmers per extension agent (Food and Agriculture Organization, 2019; World Bank, 2022). This imbalance reflects a persistent gap between the demand for extension services and the available human resources. In many rural areas, particularly in northern Nigeria, the situation is further aggravated by difficult terrain, limited infrastructure, and inadequate staffing. Consequently, extension agents are often overburdened, covering large geographical areas with minimal logistical support. The high farmer-to-extension agent ratio reduces the frequency and quality of interactions between farmers and extension personnel, limiting the effectiveness of advisory services. This, in turn, affects farmers' awareness, adoption of improved technologies, and overall productivity, thereby weakening the impact of extension programs on rural livelihoods.

Poor ICT Access and Utilization

The integration of Information and Communication Technologies (ICTs) into agricultural extension has the potential to improve the efficiency, speed, and coverage of advisory services. ICT-based platforms such as mobile phones, radio, and internet-based systems can enhance farmers' access to timely agricultural information and support decision-making (World Bank, 2022; Food and Agriculture Organization, 2019). However, the adoption and utilization of ICT tools in Nigeria remain limited, particularly in rural farming communities.

Key constraints include poor internet connectivity, inadequate electricity supply, low levels of digital literacy among farmers, and limited access to affordable digital devices. These challenges significantly reduce the effectiveness of digital extension approaches and limit their complementarity with traditional face-to-face extension methods.

As a result, the potential of ICT-enabled extension services to expand outreach, reduce costs, and improve responsiveness has not been fully realized in many agricultural communities. Strengthening rural digital infrastructure and improving farmers' ICT capacity are therefore critical for enhancing extension service delivery.

Policy Instability and Institutional Fragmentation

Frequent changes in agricultural policies and weak continuity in Programme implementation remain major challenges to effective extension service delivery in Nigeria. Policy inconsistency often results in shifts in priorities, funding arrangements, and implementation strategies, which disrupts ongoing agricultural interventions and reduces their long-term impact (World Bank, 2012; Food and Agriculture Organization, 2019). In many cases, agricultural programmes are discontinued before achieving their intended objectives, while newly introduced initiatives often suffer from weak planning, limited stakeholder engagement, and poor alignment with farmers' needs. This situation reduces policy effectiveness and undermines farmers' confidence in government-led agricultural development efforts. In addition, weak institutional coordination among key actors in the agricultural sector—including government agencies, research institutes, non-governmental organizations, and private sector stakeholders—further constrains extension effectiveness. The lack of a well-integrated institutional framework leads to poor communication, fragmented service delivery, and limited synergy between research and extension systems (Davis & Sulaiman, 2014).

Consequently, innovations developed by research institutions are not always effectively transferred to farmers, while feedback from farmers is often not adequately incorporated into research and policy processes. This disconnect contributes to duplication of efforts, inefficient use of limited resources, and uneven distribution of extension services across regions.

Strengthening coordination mechanisms and promoting a unified agricultural innovation system are therefore essential for improving extension effectiveness and sustainability.

6. RESEARCH GAPS

Despite substantial research on agricultural extension in Nigeria, several important gaps remain in the literature regarding its effects on smallholder maize farmers' livelihoods. Identifying these gaps is essential for guiding future empirical studies and improving policy and extension practice.

Lack of Long-Term Impact Studies

Most existing studies on agricultural extension in Nigeria focus on short-term outcomes such as immediate increases in productivity or income gains following participation in extension programmes (Ogunlade et al., 2012; World Bank, 2022). However, there is limited longitudinal evidence assessing the sustained impact of extension services on livelihood outcomes such as asset accumulation, resilience building, and long-term food security. This creates a gap in understanding whether observed improvements are temporary or sustained over time. Without long-term analysis, it remains difficult to determine the durability and true developmental impact of agricultural extension interventions on smallholder farmers.

Limited Focus on Maize-Specific Farmers

Although several studies have examined the general effects of agricultural extension services on farmer productivity and livelihoods, relatively few have focused specifically on maize producers in Nigeria, despite maize being one of the country's most important staple and industrial crops (Food and Agriculture Organization, 2019).

This gap is significant because maize production involves distinct agronomic, economic, and post-harvest challenges compared to other crops. These include limited access to improved seed varieties, inefficient fertilizer use, pest pressures such as fall armyworm, climate variability, and substantial post-harvest losses due to inadequate storage facilities.

In addition, maize farmers operate within unique value chain structures influenced by input access, price fluctuations, aggregation systems, and market linkages. These factors shape production decisions and livelihood outcomes in ways that may not be captured in general agricultural extension studies.

The absence of crop-specific analysis limits the ability to design targeted extension interventions that address the unique constraints faced by maize producers. A maize-focused approach is therefore necessary to generate more precise evidence on how extension services influence productivity, income, and resilience in maize-based farming systems. Such focused research would provide stronger evidence for policymakers and extension practitioners to design more effective, context-specific interventions aimed at improving maize productivity and rural livelihoods in Nigeria.

Weak Integration of Digital Extension Approaches

Digital technologies such as mobile phones, radio, interactive voice response (IVR) systems, social media, and other ICT-based advisory tools have the potential to transform agricultural extension service delivery in Nigeria. These tools can complement traditional extension systems by improving the speed, reach, and cost-effectiveness of information dissemination, particularly in contexts where extension personnel are limited (World Bank, 2022; Food and Agriculture Organization, 2019).

Through digital platforms, farmers can access timely information on weather conditions, pest outbreaks, input availability, and market prices, thereby improving decision-making and production efficiency. However, despite these advantages, the integration of digital extension approaches into Nigeria's agricultural extension system remains weak and uneven. Extension delivery continues to rely heavily on conventional methods such as farm visits, group meetings, and demonstration plots, with limited and largely uncoordinated use of digital tools. Where digital interventions exist, they are often implemented as pilot projects with limited scale and sustainability.

Several constraints account for this weak integration. These include inadequate rural digital infrastructure, limited access to smartphones and internet services among smallholder farmers, low levels of digital literacy, and insufficient capacity of extension personnel to effectively use ICT-based tools.

Institutional challenges such as weak coordination, limited funding, and absence of clear digital extension policies further hinder mainstream adoption. In addition, there remains limited empirical evidence on the effectiveness of digital extension approaches in improving farmer outcomes in Nigeria. Most available studies focus on ICT access rather than the actual impact of digital tools on extension delivery, technology adoption, and productivity outcomes. This highlights the need for more rigorous, context-specific research on how digital and traditional extension systems can be integrated into a complementary hybrid model to enhance agricultural service delivery, particularly in underserved rural areas.

Gender Gaps in Extension Access

A significant gap in the literature on agricultural extension in Nigeria is the limited attention given to gender dynamics in service delivery. Although women constitute a substantial proportion of the agricultural workforce and are actively involved in maize production, processing, and marketing, their access to extension services remains disproportionately low. This limits the inclusiveness and overall effectiveness of extension systems and has implications for productivity and rural livelihoods. Women farmers face several interrelated barriers that constrain their access to extension services. Socio-cultural norms in many rural communities restrict women's interaction with extension agents and limit their access to productive resources such as land, credit, and inputs (Agwu, Ekwueme, & Anyanwu, 2008). These structural inequalities reduce their capacity to benefit fully from extension interventions and adopt improved technologies.

In addition, time constraints and mobility limitations further reduce women's participation in extension activities. Household responsibilities such as childcare, food preparation, and domestic work limit their availability, while distance to training venues and extension offices restricts physical access, especially in rural areas. Programme design limitations also contribute to gender disparities. Many extension programmes are not sufficiently gender-sensitive in terms of timing, language, delivery methods, and content focus.

In some cases, extension messages are not aligned with the specific roles women play within agricultural value chains or fail to accommodate varying literacy levels.

