

BRIDGING POLICY AND PRACTICE: MULTI-THEORETICAL PERSPECTIVES ON FOOD SECURITY IN ADAMAWA AND BEYOND

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Abstract

Food insecurity in Nigeria is not just a pressing issue, but an urgent crisis that poses severe threats to livelihoods, health, and economic well-being. The actions, inactions, and interests of diverse stakeholders drive this crisis. This paper focuses on Adamawa State within the BAY region (Borno, Adamawa, and Yobe) of North-East Nigeria, where persistent insecurity reflects the interplay of behavioral complacency, institutional voids, conflict-related shocks, competing interests, and local contextual dynamics. Despite decades of government policies, international donor interventions, local initiatives, and academic research, the country continues to struggle with the fundamentals of food availability, accessibility, and affordability. In investigating this wicked and complex problem, the study employs a multi-theoretical framework combining Entitlement Theory, Political Ecology, Resilience Theory, and Digital Ecosystem Theory. This approach not only highlights the challenges of fragile value chains, institutional weaknesses, and community-level inaction but also underscores the significant and hopeful transformative potential of digital platforms and grassroots innovations. Drawing on immersive fieldwork, cross-country experiences, and lived realities in East Africa and Asia, the paper argues that top-down interventions alone are grossly inadequate. The analysis emphasizes the importance of micro-level commitments, such as home gardening, water harvesting, hydroponics, and value addition. It also underscores the crucial need for greater practical engagement by universities, private sector actors, and smallholder farmers. The study concludes that achieving long-term food security in Nigeria requires localized, technology-enabled, and behaviorally informed strategies that strengthen community resilience while adapting proven practices from other African contexts.

Keywords: Food insecurity; Nigeria; BAY states; Communities; Behaviors; Digital ecosystems; Lived Realities.

Introduction

Nigeria faces significant food insecurity issues in various states and geographic locations due to complex factors that threaten livelihoods, health, and human well-being (Falola et al., 2025). It has become a recurring issue that is unlikely to go away soon unless there are sustained, deliberate behavioral and systemic changes. The problem of food insecurity is a topical issue, and existing studies have investigated this multifaceted problem from various perspectives influenced by their core areas of interest and expertise (Ojo et al., 2024; Okuneye, 2001).

It is impracticable to address food insecurity issues in Nigeria using a unitary approach; therefore, the focus will be on Adamawa state within the BAY framework (Borno, Adamawa, and Yobe). This context experiences multidimensional crisis worsened by macro challenges: desertification (Yahaya et al., 2024), flooding, the Boko Haram insurgency (Kangdim et al., 2022), farmer-herder conflicts (Acquah et al.), and human-environment conflict (Banwo & Du,

2019; Bombom & Yemisi, 2024), displacement, environmental degradation (Folorunso & Folorunso, 2022), institutional voids, weak agricultural value chains (Nordhagen et al., 2023), poor infrastructure (Abdulazeez & Hamidu, 2024), and climatic issues (Sambo & Sule, 2024).

The Federal Republic of Nigeria is often referred to as the "Giant of Africa," but it is plagued by food insecurity crises that cause migration shifts and socio-economic problems (Nwosu, 2024; Tsakok, 2023). Despite the vast landmass, abundant natural resources, arable soil, and an agricultural workforce constituting over 70% of the rural population, the majority of Nigerians experience different forms of hunger (Unicef, 2024). According to the World Food Programme report, over 31 million Nigerians face acute food insecurity and hunger (Program, 2024). The statistics are frightening, but there is also hope, as well as micro-level approaches that can help mitigate and overcome these problems. Wicked problems cannot be tackled by conventional approaches that work in the short term; sometimes, there is a need to explore long-term, sustainable initiatives, and also learn from the models of other African countries.

Food insecurity is not a new phenomenon; it predates modern insurgencies and economic downturns, and it has evolved into a complex, systemic issue shaped by a nexus of environmental, political, economic, and socio-behavioral factors (Sassi & Sassi, 2018). The World Food Programme stated that more than 4.4 million people experience food insecurity in the Northeast, and approximately 2.3 million people suffer from forced displacement in the Bay States (WFP, 2025).

