

Niger State Agricultural Investment Plan and Household Food Insecurity Among Smallholder Farmers in Niger State.

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Abstract- Agricultural investment plans are increasingly promoted as policy instruments for improving productivity, strengthening rural livelihoods, and reducing household food insecurity. However, the extent to which such interventions translate into sustained food security outcomes among smallholder farmers remains a major policy concern. This study examined the Niger State Agricultural Investment Plan and household food insecurity among smallholder farmers in Niger State. Anchored in the Sustainable Livelihoods Framework, the study conceptualized food insecurity as a livelihood outcome shaped by access to finance, extension services, infrastructure, agricultural technologies, market systems, and vulnerability conditions. A mixed-methods descriptive design was adopted. Quantitative data were obtained from 360 smallholder farmers across six Local Government Areas selected from the three senatorial zones of Niger State, while qualitative insights were generated through interviews with agricultural stakeholders of the state, extension workers, and farmer representatives. Data were analysed using frequencies, percentages, mean scores, composite mean analysis, and thematic interpretation. The study discovered that systemic barriers, particularly limited access to affordable credit, inadequate extension follow-up, poor rural infrastructure, and uneven distribution of agricultural inputs, constrained the effective implementation of NSAIP interventions. The study also found that sustained reduction in household food insecurity beyond 2025 requires improved agricultural financing, stronger institutional coordination, increased investment in climate-smart technologies, better market and storage systems, and continuous policy review based on farmers' experiences. The study concludes that NSAIP has the potential to support food security, but its effectiveness depends on strengthening the livelihood-support environment around smallholder farmers and therefore recommends an integrated smallholder support framework and a post-2025 NSAIP review and coordination platform to improve implementation, resilience, and household food security outcomes.

Keywords: *Agricultural Investment Plan, Food Insecurity, Smallholder Farmers, Sustainable Livelihoods Framework, Niger State.*

I. INTRODUCTION

Food insecurity remains one of the most urgent development challenges of the twenty-first century. Although global food production has expanded, access to adequate, affordable, and nutritious food remains uneven across regions and households. The 2024 State of Food Security and Nutrition in the World report estimated that about 733 million people faced hunger in 2023, with Africa carrying a disproportionate share of the burden. The report also shows that progress toward Sustainable Development Goal 2 remains slow, especially in countries affected by climate shocks, conflict, weak food systems, and economic instability (FAO, IFAD, UNICEF, WFP, & WHO, 2024). Nigeria reflects this wider challenge. Despite its large agricultural population and favourable agro-ecological conditions, household food security remains threatened by low productivity, inflation, high input costs, weak rural infrastructure, post-harvest losses, and limited market access.

The food security situation in Nigeria has become more severe in recent years because rising food prices have weakened household purchasing power. The National Bureau of Statistics reported that food inflation stood at 39.84% in December 2024, reflecting sharp increases in the prices of major staples such as yam, rice, maize, fish, and vegetables (National Bureau of Statistics, 2025). For smallholder farmers, this creates a difficult paradox. They produce a significant share of domestic food, yet many remain vulnerable to food insecurity because of seasonal income, limited access to credit, weak

storage facilities, poor roads, climate variability, and unstable farm-gate prices. This suggests that food insecurity among smallholder farmers is not only a production problem; it is also a livelihood, market, and policy implementation problem.

Agricultural investment plans and technology-driven interventions have therefore become important policy tools for improving food security. Across developing economies, such interventions are expected to improve yields, reduce post-harvest losses, increase resilience, and raise household welfare through improved seeds, fertiliser, mechanisation, irrigation, extension services, climate-smart agriculture, digital advisory systems, and value-chain support. Nigeria's National Agricultural Technology and Innovation Policy 2022–2027 reflects this direction by identifying technology, innovation, climate-smart agriculture, mechanisation, finance, extension, and agribusiness development as key pathways for improving productivity, food security, employment, and wealth creation (Federal Ministry of Agriculture and Rural Development, 2022). However, evidence from agricultural innovation studies shows that technology provision alone does not automatically lead to sustained adoption or improved food security. Adoption and welfare outcomes are shaped by finance, infrastructure, institutional coordination, extension support, market access, and the suitability of technologies to farmers' local conditions (Feder, Just, & Zilberman, 1985; Rogers, 2003).