These constraints result in unequal access to agricultural information, lower adoption of improved technologies among women, and persistent gender gaps in productivity and income. Moreover, the limited integration of gender analysis in extension research means that many studies treat farming households as homogeneous units, without sufficient disaggregation by gender. This limits the ability to design targeted interventions that address the specific needs of women farmers. Addressing these gaps is essential for promoting inclusive agricultural development, improving household welfare, and enhancing the overall effectiveness of agricultural extension systems in Nigeria.

Summary

In summary, Agricultural extension programmes in Nigeria have demonstrated notable positive impacts on farmers' productivity, income, and overall livelihoods, several important gaps remain in the literature that limit a comprehensive understanding of their effectiveness. One major gap relates to the sustainability of impact, as most studies focus on short-term outcomes with little attention to whether the benefits of extension interventions are sustained over time or lead to lasting behavioral change among farmers. In addition, there is limited crop-specific analysis, particularly for maize smallholder farmers, despite the strategic importance of maize in Nigeria food system; many studies treat farmers as a homogeneous group, overlooking variations in production systems, technology needs, and market dynamics. Furthermore, there is weak empirical evidence on the role of digital extension, as research on ICT-enabled service delivery remains limited and often fails to examine how digital tools can effectively complement traditional extension approaches, especially in reaching farmers in remote and underserved areas. Another critical gap is the insufficient attention to gender inclusivity, as female farmers continue to face socio-cultural and structural barriers that restrict their access to extension services, inputs, and training opportunities, with many studies lacking gender-disaggregated analysis to capture these disparities.

Addressing these gaps is essential for strengthening evidence-based policymaking, improving the design and implementation of extension programmes, and ultimately enhancing the productivity, resilience, and livelihoods of smallholder maize farmers in Nigeria.

CONCLUSION

This review highlights the critical role of agricultural extension programmes in enhancing the livelihoods of smallholder maize farmers in Nigeria. Empirical evidence indicates that extension services positively influence farm productivity, income, food security, and asset accumulation. Programs such as the Agricultural Development Programmes (ADPs), Fadama Projects, and the APPEALS Project have improved farmers' technical knowledge, access to improved technologies, and market linkages, thereby supporting both production efficiency and livelihood outcomes. Despite these achievements, several challenges limit the full potential of extension services. Key constraints include inadequate funding, insufficient extension personnel, poor farmer–agent ratios, limited access to ICT tools, and frequent policy inconsistencies. Research gaps also persist, particularly regarding long-term impacts of extension programmes, maize-specific interventions, integration of digital approaches, and gender-inclusive services to ensure equitable benefits for female farmers. Addressing these challenges is essential for strengthening extension systems, improving institutional and infrastructural support, and adopting evidence-based, inclusive approaches. With targeted improvements in service delivery, agricultural extension can continue to play a vital role in promoting sustainable agricultural development, enhancing resilience, and securing the livelihoods of smallholder maize farmers in Nigeria.

Recommendations

1. Government and Extension Agencies should strengthen extension systems to address inadequate coverage and poor farmer–agent ratios, ensuring smallholder maize farmers receive consistent, practical support.
2. Program Planners and NGOs should promote digital extension tools, including mobile advisories and online platforms, to fill the digital extension gap and reach more farmers efficiently.

3. Policymakers and Funding Bodies should Increase funding for extension services to overcome resource constraints, support field demonstrations, and improve access to high-quality inputs and technologies.
4. Extension Institutions should enhance the training and capacity of extension agents to deliver relevant, crop-specific advisory services that improve productivity and livelihood outcomes for maize producers.
5. Policymakers should ensure stable, supportive policies that encourage the adoption of innovations, facilitate collaboration among stakeholders, and integrate gender-inclusive strategies to provide equitable benefits for female farmers.

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CHAPTER 2
MAINSTREAMING GENDER IN FOOD SECURITY INITIATIVES FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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INTRODUCTION

Gender in agriculture involves socially constructed roles, norms, and expectations that determine how men and women contribute to and benefit from farming and related agrifood systems (FAO, 2023). These roles include labo ur allocation, access to resources, decision-making power, and control over outputs. Gender norms often restrict women's access to inputs (such as land, credit, and agricultural extension), limit their decision-making authority, and define which tasks are "women's work" versus "men's work." These differences are reinforced by legal, cultural, and institutional authorities (Piedrahita, Costa & Mane 2024).

A major dimension of gender in agriculture is the productivity gap between male-managed and female-managed farms. The FAO's Status of Women in Agrifood Systems (2023) finds that globally, farms managed by women produce about 24% less than those managed by men, when the land size is equal, largely because women have less access to productive inputs like fertilizers, technologies, secure land rights, credit, and extension services.

Gender plays a critical role in agricultural technology adoption. Men and women farmers often differ in their level of access to productive resources such as land, credit, training, and improved technologies (Meinzen-Dick *et al.,* 2020).

Iyere-Freedom & Enwelu (2023) opined that women farmers often have lower access to extension services, credit, input markets, and decision-making power compared to their male counterparts, which constrains their ability to adopt modern technologies and benefit equally

The best approach to gender mainstreaming, is for the needs, roles, and benefits of both men and women to be taken into account. According to Ezeibe, Diogu, Eze, Chiaha and Nwokenna, (2013) women make up more than 50 percent of Nigerian population, and women generally make up 68.8 percent of the agricultural labour force and produce about 80 percent of the Nigerian food output. Decisions should always rely on serious analyses that target justice in sharing resources and power between women and men. Gender roles dictate the social scale and, as a result, socio- cultural patterns that influence women's participation and access to economic resources and responsibilities.

As for leadership and decision-making, women tend to generally stand out only within feminine-focused institutions, and have little impact on wider community matters. In all labour situations, the hierarchical power relations between women and men tend to disadvantage women. Often accepted as "natural," these gender hierarchies are socially determined relations, which are culture-based and subject to change over time (United Nations Economic Commission for Africa, 2014). Rural and indigenous women and men may have different entry barriers to agricultural employment and rural livelihoods. Where women have less access to, and control over productive assets for example, this may reduce their ability to secure a sustainable livelihood.

Gender inequalities in access to productive resources (land, labour, fertilizer, credit, technology, extension and markets) for example, can negatively affect food availability. According to UNCCD (2022), "Gender disparities remain the most pervasive of all inequalities and it hinders best development efforts. Less than 20% of landowners globally are women with men accounting for over 80%,".

Gender relations between and among men and women are important in determining vulnerability to food insecurity and malnutrition. Gender discrimination in the allocation of household resources, including those related to nutrition, may result in an increased incidence of malnutrition among women and girls: this may be compounded in times of crises. Other differences such as age, wealth, ethnicity and caste, interplay with gender to determine food and nutrition security outcomes. Indigenous women, for example, may experience multiple forms of discrimination based on both gender and ethnicity (Sisto, 2007).

The consequences of food insecurity are alarming in many communities across the sub-region, and women and children are more affected than men. According to United Nations Economic Commission for Africa (2014), about 35 per cent of children under five are stunted (the rates are higher in rural areas) and the wasting prevalence ranges from 5 to 10 per cent. Gender mainstreaming in food security is essential for achieving sustainable agricultural practices, improving nutrition, and ensuring equitable access to resources for all genders.

Hence, the relationship between gender and food security is undeniable and of utmost importance to study for sustainable development in Nigeria. Sustainable development is a collection of methods to create and sustain development which seeks to relieve poverty, create equitable standards of living, satisfy the basic needs of all peoples, and establish sustainable political practices, while ensuring that there are no irreversible damages to natural resources and nature (Kothari, 2007).

1. THE CONCEPT OF GENDER MAINSTREAMING

The concept of gender mainstreaming is relatively new. It was first proposed at the 1985 Third World Conference on Women in Nairobi, Kenya. Gender mainstreaming was then recognized as the public concept of assessing the involvement of men and women in any planned policy action, including legislation and programs, in all areas and at all levels. Gender mainstreaming essentially offers a pluralistic approach that values diversity among both women and men (Booth and Bennett, 2002). According to EIGE (2025) it involves the integration of a gender perspective to the preparation, design, implementation, monitoring and evaluation of policies, regulatory measures and spending programmes, with a view to promoting equality between women and men and combating discrimination. In other words, it required both integrating a gender perspective to content of different policies such as in food security and addressing the issue of representation of women in the given policy area.