Adamawa State, known as the "Land of Beauty," is renowned for its abundant agricultural outputs, including rice, Maize, Cassava, Groundnut, Cotton, Guinea Corn, Millet, Beans, Sweet Potatoes, and Cattle rearing (Government, 2023). Despite this natural abundance, the food value chains and processes remain fragile and are subject to constraints such as inadequate rural infrastructure, poor storage, limited market access, low adoption of improved technologies and inputs, financing issues, and weak extension systems (Sani et al., 2023). In addition, environmental stressors such as desertification, erratic rainfall, and climate change, as well as flooding and pest infestations, further constrain productivity.

Multiple stakeholders and agencies have painstakingly implemented initiatives and programs to combat this menacing problem using varied intervention approaches. For instance, the FAO has implemented Climate-Smart Agriculture (CSA) programs in selected Local Government Areas (LGAs) to enhance localized land management (Onoja et al., 2019). USAID's Feed the Future Nigeria initiative has focused on improving agricultural productivity and market linkages. Meanwhile, the International Fund for Agricultural Development (IFAD) and the Nigerian Government's Anchor Borrowers Programme have provided input subsidies and credit (Onoja et al., 2024; Quadri et al.)

The Adamawa State Government has also invested a colossal amount of N2 billion in agricultural inputs, and to boost food security, it partnered with the Federal University of Agriculture, Mubi (Government, 2024; Nairametrics, 2025). However, many of these initiatives

face limitations in scalability, sustainability, and symbiosis. Most of the time, conventional models of aid and extension are hindered by a limited integration of digital systems, a gap in private sector participation, and a lack of synergy between local entrepreneurship.

Although women are key players in the food value chain, they are sometimes marginalized or excluded from decision-making in both farming and entrepreneurial domains (JOSHUA, 2021; Kawarazuka et al., 2022). This socio-economic exclusion limits the region's collective ability to respond to food crises. In addition to these structural issues, the existence of gaps in policy implementation at the local government level reveals bureaucratic, reactive, and top-down intervention models that sometimes are disconnected from the lived experiences of smallholder farmers and agro-entrepreneurs.

This conceptual paper adopts a novel perceptual lens grounded in multiple theories, lived experiences, and reflective inquiry. The central premise argues that while structural issues are important, individual behaviors, community actions, and inactions, as well as institutional gaps, significantly exacerbate the food crisis in Nigeria. The goal is to spark discussions and promote micro-level behavioral modifications grounded in sustainability and community-based innovation.

Problem Statement

The persistence of food insecurity in Nigeria is a result of a deeper malaise: behavioral indifference, institutional voids, and a failure to act locally. Despite decades of international and local development programs and billions of dollars in agricultural financing, Nigeria continues to struggle with the fundamental issues of food availability, accessibility, affordability, and sustainability (FAO, 2021; IFPRI, 2022). Most extant literature attributes climate change, insurgency, global price shocks, and global wars to food insecurity; however, these causes are also the resultant effects of internal, external, and behavioral factors (Dush, 2020). Solving food insecurity is multidisciplinary and intricate, much like the intricate piece of woven raffia crafted by artisans.

The problem of food insecurity is caused by our behavioral actions and inactions, which sometimes conflict with or harm the environment. We are all responsible, and there is no need to back this up with additional secondary data; however, this discourse would shed light on how we have arrived at this stage. This problem is multifaceted and requires a systematic and holistic approach undertaken through a micro-level action plan. It would not be good to point fingers or blame the Government for these woes, but rather, let us look inward and ponder over this.

There are over 200 Universities in Nigeria, and recently the Government decided to halt the issuance of new licenses. So, why is it that most University communities cannot feed or cater to their immediate community and the larger society through a backward integration process by operating commercial farms and agricultural ventures? For instance, the University of Lagos, Landmark University, Afe Babalola University, and a few other Universities operate large

commercial farms. In contrast, the University of Ibadan Ileogbo farm is renowned for its practical training, research, and sales. Similarly, the Federal University of Agriculture, Abeokuta directorate of University farms generates revenue internally for the University (AbFarms, 2022; LandmarkUniversity, 2025; Unilag, 2025).