Niger State provides an important sub-national context for examining this issue. The state is widely recognised for its agricultural potential and is often described as one of Nigeria's major food-producing states. In response to this potential, the Niger State Agricultural Investment Plan was designed as a framework for mobilising public, private, and development-partner investment into agriculture, with attention to value-added agriculture, infrastructure development, capacity building, agribusiness growth, and employment creation (Niger State Government, 2020). Reports on the launch of the state agricultural policy and investment plan indicate that the state government, in collaboration with development partners, projected about ₦203.6 billion in agricultural investment over a four-year

period to strengthen the sector (Voice of Nigeria, 2020). Within this policy environment, several technology-oriented interventions have been promoted, including input support, mechanisation, irrigation development, agro-processing, extension services, and value-chain strengthening.

Despite these interventions, household food insecurity among smallholder farmers in Niger State remains a concern. Many farmers still face barriers that limit their ability to convert agricultural investments into stable food access and improved welfare. These barriers include limited access to affordable credit, weak extension follow-up, poor rural infrastructure, climate risks, insecurity in some farming areas, inadequate storage, and uneven distribution of agricultural inputs. Such constraints may explain why increases in production or access to technology do not always translate into sustained household food security. The issue, therefore, is not only whether the Niger State Agricultural Investment Plan exists, but whether its implementation has effectively addressed the structural conditions that shape food insecurity among smallholder farmers.

Against this background, this study examines the Niger State Agricultural Investment Plan and household food insecurity among smallholder farmers in Niger State. It focuses on systemic barriers limiting the effective implementation of agricultural technology interventions and the policy refinements required to sustain reductions in household food insecurity beyond 2025. By adopting a sub-national policy evaluation approach, the study contributes to the literature on agricultural investment, technology adoption, and food security by linking policy implementation to household-level outcomes among smallholder farmers.

1.2 Statement of the Problem

Household food security among smallholder farmers should be reflected in reliable food access, stable farm income, improved productivity, reduced post-harvest losses, and resilience to market and climate shocks. With the implementation of the Niger State Agricultural Investment Plan (NSAIP) and related technology-driven interventions, smallholder farmers in Niger State are expected to benefit from improved

seeds, mechanisation, irrigation support, extension services, input distribution, storage facilities, market linkages, and access to finance. These interventions should enhance farm output, strengthen household purchasing power, and reduce food insecurity among rural farming households.

However, field realities suggest a gap between policy expectation and household-level outcomes. Despite agricultural investment efforts, many smallholder farmers continue to face high input costs, limited access to affordable credit, weak extension follow-up, poor rural infrastructure, inadequate storage facilities, unstable produce prices, and uneven distribution of subsidised agricultural inputs. Nigeria's food inflation reached 39.84% in December 2024, reflecting the pressure of rising food prices on household purchasing power (National Bureau of Statistics, 2025). In Niger State, recent field reporting also shows that bumper harvests do not always translate into improved farmer welfare, as some farmers continue to experience price crashes, rising input costs, diverted subsidies, and limited access to mechanisation and storage support (ICIR, 2025).

In response to these challenges, the Niger State Government and its development partners have promoted agricultural interventions under the NSAIP framework, including mechanisation support, input distribution, irrigation development, extension services, value-chain support, and agricultural investment mobilisation. These interventions reflect the state's effort to transform agriculture from subsistence production to a more productive and market-oriented system.

Despite these interventions, uncertainty remains about whether NSAIP has produced measurable and sustained reductions in household food insecurity among smallholder farmers. Even where agricultural technologies are introduced, their effective use may be constrained by financing gaps, weak institutional coordination, climate variability, insecurity, inadequate after-sales support, and limited market integration. This creates a policy and empirical gap on how NSAIP implementation affects household food insecurity at the farmer level.

This study addresses that gap by examining the systemic barriers limiting NSAIP implementation and the policy refinements required to strengthen its food security outcomes beyond 2025. The focus is on how agricultural technology investments relate to household food insecurity among smallholder farmers, rather than on investment volume or policy intention alone.

1.3 Research Questions

- I. What systemic barriers limit the effective implementation of NSAIP's agricultural technology interventions in reducing household food insecurity among smallholder farmers in Niger State?
- II. What policy refinements are required to enhance NSAIP's effectiveness in achieving sustained reduction of household food insecurity among smallholder farmers in Niger State beyond 2025?