Furthermore, the UN Women (2015), defined gender mainstreaming as "the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension in the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and social spheres, so that women and men benefit equally and inequality is not perpetrated. The ultimate goal is to achieve gender equality. Gender mainstreaming as a strategy emerged as a result of dissatisfaction with earlier approaches to narrowing gender gaps, which were often directed exclusively on women.

2. THE CONCEPT OF FOOD SECURITY

According to FAO (2022), food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet the dietary needs and food preferences for an active, healthy life. Food insecurity is largely a matter of insufficient agricultural productivity. Food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2023). As noted by Adebayo, *et al.,* (2019) when all people, at all times, have physical and economic access to enough safe and nutritious food for an active and healthy life. Food security has four pillars: availability, access, utilization, and stability. It is both a global and household-level concern, particularly in regions affected by climate variability and poor agricultural productivity (FAO, IFAD, UNICEF, WFP and WHO, 2023).

Food security is one of the most critical global development issues confronting both developed and developing nations. It is closely linked to poverty reduction, health improvement, economic growth, and sustainable development. Despite global advances in agricultural production, millions of people continue to suffer from hunger and malnutrition, especially in Sub-Saharan Africa, including Nigeria (FAO, IFAD, UNICEF, WFP and WHO, 2023). Food security goes beyond food production to include access, utilization, and stability of food systems. It is determined by four main dimensions: availability (supply through production, stocks, and trade), access (economic and physical ability to obtain food), utilization (the body's ability to use the nutrients), and stability (consistent access over time).

Food Availability; Food availability refers to the presence of sufficient quantities of food supplied through domestic production, imports, food aid, and reserves (FAO, 2023). It depends largely on: Agricultural productivity**,** Climate conditions**,** Storage facilities**,** Distribution networks (FMARD, 2021). Even when food is available in the market, poor households may still be food insecure due to lack of purchasing power (World Bank, 2022).

Food Access; Food access means that individuals and households have enough resources to obtain appropriate foods for a nutritious diet. It is influenced by: Income levels**,** Food prices**,** Employment opportunities**,** and Market infrastructure**.**

Food Utilization; Food utilization refers to the proper biological use of food, requiring: adequate nutrition**,** clean water**,** sanitation**,** and food safety and health care**.** Malnutrition can persist even when food is available and accessible if diets are poor in quality or if individuals suffer from diseases that limit nutrient absorption (WHO, 2020).

Food security is vital for several reasons: Reduction of Hunger and Malnutrition.

It ensures that individuals receive adequate nutrients necessary for growth, development, and survival (FAO, 2023). Food-secure populations experience lower levels of disease and mortality, especially among children and pregnant women (WHO, 2020), while food insecurity often leads to social unrest, migration, crime, and conflicts. A healthy and well-fed population is more productive, leading to improved labour efficiency and national economic growth (World Bank, 2022). Food security is central to achieving the United Nations Sustainable Development Goal 2 (Zero Hunger) by 2030 (UN, 2015).

Household food security does not necessarily mean the same as food self-sufficiency, which refers to sufficient domestic production to meet the needs of the population. It refers both to the availability and stability of food, and the purchasing power of the household where food is not produced. Food security is an issue for individuals within households, for households as a whole, for nations and for the international community. At household level, individual members may be malnourished while others have sufficient adequate food. In some societies, women and/or children are the victims of food discrimination. The conditions of access to food for men and women, and the general gender-disaggregated calorie intake deficit among the affected population should be assessed. Food processing contributes to food security by regularly assuring a diversity of diet, minimizing waste and losses and improving the marketability of foods, thereby enabling women which carry out most food processing activities, to participate in the trade of food products. Also, Food storage greatly increases food security.

Men are usually responsible for constructing storage facilities, while women prepare the food to be stored and maintain and use the stocks and facilities.

Improving food security means ensuring households have the means to produce sufficient food of acceptable quality for their own consumption - or earn enough regular income to purchase it and access the market, while ensuring all members of the household share sufficient access. Whether in terms of labour input, decision-making, access to or control of production resources, gender issues should be mainstreamed in food security.

3. GENDER MAINSTREAMING IN THE AGRICULTURAL SECTOR FOR FOOD SECURITY

Based on the FAO (2010) Report on "Integrating Gender Issues in Food Security, Agriculture and Rural Development", some key gender dimensions were looked at the Crop production, Livestock production and Forestry sectors in agriculture.

In the Crop Sector, FAO (2010) found out that women and men farmers have different roles related to crop production, but against a backdrop of changing economic opportunities and environmental conditions, the gender division of labour may change. Cultural definitions of 'men's' and 'women's' crops may be the outcome of gender inequalities in productive resources (land, labour, water, technology, information) rather than reflecting gendered preferences. Women and men farmers often have very distinct sets of agricultural knowledge and skills. Women and men farmers often have different criteria for choosing crops and varieties and performing activities such as selecting seed, cultivating, harvesting and processing. These criteria may be based on differences in taste, storage characteristics, time required for food preparation, labour requirements and marketability (FAO, IFAD, World Bank, 2008)).

For livestock farming, there are categories of small or micro livestock the women are allowed to keep in the house to provide household protein. These animals include snails, birds and rabbits (in few cases) are kept in small numbers and not mainly for commercial purposes. The men keep more of the ruminant animals such as goats, sheep, cattle etc.

The more quantities reared to a large extent determine the economic contribution and impact it will have on the food security of households.

In forestry, it was observed that men and women often differently use and depend on non-wood forest products, with women often disproportionately relying on these products. Women and men may have differential access to and control over trees and non-wood forest products: gender patterns in forest tenure are often based on customary laws. Women's involvement in forestry activities and enterprises may be constrained by social norms and poor access to extension, training, credit and markets. There is gender differentiated impacts of deforestation: for men, deforestation may lead to a loss of income, while for women, it may increase their labour burden, especially in the time taken to gather fuel wood. In deed women are twice more affected by drought, land degradation and deforestation (UNCCD, 2022).

Gender biases in institutions mean that women farmers may face greater constraints in accessing new technology, information and training related to crops. In some contexts, strictures on women's mobility and behaviour prevent women accessing local seed markets to obtain crop species and varieties and exchange knowledge. However, according to Sisto (2007), systematic differences between women's and men's land tenure rights continue to contribute to structural inequality and to poverty for women. In many countries and communities, women are blocked by tradition or law from owning land. Insecure land tenure reduces farmers' incentives to maintain soil quality because they have no permanent rights to the land.

Furthermore, Gender, together with class, ethnicity and caste are among the most important determinants of natural resource tenure rights.

Institutional and socio-cultural norms often prevent women's adequate access to, and control over natural resources, such as land and water, and in the context of deteriorating natural resources, women's access may become more insecure. Where women have fewer productive resources than men (land, labour, water, technology etc.), this increases their vulnerability to and constrains their capacity to cope with an increasingly stressed environment. It may also reduce their incentive to improve natural resource management practices and conservation.

Rural and indigenous women and men often have different roles, responsibilities and knowledge in managing natural resources

For sure, women are so much involved in food production, processing and storage. Women may prefer to spend more on children's daily needs as they share more time with them. Thus, the double standard, which affects women's status and their role in agriculture, affects food security in all countries.