As of 8th May 2025, 64 Federal Universities, 159 Private Universities, and 63 State Universities are listed on the National University Commission Website(NUC, 2025), and many offer agricultural courses and training without corresponding commercial ventures. Let us imagine a scenario where all 286 institutions cultivate at least 10 hectares of farmland or integrate into the value chain practically, this national issue would be reduced. It is justifiable if experts fault this analogy, but it aligns with some recent Federal Government initiatives and is practical (Project, 2025). Where land is scarce, Hydroponics is a feasible and a commercially viable option in Nigeria (Folorunso et al., 2023). Instead, some Universities prefer short-term, profitable income sources, such as sachet water production and bakeries, whose outputs harm the environment and worsen food insecurity. Why do Nigerian markets discard unsold produce instead of preserving it?

Why do many households in urban and semi-urban areas neglect to cultivate a small-scale vegetable garden despite rising food prices?

In breaking down this complex and wicked problem, it is necessary to adopt an unconventional and simplified approach. It is not rocket science, but an exploration of simple options that are critical in times of uncertainty.

There are several Nigerian agricultural-based startups and farmers championing innovative digital platforms and technologies in the food value chain (Atuahene-Gima & Amuzu, 2019). However, the escalating prices that prompt many to explore less desirable options and choices hinder healthy living and growth. Our lifestyles are contributing negatively to food insecurity in our respective communities. For instance, most systems still rely heavily on printing documents, even though printed copies are often more visually appealing. However, we blame those who cut trees for firewood, yet we still depend heavily on printed papers that are made from trees and not recycled paper. Some savvy entrepreneurs capitalize on the fact that green washing benefits them, making spurious claims that lead us to believe we are using recycled paper and buying organic food items. It is easy to blame the arid lands, desertification, and the climatic conditions in the BAY regions of Nigeria. However, the question then arises: Egypt and Saudi Arabia, with similar desert topography, have conquered these problems using novel strategies and technology. Before the emergence of armed conflicts in the BAY regions, there had been food insecurity in Nigeria, though it may seem worse due to multiple vested interests of economic agents, stakeholders, and economic conditions.

Theoretical Framework

The academic norm encourages the use of theoretical lenses or perspectives in research studies (Lederman & Lederman, 2015). The use of unitary or multiple theoretical foundations is based on established practices, study objectives, research relevance, and scope. However, in reality, the application of a single theory reveals an inherent limitation in the linear perspective adopted, and even when two or three theories are used, it is often viewed as a deviation and a complex process. This has resulted in scholarly studies adopting different theoretical foundations based on the researcher's discipline and the theory's ability to align with the study's goals.

Truly, it may be impractical to apply all theories in a study due to multiple factors, but this does not deny the fact that it provides a more holistic premise based on the nature of societal problems and issues. For instance, food insecurity studies are multidisciplinary, and researchers have investigated and sought to understand these issues using theoretical premises that suit their specific studies. Tsang (2022) identifies the main constraints in the use of multi-theories as journal requirements and practice, the nature of the research foundation, and personal choices. However, he posits five valuable insights from multi-theories: the ability to provide a premise that explains the results, the emphasis on the need for complementarity, the revelation of limitations in the use of unitary theories, the blending of strengths in the theories, and the provision of researchers with an opportunity to test conflicting ideas.

Kivunja (2018) posits that theoretical frameworks are necessary due to their ability to present theories propounded by leading experts within the researcher's domain. It forms the foundation for data analysis, discussion, and interpretation of findings. The framework offers a structured representation of conceptual foundations, incorporating theories that have been tested and applied in existing studies. Realizing that food insecurity in North-East Nigeria is complex and shaped by conflict, environmental degradation, economic instability, and governance failures, this study applies a multi-theoretical framework comprising Entitlement Theory, Resilience Theory, Political Ecology Theory, and Digital Ecosystem Theory to unbundle the underlying causes, inform sustainable actions, and provide a nuanced understanding that embraces multiple dimensions.