1.4 Objectives of the Study

The objectives of the study are to:

- I. identify the systemic barriers limiting the effective implementation of NSAIP's agricultural technology interventions in reducing household food insecurity among smallholder farmers in Niger State; and
- II. determine the policy refinements required to enhance NSAIP's effectiveness in achieving sustained reduction of household food insecurity among smallholder farmers in Niger State beyond 2025.

1.5 Research Hypotheses

The study tested the following null hypotheses:

- I. H_{01} : Systemic barriers do not significantly limit the effective implementation of NSAIP's agricultural technology interventions in reducing household food insecurity among smallholder farmers in Niger State.
- II. H_{02} : There is no significant relationship between current NSAIP implementation frameworks and the prospects for sustained reduction of household food insecurity among smallholder farmers in Niger State beyond 2025.

1.6 Scope of the Study

This study covers the period 2020 to 2025, corresponding with the implementation phase of the Niger State Agricultural Investment Plan and the intensification of technology-driven agricultural interventions targeted at smallholder farmers in the state. The period also captures the post-COVID-19 recovery context and the scaling of interventions such as input distribution, mechanisation support, irrigation development, extension services, and value-chain strengthening.

Geographically, the study is limited to six Local Government Areas selected across the three senatorial zones of Niger State: Kontagora and Magama in Niger North, Shiroro and Chanchaga in Niger East, and Mokwa and Bida in Niger South. This distribution provides balanced representation of the state's major agro-ecological, socio-economic, and institutional contexts, including differences in crop production systems, infrastructure access, market integration, and exposure to climate-related vulnerabilities.

II. CONCEPTUAL CLARIFICATION

2.1.1 Agriculture

Agriculture refers to the cultivation of crops, rearing of livestock, fisheries, forestry, and other activities through which food, fibre, and raw materials are produced for human use. Contemporary understanding of agriculture extends beyond primary production to include input supply, mechanisation, storage, processing, transportation, marketing, and other activities within the agri-food value chain. This broader view reflects the shift from subsistence-oriented farming to integrated agricultural systems that connect production with markets, technology, and household welfare outcomes (FAO, 2022; World Bank, 2021).

In developing economies, agriculture remains central to employment, income generation, food supply, and poverty reduction. Diao, Hazell, and Thurlow (2010) argue that agriculture continues to play an important role in African development because of its scale, rural employment potential, and linkages with poverty reduction. However, the sector is often constrained by low technology adoption, limited

infrastructure, weak access to finance, climate vulnerability, and poor institutional coordination. For this reason, agricultural modernisation through technology, investment, extension support, and governance reform has become an important pathway for improving food security and rural livelihoods.

2.1.2 Agricultural Technology Investment Programmes

Agricultural Technology Investment Programmes refer to structured public, private, or development-partner interventions aimed at improving agricultural productivity, resilience, and value-chain performance through the provision or promotion of modern technologies and support systems. These may include improved seeds, fertiliser, mechanisation, irrigation, extension services, digital advisory platforms, post-harvest technologies, storage facilities, and agro-processing infrastructure. Their central assumption is that technology-driven productivity growth can improve farm output, reduce losses, strengthen resilience, and enhance household food security when supported by finance, infrastructure, and effective institutions (FAO, 2022; Federal Ministry of Agriculture and Rural Development [FMARD], 2022).

However, technology investment does not automatically produce welfare gains. Agricultural innovation literature shows that adoption depends on farmers' access to information, affordability, perceived usefulness, compatibility with local conditions, extension support, and institutional reliability (Feder, Just, & Zilberman, 1985; Rogers, 2003). In this study, agricultural technology investment programmes are therefore understood not merely as input-distribution schemes, but as integrated interventions that link technology access with finance, extension, markets, infrastructure, and governance support.

2.1.3 Food Insecurity

Food insecurity refers to a condition in which individuals or households lack reliable physical, social, or economic access to sufficient, safe, and nutritious food required for an active and healthy life. The concept is commonly understood through four interrelated dimensions: food availability, access,

utilisation, and stability over time (FAO, 2008; FAO, IFAD, UNICEF, WFP, & WHO, 2024). This means that food insecurity is not caused only by low food production. It may also arise where households lack income, markets, storage, nutrition knowledge, or resilience against shocks.