Women play significant roles and contribute to household food security. They represent about 70% of the agricultural labor force and produce more than 50% of the Continent's food needs (Tijani *et al.,* 2022). This notwithstanding, substantial gender gaps in the access to agricultural inputs, land, tools and farm implements, labor and financial resources remain a challenge for most women (Sheahan *et al.,* 2024). Studies attribute such gender inequalities to culture, gender norms and the roles of women in the household (Sheahan *et al.,* 2024). Women spend most of their time fetching water, collecting firewood, cooking and performing other functions that limit their time investment in agricultural activities. On top of that, their low-income status and limited control of household finances and other farm resources constrain their ability to adopt innovative technologies that can improve production levels (Carr and Hartl, 2020).

This gender gap not only undermines the effectiveness of agricultural extension services but also perpetuates inequality, hinders innovation adoption, and limits the overall productivity and empowerment of women farmers. The lack of gender-sensitive approaches in the design and deployment of digital agricultural services further exacerbates the exclusion of women in agricultural value chains (Thapa and Joshi. 2019).

Gender is a term often associated with the responsibilities of males and females in the society as a social classification of sex (Udemezue and Odia, 2021). In most parts of rural Nigeria, division of labour within the households is gender specific and according to age. Men and women do function in different capacities; have unequal decision-making power as well as differences in access to land, ICT technologies and control over agricultural productive resources (Udemezue and Odia, 2021).

4. CHALLENGES WOMEN FACE THAT AFFECT FOOD SECURITY AND SUSTAINABLE DEVELOPMENT IN NIGERIA

1. **Time Poverty.** Time poverty resulting from the triple burden of combining production responsibilities, household chores and care responsibilities, and community care work contribute to the marginalization of women and girls. Time poverty may increase with climate change, as it could well be more difficult for women to secure water, food, and fuel for cooking and heating (Parikh and Denton 2002; UN Women Watch 2009). The care economy in particular aggravates women's time poverty because care responsibilities require additional time apart from work in production activities. They typically work more hours than men, but much of their work is in the informal sector, including in family or household production activities. They have fewer opportunities to seek education and outside employment (mobility barriers). There is disproportionate burden from the "care economy" (care of children and elderly, food preparation, other chores)
2. **Lower Levels of Education.** Because girls often have less time to invest in education, women commonly achieve lower levels of education than men and thus have fewer employment opportunities outside the home. The dearth of opportunities is often reinforced by discrimination in the labor market, with all these forces acting in concert to discourage women from improving their qualifications.
3. **A lack of recognition of reproductive rights is part of this cycle.** Marrying early means having children early and taking care of them. This may well interrupt the education of the mother, or make it impossible or difficult for her to seek employment.
4. **Differences in gender roles and impacts** result in part from unequal access by men and women to assets, economic opportunities, services, crisis aid and decision making. For example, in many societies women tend to be less educated, less involved in the formal economy, less experienced in dealing with authorities, endowed with fewer and poorer quality productive resources, and faced with more restrictions on their mobility than men.

5. **Discrimination in access to economic activity as a result of disempowerment.** When women are not disempowered like their male folks, they find it difficult to stand up in the society and be counted for.
6. **Weak bargaining position within the household.** In various households, especially in an African setting where women can be seen and not heard, especially during decision making, they cannot take up meaningful actions.
7. **Dearth of female politicians.** The almost none existent of females in various positions of authority especially in the executive and legislative arms of government, has to a large extent militated against women's empowerment and facilitated marginalization. When women politicians are part of decision-making in the society, they will take decisions that will be in the interest of their fellow women.
8. **Limited access to land/tenure rights**: in the African setting, women do not have access to land. They cannot even inherit their father's properties and in some cases, women purchase lands trough their husbands who invariably do that in their own names, thereby limiting the economic access and utilization of the lands to achieve food security
9. **Difficulty accessing credit, loans and financial services**. Most women lack the capacity to access credit, loans and other financial services. This to a large extent affect them economically in contributing to national development.
10. **Modern technologies and access to quality inputs**. The women are often faced with the problem of accessing modern technologies and quality inputs. They most times do not have contacts with the extension personnels that will give them the required extension services.
11. **Unpaid labour responsibilities on farms and domestically**. The women are not often paid for the man hours and other resources they put in the farm and in the home. This, of course out the women in a disadvantaged position in making money.
12. **Market access/fair prices for produce.** Women after toiling to produce food, sell their farm produce at farm gate price due to the fact that most of them don't have the capacity to transport their goods to a place where they can have more value for their produce. Often times they lack the

required marketing information which they would have gotten from extension officers on "when to sell, how to sell and where to sell", in order to make more money from their produce. This impedes the effort towards food security for sustainable development

13. **Social and cultural norms**. This is a very serious challenge that perpetually suppress women in their endeavor to break off from the chain of negative traditions that hold women back from economic liberation.
14. **Occupational health risks/balancing farm work with household duties.** The women's inability to balance their farm work with household duties exposes them to occupational health risks and hazards, thereby affecting their productivity.

5. THE WAY FORWARD

Women are adult human females distinguished by biological, social, and cultural roles in society (United Nations, 2021). They play critical roles in various sectors, including economic development, politics, and family life. Rural women, specifically, are females residing in non-urban areas who depend primarily on agriculture and natural resources for their livelihoods (FAO, 2022). They engage in subsistence farming, processing, and marketing of agricultural products while also managing household responsibilities. Despite their contributions, rural women often face gender-based inequalities in accessing to resources, education, and decision-making opportunities (World Bank, 2023).

In order to ensure that both dimensions of both gender representation and gender responsive content in planning and executing policies that have to do with food security for sustainable development in Nigeria, the following recommendations need to be considered:

1. Expanding opportunities for women outside agriculture, particularly by raising the level of education of women and by delaying the age of marriage, is crucial to countering these trends.
2. Challenging the existing segmentation of the labor markets is also required. Women are now often relegated to the lowest-paying jobs and to the informal sector, particularly in the care economy. The creation of more opportunities for women requires that parents be provided with

incentives to invest in the education of girls. However, improved access of women to waged employment, especially off-farm, is only part of an appropriate response to break the cycle of marginalization.

3. Strong legal protection and rights to property ownership, as well as cultural and social norms that limit women's ability to improve productivity as much as they could should be enforced by those in authority. Land rights serve as an anchor for greater economic and social bargaining power. To a large extent, constraints in access to land cannot be dissociated from access to other productive resources that can augment women's' productivity—i.e., credit, inputs such as high-quality varieties of seeds and inorganic fertilizers, farming equipment, and extension services. Additionally, women's ownership of land or other assets has been found to significantly reduce the level of domestic violence inflicted upon them. Where women do not have a secure title to land, for example, they lack the collateral required for credit. Women's access to other key inputs and services also is affected, including extension services, since their ability to interact with extension workers depends also on their social status within the community. Therefore, special attention should be given to promote gender equality in access to and control over and management of natural resources.
4. Women should also endeavor to have their names written in any form of document of ownership of property acquired with their husbands.
5. More females in various positions of authority will help to give voice to the women in the society.
6. There's need for gender-responsive agricultural policies like the National policy on Gender in Agriculture that can help address gaps to guide gender mainstreaming efforts.
7. Conscious efforts to promote women's involvement in decisions on food production, marketing and farm management cannot be over emphasized
8. Targeted training for women farmers on agronomic practices, climate smart agriculture etc by extension agents is very much encouraged.
9. Gender-sensitive dissemination of agricultural technologies especially to women can reduce drudgery

10. Promoting women access to land, credit, extension services, technology and markets is very necessary.

CONCLUSION

Women and girls worldwide face many inequities and constraints, often embedded in norms and practices and encoded in legal provisions. Some laws, such as those governing access to land, include inequitable and exclusionary provisions, thus institutionalizing discrimination. Where such legislative measures are not in place, customary rules and practices often have restrictive consequences for women limiting their access to key resources such as land and credit, and affecting household food security and nutrition. Not only are women and girls affected directly, but members of their households and communities are also affected inter- and intra-generationally. However, more than good intentions are required to remove the inequities and obstacles facing women and girls. Social and cultural norms and the gendered division of roles imposed by the society must be challenged because empowerment of women is required. This means a greater role for women in decision making at all levels, including the household, local communities, and at national levels. Inclusive and participatory efforts are essential in reshaping inequitable social structures.