Entitlement Theory

Sen (1981) entitlement theory posits that hunger is not due to a lack of food but rather from a person's inability to access food legally and affordably. This concept is particularly relevant in North-East Nigeria, where internally displaced persons (IDPs), women, and other marginalized groups face structural, institutional, and conflict barriers to food access. He asserted that market availability does not guarantee consumption when entitlements such as land, income, or social safety nets are disrupted by insurgency or displacement. The framework was later expanded into the capability approach, where poverty is defined as the deprivation and lack of critical capabilities. Within this approach, an individual's ability to access food is determined by their ownership bundle, a combination of tangible (e.g., land, livestock) and intangible (e.g., skills,

education, health) assets, and the prevailing exchange entitlement mapping, which governs what one can obtain in return for those assets (Tiwari, 2007). This perspective explains why poverty persists even in areas where food is physically available because they lack the entitlements needed to access it.

Political Ecology Theory

Robbins' study posited that political ecology theory can enhance understanding of the historical and institutional roots of food insecurity by examining the lens of fragile local infrastructure, complex power dynamics, conflicting interests, and the entrenchment of corruption in these dynamics (Robbins, 2003). Walker (2005) describes Political Ecology Theory as a widely used interdisciplinary framework in human-environment studies. It enhances understanding of the dynamics of ecology, politics, and socio-economic factors, as well as their environmental nexus. Blaikie and Brookfield (2015) posit that political ecology combines ecological concerns with political economy, emphasizing the contention between society, natural endowments, and inequalities among social groups.

A significant contribution of this theory is its linkage of local environmental degradation to global structural factors, including market demands, policy failures, and economic exclusion (Robbins, 2019). These insights demonstrate why environmental decline in North-East Nigeria cannot be attributed solely to institutional and systematic mismanagement but must be viewed within a broader context of endemic insurgency, institutional failures, power dynamics, and the control of land and aid by multiple stakeholders and elites.

Digital Ecosystem Theory

Digital Ecosystem Theory is premised on the usage of innovative, emerging digital platforms and disruptive technologies in framing the adoption, access, contextualization, inclusion, data gathering, and service delivery. The theory provides a lens for analyzing the ability and efficacy of digital innovations in empowering marginalized users, promoting inclusion, and transforming the system value chain (Heidhues et al., 2024).

In Nigeria, mobile apps, fintech solutions, and agricultural extension platforms are increasingly used to bridge gaps in market access and information flows. However, digital inequality driven by infrastructural deficits, conflict, and low digital literacy limits the effectiveness of such tools in the North-East.

Resilience Theory

Holling (1973) seminal work pioneered ecological resilience theory, focusing on the dynamics of relationships and interconnectivity in socio-ecological systems and the resultant push and pull factors that cause adaptations and change. Other scholars have developed a theoretical framework that illustrates how personal traits, the nature of family support, and external and social support enable individuals to develop the resilience needed to survive adverse and harsh conditions (Garmezy, 1991; Masten & Powell, 2003). The need to expand the scope and adopt a

systems-based view led to the adoption of developmental psychology, which posits that some risk exposure and experiences enable individuals to develop resilience capabilities and competencies (Rutter, 2023).

Using a system perspective, Folke (2006) emphasized that a theoretical framework might not be sufficient to capture the sphere of resilience elements alone, but emphasized the necessity of integrating the interactive process, life-shared experiences, environmental factors, perception, supportive relationships systems, and protective systems in a dynamic context of some risks. Its ability to enhance understanding of the development of adaptive, transformative, and absorptive capacities in response to crises is also established. In North-East Nigeria, where communities face endemic human-environmental crises, conflicts, and displacement, adopting resilience is critical for survival and well-being.