In rural farming communities, food insecurity often results from unstable yields, high input costs, seasonal income fluctuations, climate variability, weak storage systems, poor market access, and limited livelihood diversification. Barrett (2010) emphasises that food security is both a production and access issue, meaning that improved output does not automatically guarantee improved household food security unless it strengthens purchasing power, diet quality, and resilience. In this study, household food insecurity is therefore assessed as an outcome shaped by agricultural productivity, income stability, market access, technology utilisation, and the capacity of smallholder farmers to withstand shocks.

2.1.4 Smallholder Farmers

Smallholder farmers are agricultural producers who operate on relatively small landholdings, rely largely on family labour, and often have limited access to capital, improved inputs, formal credit, extension services, storage facilities, and organised markets. Although farm-size definitions differ across countries, smallholder farms are commonly associated with low-resource production systems and strong dependence on household labour. Lowder, Scoet, and Raney (2016) show that small and family farms remain central to global agriculture, particularly in developing regions where they support rural livelihoods and domestic food supply.

Despite their importance, smallholder farmers face structural constraints that reduce productivity and increase vulnerability to food insecurity. These include poor rural infrastructure, weak access to finance, insecure land tenure, limited mechanisation, climate shocks, market instability, and information gaps. In the context of Niger State, smallholder farmers are central to food production but remain exposed to the same conditions that agricultural investment programmes seek to address. They therefore constitute an appropriate target group for

evaluating the effectiveness of the Niger State Agricultural Investment Plan.

2.1.5 Niger State Agricultural Investment Plan

The Niger State Agricultural Investment Plan is a state-level policy and investment framework designed to guide agricultural transformation through coordinated public, private, and development-partner investment. The plan identifies priority areas such as value-added agriculture, infrastructure development, capacity building, agribusiness promotion, and employment creation. It also provides a framework for partnerships intended to strengthen agricultural productivity and market participation in the state. Public reports on the launch of the state agricultural policy and investment plan indicate that Niger State, with support from development partners, projected about ₦203.6 billion in agricultural investment over a four-year period (Voice of Nigeria, 2020).

Conceptually, the NSAIP is treated in this study as the policy framework shaping agricultural technology investment, institutional coordination, and resource allocation in Niger State between 2020 and 2025. Its relevance lies in its expected role in improving smallholder farmers' access to inputs, mechanisation, irrigation, extension support, finance, storage, and value-chain opportunities. The Niger State agricultural policy framework also identifies agriculture as a pathway for improving food security, productivity, and farmer income within the state's development agenda.

For this study, the effectiveness of NSAIP is assessed not merely by the existence of investment plans or agricultural programmes, but by whether such interventions translate into improved household food security among smallholder farmers. This includes the extent to which farmers experience improved access to technologies, reduced production constraints, better market linkage, stable income, and stronger resilience against food insecurity.

2.2 Empirical Review of Related Literature

Empirical studies on agricultural technology adoption and food security show that access to technology alone does not automatically improve household welfare. Awotide, Karimov, and Diagne (2016)

examined agricultural technology adoption, commercialisation, and welfare among smallholder rice farmers in rural Nigeria. Their study found that technology adoption and market participation improved welfare outcomes, but the gains were stronger where farmers had better access to institutional support, input systems, and commercial opportunities. This finding is relevant to the present study because NSAIP's effectiveness depends not only on providing agricultural technologies, but also on whether smallholder farmers can use such technologies to improve production, income, and household food access.

Recent evidence from north-western Nigeria further supports this position. Nazifi, Mohammed, and Ibrahim (2024) examined the adoption of climate-smart agricultural practices among 377 smallholder farming households and found that adoption improved technical efficiency, crop income, and household food security. However, the study also showed that continued adoption depended on farmers' access to credit, awareness, and institutional support. This is important for the present study because many NSAIP interventions, including irrigation, improved inputs, mechanisation, and climate-resilient practices, can only reduce food insecurity when farmers have the financial and institutional capacity to sustain their use.

Agricultural financing has also been identified as a major determinant of food security outcomes. Abdul, Saheed, Abraham, Anthony, and Yakubu (2022), in their JEAR study on agriculture financing and food security in Nigeria, used an Autoregressive Distributed Lag model and found that agricultural credit had a positive relationship with food security, while high interest rates negatively affected food security. Their study recommended improved access to affordable agricultural credit for farmers. This finding supports the present study's focus on rural finance as a systemic factor affecting the capacity of smallholder farmers to benefit from NSAIP interventions.