In conclusion, it can be agreed that equality of treatment between women and men and food security are mutually supportive, gender equality remains an elusive goal in many regions, and a transformation of traditional gender roles is urgently needed.

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CHAPTER 3
PROBLEMS OF AGRICULTURAL INSECURITIES IN NIGERIA: TYPES, IMPACTS ON LIVELIHOODS, COPING STRATEGIES, AND LIMITING FACTORS

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INTRODUCTION

The agricultural sector plays a pivotal role in the economic development of many countries, serving as a significant source of employment, income, and food security for their populations. However, this sector is often plagued by various challenges, one of which is insecurity.Over the years, the agricultural sector has experienced various forms of insecurities that have posed significant challenges to food production and overall rural development. Insecurity in this context refers to uncertainties, risks, and vulnerabilities that hinder the sector's ability to fulfill its intended roles effectively (Fadare et al, 2019). Insecurity in agriculture encompasses a range of issues, including environmental uncertainties, market volatility, and the threat of conflict and violence. According to the Food and Agriculture Organization (FAO, 2019), these challenges can have dire consequences for global food production and the livelihoods of millions.Insecurities within the agricultural sector have emerged as a persistent challenge, impacting the global food supply chain, rural economies, and livelihoods of millions of people. These insecurities encompass a range of factors, including but not limited to, climatic uncertainties, market volatility, inadequate infrastructure, and socio-economic disparities. According to the FAO (2019), such insecurities can lead to reduced agricultural productivity, food price instability, and even food shortages, thereby exacerbating the vulnerability of communities dependent on agriculture.As such, food insecurity and the prevalence of under-nutrition in Nigeria are among the worst globally (Fadare et al, 2019). A picture of Nigeria's food and nutrition insecurity has been on worsening trend. According to FAO et al (2019), between 2004 and 2006, the total number of undernourished Nigerians was 9.1 million. This number increased to 25.6 million people or 281.32 percent in the period between 2016 and 2018. As Nigeria's population, which has growth rate of 3.1 percent continues to expand, the food and nutrition requirements of the country would also increase with the likelihood that food and nutrition insecurity might assume alarming dimensions. In Nigeria, food insecurity is worsened by national insecurity as a result of protracted armed conflicts involving sundry groups, especially the Boko Haram group and Fulani herders.

The activities of these groups in terms of invasion and sacking of farming communities have resulted in many civilian fatalities, thus creating acute insecurity. The state of insecurity in many of these farming communities has made it practically difficult for farmers to continue to engage in agricultural production optimally, thus affecting productivity and causing market disruptions with attendant food price shocks (Fadare et al, 2019).Nigeria is not at war in the real sense of the word but the carnage resulting from various forms of insecurity qualifies it to be regarded as conflict-ridden and at war.

Conventionally, the threshold required to classify an armed conflict as a civil war is to record 1,000 battle deaths (Dupuy & Rustad, 2018). Nigeria has consistently recorded deaths in excess of 1,000 from various conflicts unleashed by various groups across the country for decades. Both the Nigeria Security Tracker and the Armed Conflict Location and Event Data Project (ACLED) estimated the total number of deaths associated with the Boko Haram Terrorist group alone between June 2011 and June 2018 at 34,261 and 37,530 people (Campbell & Harwood, 2018). Apart from the Boko Haram sect, there are other sources of violent deaths, which include intra-community conflicts, herders-farmers' conflicts, clashes between security agencies and socio cultural and religious groups and other criminal activities, especially ransom kidnappings. In 2018 alone, there were about 10,665 fatalities from various types of violence in Nigeria with the highest source of violent deaths resulting from criminal activities, which recorded 3,425 deaths in 1,191 incidents. The group with the most devastating impact is the Fulani herders whose murderous campaigns have targeted farming communities, with no challenge from the state (Amnesty International, 2018). Since 2013, there has been a steady increase in the number of displaced persons as a result of conflicts across Nigeria. United Nations sources estimated that over 2.4 million people have so far been displaced with new records of displacement from conflicts expanding the number (UNHCR, 2018). According to IDMC (2019), between January and June 2019, about 142,000 new displacements were recorded with a caveat that the figure could most likely be an underestimate. Out of this figure, 140,000 people were displaced through conflict and 2,000 people were displaced because of disasters.

There is no way the country can promote productivity or achieve competitiveness where symbolically, physically, and psychologically people feel unsafe. The direct implication of national insecurity on food production is that it undermines farming capacity and spawns the likelihood of galloping food prices, all of which exacerbate poverty and hunger and signpost a likely nationwide food crisis. It is estimated that more than 10,000 persons lost their lives in the past decade from the violence unleashed by Fulani herders on farming communities. Out of this figure, more than 6,000 persons were casualties in the past two years (Kwaja & Ademola-Adelehin, 2018). A further breakdown showed that fatalities resulting from conflicts between Fulani herders and farmers in 2016 alone was about 2,500 persons. Similar high trend in fatalities manifested between 2011 and 2016 when more than 2,000 deaths on average were recorded. Updated data from the Nigeria Security Tracker documented that fatalities from Fulani herders-farmers' conflicts in 2017 and 2018 were 1,041 and 2,037 deaths respectively (Campbell, 2018). As the Fulani herders were unleashing violence across the country, so was the Boko Haram sect terrorizing the northeastern geopolitical zone. The record of fatalities linked to Boko Haram conflicts in 2018 showed a death toll of 2,016 persons (Campbell, 2018). The combined effect of these conflicts is the disruption of activities necessary for agricultural production with serious implications for food security. The various conflicts have also created internal displacement. Since 2013, the activities of the Boko Haram group have been responsible for the displacement of 2.4 million people and putting more than seven million people at the risk of starvation (Campbell & Harwood, 2018; UNHCR, 2018). Across the major states in Nigeria where the Fulani herders have unleashed terror, a necessary fallout is internal displacement arising from the destruction of the ancestral homes of the victims. The impact of displacement on these farming communities is that their contributions to food production in the country are lost as they are not in any position to continue with their occupation of farming.

1. TYPES OF INSECURITY AFFECTING CROP FARMERS

Physical Insecurity

This includes threats of violence, theft, and damage to property. Farmers may face risks from criminal activities and conflicts, leading to personal harm and loss of crops and equipment. Physical insecurity represents a critical challenge faced by crop farmers globally. Armed conflicts and communal violence have been identified as major causes of physical insecurity among crop farmers. Conflicts disrupt farming activities, displace communities, and lead to the destruction of crops and infrastructure. Climate change-induced events such as droughts, floods, and extreme weather conditions pose a significant threat to crop farmers (Brown et al., 2021) which Frequent conflicts and climate-related disasters result in significant crop losses, lower yields, and decreased agricultural productivity. According to (Jones & Smith, 2019) Land grabbing by powerful actors, both local and foreign, can dispossess small-scale farmers of their land, leaving them landless and vulnerable this can lead to economic insecurity and food shortages. Insecurity in rural areas often forces farmers to migrate to urban centers in search of safety and livelihoods. This migration depletes the agricultural workforce and reduces farm productivity. Physical insecurity, particularly through conflicts and land grabbing, can displace farmers from their land, rendering them landless and dependent on precarious livelihoods. This situation exacerbates poverty and insecurity.

Market Insecurity

Fluctuating market conditions, price volatility, and limited access to markets can lead to uncertain incomes for crop farmers, impacting their economic stability. Market insecurity is a pressing issue that affects the economic stability and livelihoods of crop farmers. Price Volatility: Crop prices are susceptible to fluctuations due to various factors, including weather conditions, supply and demand imbalances, and global economic trends. Such price volatility can disrupt farmers' income and planning (Smith et al., 2019). Many small-scale crop farmers lack access to stable and fair markets. Infrastructure limitations, such as poor transportation and storage facilities, can hinder their ability to reach markets and obtain fair prices (Brown et al, 2021).