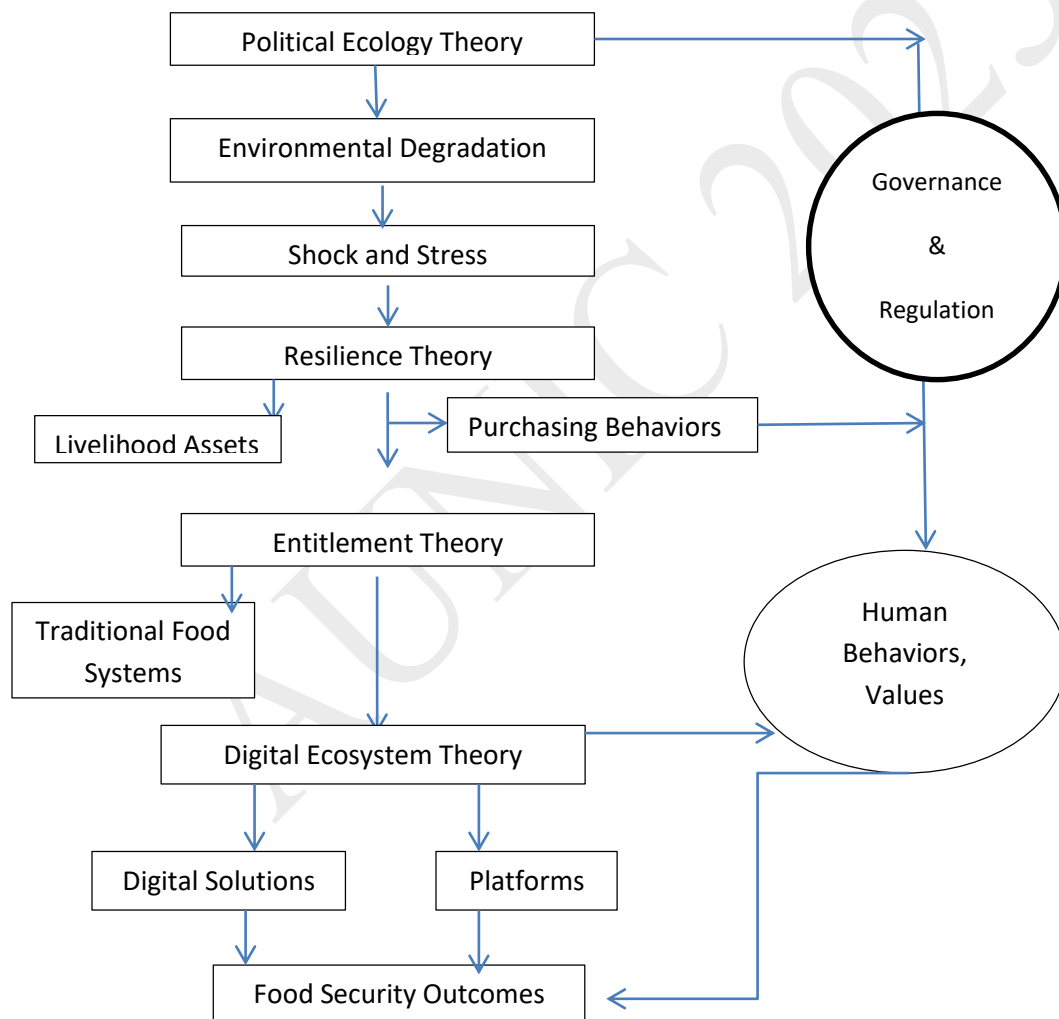


Figure 1: Theoretical Framework Diagram

The theoretical framework contextualization in figure 1 illustrates the multiple dynamics and pathways to achieving food security in North-East Nigeria and other vulnerable regions across Nigeria. The application of multi-theoretical foundations underscores the necessity of using diverse lenses. The foundational thrust is hinged on Political Ecology Theory's ability to provide historical insights into marginalization, fragile land governance systems, and the push-and-pull factors that influence conflict-related displacements, as well as human-environment behaviors that cause environmental degradation. Some standard practices are enshrined in cultural norms, necessity, and limited options, such as the thriving firewood economy, overgrazing due to nomadic cattle herds, and low levels of pro-environmental behaviors. The outcomes manifest in harmful and evolving environmental issues that exacerbate climate shocks and stresses.