Evidence from studies on farming households also shows that food insecurity is shaped by more than production. Ogheneruemu and Opeyemi (2023), in a

JEAR study using Nigeria's General Household Survey data, found that farming households were exposed to shocks such as pest invasion, flooding, poor rainfall, input price increases, and output price falls. Their findings showed that credit access, cooperative membership, and assistance-based coping strategies increased the probability of food security among farming households. Similarly, Arua, Muomaiife, and Ibe (2025), in a JEAR study of farming households in Enugu State, found that a high proportion of farming households were food insecure and that age, education, and farm size significantly influenced food security status. These findings are useful to the present study because they show that household food insecurity among farmers is influenced by economic, institutional, and shock-related factors, not by production alone.

Studies on agricultural information and technology use further indicate that awareness is not sufficient unless it is supported by infrastructure and follow-up systems. Kolapo, Adegbite, Oyekale, and Adepoju (2024) found that exposure to agricultural smartphone applications influenced adoption among smallholder farmers in Southwest Nigeria, with implications for technical efficiency and productivity. However, digital and technology adoption remains dependent on training, trust, affordability, and farmers' ability to use the tools effectively. This supports the view that NSAIP's technology-driven interventions require strong extension services, farmer education, and continuous support if they are to produce sustained food security outcomes.

The policy-reform literature also points to the need for stronger value-chain and institutional support. Onyenekwe, Amaechina, Onah, Ayogu, and Eze (2025), in their JEAR study on urban agriculture, food security, and poverty reduction in Enugu State, found that food insecurity and poverty were influenced by income, farm size, household characteristics, credit access, and climate-related constraints. The study recommended targeted interventions such as micro-financing, subsidised inputs, and climate-resilient practices. These recommendations align with the present study's concern that NSAIP effectiveness beyond 2025 will depend on improved financing, storage, market

access, climate-smart investment, and farmer-centred implementation.

Overall, the empirical literature suggests that agricultural technology programmes reduce household food insecurity only when they are supported by affordable finance, effective extension services, rural infrastructure, reliable input delivery, climate resilience, storage facilities, and market linkages. The studies reviewed show that smallholder farmers often understand the value of improved technologies, but their ability to benefit from such technologies is constrained by structural and institutional barriers. This provides the basis for examining NSAIP not merely as an agricultural investment plan, but as a policy framework whose effectiveness depends on implementation quality and the enabling environment surrounding smallholder farmers.

2.3 Summary of Gap in Literature

Existing studies have provided useful evidence on agricultural technology adoption, climate-smart agriculture, agricultural financing, household food insecurity, and coping strategies among farming households in Nigeria. However, many of these studies focus either on national-level agriculture, specific technologies, or farming households outside Niger State. While they show that finance, extension support, infrastructure, climate shocks, market access, and institutional coordination affect food security outcomes, they do not sufficiently explain how these factors operate within the Niger State Agricultural Investment Plan.

The major gap, therefore, is the limited empirical evidence on whether NSAIP's technology-driven interventions have translated into sustained reductions in household food insecurity among smallholder farmers in Niger State. There is also limited sub-national evidence on the policy refinements required to strengthen NSAIP implementation beyond 2025. This study addresses that gap by examining the systemic barriers limiting NSAIP effectiveness and the reforms needed to improve household food security outcomes among smallholder farmers in selected Local Government Areas of Niger State.

2.4 Theoretical Framework

This study is anchored on the Sustainable Livelihoods Framework (SLF). The framework is considered appropriate because the study examines how agricultural investment interventions affect the livelihood conditions and household food security of smallholder farmers. Rather than treating food insecurity as a problem of food production alone, SLF explains it as an outcome of farmers' access to assets, exposure to shocks, institutional support, and livelihood strategies.

The intellectual foundation of SLF is associated with Chambers and Conway (1992), who define livelihood as the capabilities, assets, and activities required for a means of living. A livelihood is considered sustainable when it can cope with and recover from shocks, maintain or enhance its capabilities and assets, and support future generations without undermining the natural resource base. This makes the framework useful for analysing rural households whose food security depends not only on farm output, but also on income, access to productive resources, climate resilience, and institutional support.