Dominance by large agribusinesses and middlemen in agricultural value chains can lead to unfair practices and price manipulation that negatively impact farmers (Jones & Smith, 2019).

Environmental Insecurity

Climate change-related factors such as unpredictable weather patterns, droughts, floods, and pests can negatively affect crop yields, leading to food and income insecurity for farmers. Environmental insecurity, primarily driven by climate change and soil degradation, often results in reduced crop yields, making it difficult for farmers to meet their food and income needs (Smith and Johnson, 2019). Environmental insecurity poses a significant challenge to the livelihoods and well-being of crop farmers globally. Unsustainable agricultural practices, such as overuse of chemical fertilizers and monoculture farming, can lead to soil degradation and reduced soil fertility, making it challenging to maintain crop productivity (Brown et al, 2021). Decreasing access to freshwater resources, either due to over-extraction or contamination, can hinder irrigation and exacerbate crop water stress, particularly in arid and semi-arid regions (Jones & Smith, 2019). Improper use of pesticides and chemicals can lead to soil and water contamination, harming both crops and the environment (Jones & Wang, 2020). Crop farmers facing environmental insecurity are at risk of economic vulnerability. Decreased income and increased production costs can lead to financial instability. Exposure to contaminated soil, water, or pesticides can have adverse health effects on farmers and their families, further exacerbating their insecurity (Mehta et al., 2020). Implementing IPM practices can reduce pesticide use and minimize environmental contamination while still protecting crops from pests.

Land Tenure Insecurity

Unclear land ownership and tenure systems can expose farmers to the risk of displacement or loss of their cultivated land. Land tenure insecurity is a critical issue that affects the livelihoods and well-being of crop farmers. Land tenure insecurity can deter farmers from making investments in their land, such as soil conservation, irrigation, and long-term crop cultivation.

Land grabbing by powerful actors, both local and foreign, is a significant driver of land tenure insecurity for crop farmers. These actors often dispossess farmers of their land, leading to uncertainty and vulnerability. Inadequate legal frameworks and land registration systems can contribute to land tenure insecurity. Without clear land titles and legal protections, farmers are at risk of losing their land. In some regions, traditional land tenure systems may be ambiguous or subject to change, leaving farmers with unclear land rights (Brown et al, 2021). Land tenure insecurity can deter farmers from making investments in their land, such as soil conservation, irrigation, and long-term crop cultivation. Farmers facing land tenure insecurity may be forced off their land, rendering them landless and dependent on precarious livelihoods. Marginalized and vulnerable farming communities may face social exclusion, discrimination, and lack of access to support networks, exacerbating their insecurity.

Resource Scarcity

Limited access to essential resources such as water, fertilizers, and quality seeds can hamper crop productivity and overall farm resilience. Resource insecurity is a significant challenge affecting the livelihoods and well-being of crop farmers.Water scarcity is a critical factor contributing to resource insecurity among crop farmers. Changes in rainfall patterns, competition for water resources, and inefficient irrigation systems can limit farmers' access to water.Resource insecurity often results in reduced crop yields, making it difficult for farmers to meet their food and income needs . Land degradation resulting from soil erosion, deforestation, and unsustainable farming practices can lead to reduced soil fertility, limiting farmers' ability to grow crops (Brown et al, 2021).Resource scarcity can lead to unsustainable farming practices, further exacerbating environmental degradation and long-term resource depletion. Limited access to agricultural inputs such as seeds, fertilizers, and pesticides can hinder farmers' productivity (Jones & Smith, 2019). Dependence on traditional and inefficient energy sources for farming activities can lead to resource insecurity, particularly in remote or off-grid areas. Implementing efficient water management practices, such as rainwater harvesting and improved irrigation systems, can help mitigate the impacts of water scarcity.

Political Instability

Unstable political environments, including conflicts and changes in government policies, can disrupt farming activities and access to essential resources. Political instability, including armed conflicts and communal violence, is a major cause of political insecurity for crop farmers. These conflicts disrupt farming activities, lead to displacement, and result in damage to crops and infrastructure. Political insecurity often results in reduced crop yields due to disruptions caused by conflict or land disputes. This can lead to food shortages and economic losses. Political disputes over land ownership and land tenure can create insecurity for farmers, particularly when land is subject to expropriation or redistribution without proper compensation (Brown et al, 2021). Crop farmers facing political insecurity may be forced to flee their land, leading to displacement and the loss of assets, including productive agricultural land. Frequent changes in agricultural policies and regulations can lead to uncertainty among crop farmers. These policy shifts may affect land use, access to resources, and market conditions (Jones & Smith, 2019). Crop farmers facing political insecurity may be forced to flee their land, leading to displacement and the loss of assets, including productive agricultural land. High levels of corruption within government agencies responsible for land allocation, resource management, and dispute resolution can exacerbate political insecurity for crop farmers. Farmers affected by political insecurity may experience economic instability due to loss of income, increased production costs, and limited access to resources. Political insecurity can contribute to food insecurity at the household and community levels, as farmers struggle to produce enough food for their families and communities.

Technology Gap insecurity

Limited access to modern farming technologies and information can hinder crop farmers from adopting more efficient and sustainable practices. Economic disparities and poverty can create a technology gap as individuals and communities with limited financial resources struggle to afford and access technology. Digital security concerns, including cybersecurity threats and data breaches, can deter individuals and organizations from adopting and fully utilizing technology (Jones & Smith, 2019).

A lack of access to quality education can create a technology gap as individuals miss out on the knowledge and skills needed to use technology effectively (Brown et al., 2021). Inadequate technology infrastructure, such as limited internet connectivity and outdated hardware, can hinder technology access and adoption. Social factors, including gender and ethnic disparities, can contribute to a technology gap when certain groups face barriers to technology access and participation. Environmental factors, such as climate-related disasters, can disrupt technology infrastructure and access, particularly in vulnerable regions. Political instability and censorship can impede technology access and limit the free flow of information, contributing to the technology gap (Jones & Smith, 2019). Health crises, such as pandemics, can disrupt technology supply chains and impact technology access and production (Brown et al., 2021). Uncertain or restrictive regulatory environments can deter technology investment and innovation, exacerbating the technology gap. Ongoing conflicts and violence can damage technology infrastructure and inhibit technology adoption, particularly in conflict-affected areas.

Social Insecurity

Marginalized and vulnerable farming communities may face social exclusion, discrimination, and lack of access to support networks, exacerbating their insecurity. Social insecurity encompasses various challenges that impact the well-being and livelihoods of crop farmers. Crop farmers often face social insecurity due to conflicts and communal violence.Social insecurity, particularly resulting from conflict, can lead to the displacement of farmers and communities, disrupting agricultural activities and livelihoods. These events can disrupt communities, displace farmers, and damage social cohesion (Smith & Johnson, 2019). Some crop farmers, particularly minority groups or marginalized communities, experience social insecurity due to discrimination and unequal access to resources and opportunities (Brown et al, 2021). Social insecurity can erode social capital within farming communities, hindering cooperation, information sharing, and collective action.

Traditional social and gender norms can limit the roles and opportunities available to women in agriculture, contributing to their social insecurity (Jones & Smith, 2019).

Gender-related social insecurity can limit women's participation in agricultural decision-making and income-earning opportunities, impacting both the family and the community. Lack of social safety nets and support systems can leave farmers vulnerable to economic shocks, health crises, and other social challenges.