The imbalances and resultant issues cause some level of forced behavioral adaptations, which are encapsulated in the Resilience Theory, emphasizing the adaptive capacities and capabilities of communities facing multiple deprivations, such as limited access to farmland, mechanized tools, and capital. The interplay of social networks, governance, regulations, and policies determines the level of resilience in rural and conflict-prone environments. Widening inequalities and the control of resources necessitate the use of the Entitlement Theory in contexts. Food access distribution and affordability levels are significant concerns that threaten the well-being, survival, and safety of communities. Its relevance to displaced communities manifests in the natural and external conflicts arising from institutional barriers, voids, local norms, and forced displacements and migrations. It may arise from poverty, unemployment, inequitable land tenure systems, and cultural values. The adoption of a Digital Ecosystem Theory offers a novel approach to addressing complex issues through contextualized, simple digital innovations that can mitigate risks and provide an ecosystem of value to stakeholders in food security value chains, utilizing mobile platforms and technologies to support farmers. It represents a significant shift from traditional food ecosystems, leveraging its ability to enhance access to information through lean models to improve food security.

Lived Realities and Practical Approaches

The office of the President and the First Lady recognized the gravity of these problems and advocated for everyone to cultivate a garden in their homes, which was incorporated into the National Urban Agricultural Programme. Although, it may seem insignificant in tackling a big problem, it is effective, if sustainable in the long run (Orientation, 2024). Before the advent of modernization, subsistence farming was a practical and widely used practice, instilling in us and our children a civic, responsible, and eco-friendly attitude from a young age, right from home. Using this micro and grassroots family approach is beneficial to homes and communities. During field immersion experiences in Eastern Uganda, it was observed that they plant food crops, fruit-bearing plants, and vegetables as flowers in their homes; conversely, most homes in the urban areas in Nigeria are adorned with exotic flowers and plants that have a positive impact on

beautifying the greenery and environment but deprive ourselves the benefits of enjoying from medicinal and basic food bearing plants like vegetables and others that sprout and grow easily. Change is not easy, and it may take us some time to uproot some of these flowers and replace them with medicinal, air-purifying, and vegetable plants and shrubs. At least our families eat 100% organic vegetables when they want to.

During our working and study experience in China, we often wondered what happened to the leftovers in the canteens until it was discovered that they were evacuated daily using small pickup trucks for use as biogas, fertilizer, and animal feed. Another immersive experience in Kenya led to the observation of how they combat water scarcity and shortages in Kitengela, among the Maasai populations, with a similar semblance to some of our cultures and arid landscapes in Northern Nigeria. Even in Kigali, my host informed me that water is considered a precious resource, and you would hardly be entertained as a guest with it.

Let us return to Kitengela, Kenya, a region prone to desert conditions. The residents harvest rainwater in large tanks and use some as an open water reservoir for farming and rearing ducks. The wastewater from the house goes through a channel that is presumably used for watering. Some of these practices are also prevalent in Nigeria, but on a smaller scale and for different purposes.

We often harvest rainwater in modern homes for aesthetic purposes, but it often flows into the gutter, resulting in flooding and other issues. What would happen if each household started harvesting water for some domestic use? The farmers would be joyful during the rainy season, to some extent, until the lakes and rivers dry up during the dry season. This solution might not be foolproof, but it can be contextualized.

During a visit to the United States International University in Kenya, the Professor pointed to a reservoir that was the University's water harvesting and treatment plant. It sounded strange, but they soon realized that this was their contextual solution to combating food insecurity, harnessing natural resources, to overcome local challenges.

Have you ever visited Jimeta Market or other food markets in Nigeria to buy plantains or fruits, only to notice that some sellers would rather see their produce rot than sell it at a fair price? In the North, food preservation is well-practiced by all due to the weather conditions, but why do we still experience significant food wastage?