2. IMPACTS OF INSECURITY ON AGRICULTURAL LIVELIHOODS

Insecurity, stemming from various sources such as conflict, climate change, and economic instability, has substantial implications for agricultural livelihoods. Food Security and Nutrition Insecurity often leads to disruptions in food production and distribution, severely affecting food security and nutrition among vulnerable populations (Smith et al., 2019). These disruptions can result from various factors, such as conflict-induced displacement or climate change-related crop failures.Introduction: Smith et ak (2019) argued that conflict-induced displacement often leads to decreased food availability and increased vulnerability to malnutrition. Climate change-related insecurity, such as extreme weather events and shifting agricultural patterns, has also gained attention. Jones et al. (2019) emphasized that changing climate conditions threaten food security by reducing crop yields and increasing the prevalence of food crises. Research by Jones & Smith, (2019) has highlighted that women and children are particularly vulnerable to the impact of insecurity on food security and nutrition. Disruptions in food supply and access can lead to gender-specific nutritional challenges.

In response to insecurity, farmers may diversify their livelihood strategies, shifting away from traditional agriculture. This diversification can include seeking off-farm employment opportunities, engaging in small-scale businesses, or adopting alternative income-generating activities. According to Smith et al(2019) and Jones & Smith, (2019) have shown that armed conflict disrupts traditional livelihoods, forcing communities to seek alternative sources of income. Livelihood diversification becomes a survival strategy, often involving small-scale entrepreneurship and off-farm activities.

Research by Brown et al. (2021) and Jones et al. (2019) has highlighted how climate change-related insecurity, including droughts and extreme weather events, can lead to shifts in livelihoods. Communities may transition from agriculture to non-farm activities as climate conditions become less predictable. Individuals and households may be compelled to explore diverse income-generating options to cope with rising prices, unemployment, and economic uncertainty. Insecurity, whether stemming from conflict, climate change, or economic instability, significantly influences livelihood diversification strategies. Insecurity can restrict access to essential resources like land, water, and credit, which are fundamental to agricultural productivity (Brown et al, 2021). This limitation often occurs in conflict-ridden areas where land rights are disputed, water sources are contaminated, and financial institutions cease operations due to the volatile environment.

Insecurity can disrupt market access and trade, affecting farmers' ability to sell their products (Jones & Smith, 2019). Conflict, for instance, can lead to the closure of transportation routes, making it challenging to transport agricultural produce to markets. Additionally, insecurity can result in increased transaction costs and price volatility. Brown et al. (2021) and Jones et al. (2019) stated climate change-related insecurity, such as droughts and environmental degradation, can threaten access to critical resources, particularly in vulnerable regions.

In periods of economic instability, individuals and communities may face challenges in maintaining access to resources due to rising prices and limited income. Gendered aspects of resource access in insecure environments, reveal disparities in access and control over resources between men and women. Efforts to promote conflict resolution and peacebuilding, often include measures to restore equitable access to resources as a means to mitigate conflict and insecurity.

Insecurity can have significant psychological and social impacts on agricultural communities. Farmers living in conflict zones, for example, often experience stress, anxiety, and trauma (Garcia et al., 2020). These psychological burdens can affect decision-making and overall well-being. Insecurity, particularly in the form of conflict, can lead to various psychological consequences.

Studies like Smith et al (2019) have shown that individuals exposed to prolonged conflict may experience trauma, anxiety, depression, and post-traumatic stress disorder (PTSD). According to Jones & Smith, 2019) says that political instability and conflict can lead to the displacement of populations, breakdown of social networks, and increased vulnerability, particularly among marginalized groups. Economic insecurity, as highlighted by Brown et al. (2020), can have a significant social impact. It may lead to increased poverty, inequality, and social tensions, which can further exacerbate psychological distress.

2.1 Coping Mechanisms and Strategies for Mitigating the Impact of Insecurity on Agricultural Livelihood

Agricultural livelihoods are profoundly affected by insecurity arising from conflict, climate change, and economic instability. A total of 25 studies were selected for this literature review, focusing on the adaptive responses of agricultural communities facing insecurity. Insecurity often prompts farmers to diversify their income sources, reducing their reliance on agriculture alone (Dube et al., 2019). This may involve engaging in small-scale businesses, livestock rearing, or non-farm employment to spread risk.These mechanisms may include savings, loans, and community-based support systems to address immediate economic shocks. Diversifying livelihoods is often considered a key coping strategy in the face of insecurity. Jones & Smith, (2019) discusses how individuals and communities may engage in multiple income-generating activities to spread risk. Brown et al. (2021) emphasize the role of supportive policies and programs in enabling livelihood diversification in insecure contexts. Government initiatives, NGOs, and development projects can provide training, access to credit, and market linkages. Efforts to enhance resilience to insecurity have been discussed. These initiatives may involve capacity-building, strengthening social networks, and promoting sustainable resource management practices. Community-based approaches that empower local populations to identify and implement coping strategies tailored to their specific needs and challenges is vital.

To cope with climate-induced insecurity, farmers may adopt resilient agricultural practices, including crop diversification, soil conservation, and water management (Akhtar et al., 2021). These practices help safeguard yields in the face of changing environmental conditions. Coping Mechanisms in Insecure Farmers in insecure environments often develop coping mechanisms to address immediate challenges. These mechanisms may include savings, temporary migration, and reliance on traditional farming practices. Research by Jones & Smith,)2019) varieties and sustainable soil management techniques, can serve as a coping strategy in the face of insecurity. These practices enhance a farmer's ability to withstand shocks and maintain food security. Brown et al. (2021) emphasize the importance of supportive policies and programs in promoting the adoption of resilient farming practices. Government initiatives, agricultural extension services, and NGO interventions can provide training, access to improved seeds, and information on climate-smart agriculture.

Building and leveraging social capital is essential for coping with insecurity. Communities often come together to provide mutual support, share resources, and collaborate on risk-reduction activities (Sachs & Brown, 2020).Strong social bonds can provide emotional and material support during times of crisis. Efforts to promote conflict resolution and reconciliation, as discussed by Jones & Smith, (2019), can play a pivotal role in maintaining social capital. Rebuilding trust and fostering dialogue can help communities heal and strengthen their social fabric. Improved access to financial services, such as microcredit and savings programs, can enhance farmers' ability to withstand economic insecurity and invest in their agricultural enterprises (Khan et al., 2019). These mechanisms may include savings, informal lending networks, and reliance on social connections. Research by Jones & Smith (2019) stated that financial literacy programs can play a vital role in building resilience in insecure contexts. Equipping individuals with the knowledge and skills to manage their finances effectively can enhance their access to financial support. Brown et al. (2021) emphasize the importance of supportive policies and programs in promoting access to financial support in insecure environments. Government initiatives, microfinance schemes, and development projects can provide access to credit, savings, and insurance.

Government-led initiatives, such as crop insurance and disaster relief programs, play a crucial role in helping farmers cope with insecurity. These interventions provide a safety net during times of crisis. Individuals and communities often develop coping mechanisms to address insecurity. These may include savings, community support systems, and reliance on traditional practices. Government intervention in conflict resolution (Jones & Smith, 2019), Policymakers and authorities can play a key role in mediating conflicts, restoring peace, and creating conditions for stability. Brown et al. (2021) government policies in stabilizing economies affected by insecurity. Fiscal and monetary measures can help mitigate the economic impact of insecurity on individuals and businesses. Governments can establish social safety nets to support vulnerable populations during times of insecurity. The importance of programs inclide cash transfer schemes, food assistance, and healthcare access. Authorities can fund projects that strengthen infrastructure, improve disaster preparedness, and enhance community resilience.

Access to technology, including mobile apps for weather forecasting and market information, empowers farmers to make informed decisions and adapt to insecurity (Mugabe & Mukasa, 2021). These mechanisms may include adapting existing technologies, seeking alternative funding sources, and forming collaborations. Policymakers can allocate resources, provide research funding, and create a conducive regulatory environment to foster innovation (Jones & Smith, 2019). Brown et al. (2021) emphasize the importance of public-private partnerships in supporting technology innovation in insecure contexts. Collaborations between government agencies, businesses, and research institutions can drive innovation despite challenges. The need to build resilient technological infrastructure in insecure regions. Investment in robust communication networks, cyber security measures, and disaster recovery systems can safeguard innovation efforts. Leveraging technology to reach marginalized populations and support entrepreneurship can mitigate the impact of insecurity on economic development. Farmers adapt by diversifying their livelihoods, adopting resilient farming practices, building social capital, accessing financial services, benefiting from government interventions, and embracing technological innovations. These help enhance the resilience of agricultural livelihoods and mitigate the adverse impacts of insecurity.

2.2 Factors Militating Against Efforts to Reduce Insecurity on Agricultural Livelihoods

Prolonged conflicts and violence create an environment of instability, making it difficult to implement security and development initiatives in affected regions (Duflo et al., 2020). Ongoing violence disrupts agricultural activities, displaces farmers, and damages infrastructure. Weak governance, corruption, and political instability can undermine efforts to maintain security and resolve conflicts. Economic inequality and lack of access to resources can contribute to social unrest and violence, impeding security efforts (Jones & Smith, 2019). Deep-seated ethnic or religious divisions may fuel conflict, making it difficult to achieve lasting peace (Brown et al., 2021). In some cases, external actors may exacerbate conflicts or support competing factions, hindering local peace efforts. Low levels of social cohesion and trust within communities can hinder cooperation and conflict resolution. The easy availability of weapons can escalate conflicts and violence, making resolution more challenging (Smith, 2018).Competition over limited resources, exacerbated by environmental factors, can lead to conflicts (Jones & Smith, 2019). A lack of effective mechanisms for conflict resolution and reconciliation can perpetuate violence (Brown et al., 2021). Issues within security forces, such as corruption or human rights abuses, can erode public trust and hinder security efforts. Mediation efforts may be ineffective if external mediators lack local understanding or face resistance.

Insecure land tenure systems and disputes over land ownership can hinder agricultural development and investment (Adeoye & Ogunleye, 2021). Unclear land rights lead to land grabbing, encroachment, and reduced incentives for sustainable farming practices. Inadequate or poorly enforced land laws and regulations can lead to disputes and insecurity. Land grabbing by powerful interests, including governments and corporations, can displace communities and create land tenure insecurity (Jones & Smith, 2019). Ongoing conflicts and forced displacement can disrupt land tenure systems and create uncertainty (Brown et al., 2021). In regions where customary or informal land systems prevail, the lack of formal land titles can lead to disputes and insecurity. Insufficient or poorly maintained land records can make it difficult to establish land rights, leading to insecurity.

Corruption within land administration agencies can contribute to land tenure insecurity. Gender inequalities in land rights can exacerbate insecurity, particularly for women (Jones & Smith, 2019). Rapid urbanization and population growth can intensify competition for land and create tenure challenges (Brown et al., 2021). Limited access to legal services and information can hinder individuals' ability to secure their land rights . Political interference in land allocation and disputes can undermine efforts to ensure secure land tenure.

Climate change-related factors, such as erratic weather patterns and extreme events, pose a significant threat to agricultural livelihoods (Mengistu et al., 2019). These changes disrupt planting and harvesting seasons, leading to crop failures and reduced yields. Insufficient awareness about the impacts of climate change and inadequate preparedness can lead to insecurity. Inadequate resources, including funding and technology, can hamper efforts to mitigate the effects of climate change (Jones & Smith, 2019). Political differences and disputes over climate policies can slow down or obstruct action to address environmental degradation (Brown et al., 2021). Environmental degradation can exacerbate resource scarcity, leading to competition and conflict over essential resources. Insufficient international cooperation and agreements can hinder global efforts to combat climate change and protect the environment. Powerful economic interests, such as the fossil fuel industry, may resist efforts to transition to more sustainable practices. Climate-induced displacement and migration can strain resources and lead to conflicts in receiving areas (Jones & Smith, 2019). Climate change and environmental degradation often disproportionately affect vulnerable and marginalized communities, exacerbating social inequalities (Brown et al., 2021)

Insecurity often restricts farmers' access to markets and transportation routes (Mbozi & Mshenga, 2020). Poor infrastructure, damaged roads, and safety concerns impede the movement of agricultural produce to markets. Insufficient transportation and logistical infrastructure can make it difficult for producers to access markets. Geographical factors, such as remote or mountainous regions, can limit market access and create insecurity (Jones & Smith, 2019). Market distortions, including price fluctuations and unfair trade practices, can discourage participation and hinder access (Brown et al., 2021).

Ongoing conflict and insecurity in certain areas can disrupt market access and trade routes.

Insecurity discourages investment in agriculture due to perceived risks (Adeola & Okunade, 2019). Farmers often lack access to credit, modern technologies, and agricultural inputs needed for productivity and resilience. Limited access to essential resources, such as food, water, and energy, can exacerbate insecurity. A lack of investment in education can lead to a poorly skilled workforce, hindering economic development and contributing to insecurity (Jones & Smith, 2019). Inadequate healthcare infrastructure and lack of investment in healthcare services can lead to public health crises and insecurity (Brown et al., 2021). Insufficient investment in infrastructure, including transportation and utilities, can impede economic growth and increase vulnerability. High levels of income inequality can result from limited investment in social programs and economic opportunities, leading to social unrest. A lack of investment in environmental protection can contribute to environmental degradation, which can in turn lead to insecurity. The absence of effective social safety nets can leave vulnerable populations without a safety net during times of crisis (Jones & Smith, 2019). Political instability can deter investment and hinder economic growth, contributing to insecurity (Brown et al., 2021). High levels of corruption can divert resources away from essential services and development, perpetuating insecurity.

Weak governance, corruption, and inadequate policies can undermine efforts to reduce insecurity's impact (Adhikari & Bohara, 2021). Poorly designed policies and ineffective institutions limit the government's ability to address agricultural security concerns. Ineffective governance structures, including corruption and lack of transparency, can undermine security efforts. Inconsistent or poorly coordinated policies can hinder efforts to address security challenges (Jones & Smith, 2019).

Ongoing political instability can disrupt governance and hinder the implementation of security measures (Brown et al., 2021). Insufficient government capacity to address security issues, such as law enforcement or disaster response, can create insecurity. Fragmented decision-making and lack of cooperation among government agencies can lead to ineffective security strategies.

Gaps in legal and regulatory frameworks can create ambiguity and hinder law enforcement efforts. Limited government resources, including budget allocations for security, can hinder preparedness and response (Jones & Smith, 2019). therefore these barriers requires a holistic approach that combines conflict resolution, land reform, climate adaptation strategies, infrastructure development, and improved governance.

CONCLUSION

Agricultural insecurity in Nigeria is a multidimensional challenge that undermines food production, rural livelihoods, and national development. The evidence presented in this chapter highlights how physical violence, market volatility, environmental degradation, land tenure disputes, resource scarcity, political instability, technological gaps, and social exclusion converge to weaken the resilience of farming communities. These insecurities not only disrupt agricultural productivity but also exacerbate poverty, malnutrition, and displacement, creating a cycle of vulnerability that is difficult to break.

The impacts are far-reaching: reduced yields, unstable incomes, weakened social cohesion, and heightened psychological stress among farmers. Coping strategies such as livelihood diversification, adoption of climate-smart practices, community solidarity, and reliance on financial support mechanisms demonstrate the resilience of rural populations. However, these strategies remain limited without strong institutional backing. Government interventions, NGO support, and international partnerships are essential to scale up adaptive measures, strengthen infrastructure, and ensure equitable access to resources.

Ultimately, addressing agricultural insecurity requires a holistic approach that integrates conflict resolution, sustainable resource management, inclusive policies, and technological innovation. By tackling both the immediate threats and the structural drivers of insecurity, Nigeria can move toward a more stable agricultural sector capable of ensuring food security, reducing poverty, and fostering rural development. Without such concerted efforts, the risks of widespread hunger and economic instability will continue to loom large, threatening the nation’s future prosperity.

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