The fact that commercial value addition, preservation, and access to specific food crops are not available throughout all seasons indicates that there are still some gaps. It is disheartening for farmers to count their losses due to a lack of post-harvest preservation (Barau et al., 2023); however, some daring entrepreneurs in Nigeria have entered this space and begun to add value. Recounting the laudable government initiatives and policies is endless, yet just like these wicked problems, they also experience gaps in implementation arising from institutional voids.

The security challenges hinder farmers from engaging in farming, but what happens if Hydroponics and other emerging technologies are adopted in a pilot phase in safeguarded locations or designated areas? Recent studies indicate that the adoption of green technologies in farming in Nigeria offers a new vista of hope and processes that can help us combat food insecurity and shortages (Samuel et al., 2024).

The Federal Government's establishment of Federal Universities of Agriculture in all geographical regions aims to tackle these problems at the macro level. Although we have many licensed private universities, why haven't more private sector stakeholders established a practical-based agricultural university specializing in a niche area?

Dung waste is readily available in the North; existing research and evidence show it is a good source of manure (El-Rayyes et al., 2025). However, it is a paradox: sometimes, it is swept away, and sometimes, one wonders how much of this is harnessed by the farmers as the cattle herders ply their daily paths. There are immense benefits and new vistas of possibilities when hitherto ignored approaches are explored to address food insecurity resulting from rising input costs.

However, there are abundant natural resources that have been tried and converted into fertilizer, highlighting the potential of urine collection banks (Beijer et al., 2024; Oginni et al., 2024). We have public toilets and other facilities; what happens to the urine? You might say it gushes out, but preliminary research and a webinar series attended suggest that some organizations and farmers utilize this technique to reduce the costs of inputs (Obiefuna & Okafor, 2025).

The dimensions of food insecurity are also global and entangled in complexities that revolve around the interests of stakeholders and fragmented policy interventions. While it might be logical to assume that adopting the Egyptian, Chinese, and Arabian models in Nigeria would be expensive, we should also recognize that the long-term benefits and adoption can be contextualized.

How can we establish practical and acceptable agricultural food banks or agencies that purchase excess produce from farmers without bureaucratic and institutional bottlenecks? Moreover, is it possible for every corporate organization to invest in farming as part of its corporate social responsibility (CSR) for its workplace families and communities?

Different schools of thought and think tanks, framed within an academic mindset, might rightly provide enough reasons why some of these are impractical. However, the fact remains that they are practical in many other contexts, **while** countries that do not have food security issues are exploring greener methods for food sustainability.

There are direct and indirect beneficiaries of the state of food insecurity in Nigeria, including entrepreneurs and operators in the value chain who create artificial scarcity and manipulate prices for personal gain. During an interview with a farmer in Girei, he narrated how some of them take loans for farming and to procure farming equipment, the effect of rising labor costs on harvesting, the resultant pressure to sell, and the decision to hoard and sell at breakeven prices

rather than incurring a loss. Their speculations are based on understanding the harvest and demand-supply cycles. To some extent, it is easy to point accusing fingers at them, but if we dig deeper, there are solutions to this problem if there are reliable and regulated off-takers that help alleviate their post-harvest worries. They should not bear the risks alone; they could also invest in a pure water sachet business, a bakery, and other ventures, just as some institutions and entrepreneurs do.

Practical Implications and Conclusions

Wicked problems related to food insecurity cannot be solved solely by the Government, International agencies, and Non-governmental organizations. Interventions using top-down models are often unsustainable and can sometimes exacerbate the situation (Prajapati et al., 2025). Central to reducing food insecurity is behavioral modification and collective small-scale actions that can have a multiplier effect on different communities in Nigeria. Harnessing and integrating technology advances in the food value chains offers an immense vista of opportunities and risk mitigation. Indeed, not everyone can be a farmer or cultivate a small garden, but let us remember the disruptive changes and adaptations that all human beings made during the COVID-19 pandemic. The studies and discourse on food insecurity are unlikely to end soon due to its complex forms and varied outcomes in different communities. The clarion call is for a micro-level commitment, including actions, benchmarking, and adaptation of successful initiatives in some African countries.

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