The framework was further developed by the Department for International Development (DFID, 1999), which identified five major livelihood assets: human capital, social capital, natural capital, physical capital, and financial capital. Human capital includes farmers' knowledge, skills, health, and access to extension services. Social capital refers to cooperatives, farmer groups, community networks, and institutional relationships. Natural capital includes land, water, soil, rainfall, and other environmental resources. Physical capital covers roads, storage facilities, irrigation systems, mechanisation, and market infrastructure. Financial capital includes credit, savings, insurance, and other financial resources available to farmers. These assets shape the ability of smallholder farmers to produce food, earn income, withstand shocks, and maintain household food access.

In the context of this study, the Niger State Agricultural Investment Plan is treated as a policy intervention expected to strengthen smallholder farmers' livelihood assets. Its interventions, including

improved inputs, mechanisation, irrigation support, extension services, financing, storage, and value-chain development, are expected to improve farmers' productive capacity and reduce household food insecurity. However, SLF also recognises that policy interventions do not operate in isolation. Their outcomes are influenced by the vulnerability context, including climate variability, insecurity, market instability, food inflation, input price increases, and infrastructural deficits.

The framework is particularly relevant to the study's first objective, which focuses on systemic barriers limiting effective NSAIP implementation. Weak access to credit reflects a limitation in financial capital; inadequate extension support reflects weakness in human and institutional capacity; poor roads, storage, and irrigation facilities reflect gaps in physical capital; while climate shocks and insecurity represent vulnerability factors that reduce livelihood stability. These barriers help explain why agricultural technology investments may not automatically translate into improved household food security.

SLF also supports the second objective, which focuses on policy refinements required to sustain food security outcomes beyond 2025. From the perspective of the framework, effective policy reform should strengthen farmers' livelihood assets, reduce vulnerability, and improve the institutions that mediate access to resources and opportunities. This means that improving NSAIP effectiveness requires more than distributing inputs or introducing technologies. It requires affordable finance, reliable extension services, climate-smart investment, rural infrastructure, transparent input delivery, farmer participation, and stronger market linkages.

Overall, the Sustainable Livelihoods Framework provides a suitable analytical lens for this study because it links policy implementation, livelihood assets, vulnerability, and food security outcomes. It enables the study to examine whether NSAIP has strengthened the capacity of smallholder farmers to improve productivity, stabilise income, access food, and cope with shocks. The framework therefore guides the interpretation of the findings and supports the study's argument that sustained reduction in

household food insecurity depends on both agricultural investment and the broader livelihood conditions surrounding smallholder farmers.

III. METHODOLOGY

This study adopted a mixed-methods descriptive research design to examine the Niger State Agricultural Investment Plan and household food insecurity among smallholder farmers in Niger State. The design was appropriate because the study required quantitative evidence from smallholder farmers and qualitative explanations from agricultural officials, extension workers, and farmer representatives.

The study population comprised registered smallholder farmers, agricultural extension workers, officials of the Niger State Ministry of Agriculture, and representatives of the All Farmers Association of Nigeria (AFAN), Niger State Chapter. The quantitative population consisted of 3,891 registered smallholder farmers across six selected Local Government Areas: Kontagora and Magama in Niger North, Shiroro and Chanchaga in Niger East, and Mokwa and Bida in Niger South. These areas were selected to reflect the agricultural, socio-economic, and institutional diversity of Niger State.

The sample size was determined using Taro Yamane's formula:

$$n = N / (1 + N(e)^2)$$

Where n is the sample size, N is the population size, and e is the margin of error. With $N=3,891$ and $e=0.05$, the sample size was calculated as:

$$n = 3891 / (1 + 3891(0.05)^2) = 363$$

Therefore, 363 smallholder farmers constituted the quantitative sample for the study. A multi-stage sampling technique was adopted. The six Local Government Areas were purposively selected across the three senatorial zones via kobo collect, while smallholder farmers were selected using simple random sampling from available farmer lists. 6 Key

informants were purposively selected based on their involvement in agricultural policy implementation, extension delivery, and farmer support services.

Primary data were collected through structured questionnaires and key informant interviews. The questionnaire was designed on a five-point Likert scale and focused on systemic barriers affecting NSAIP implementation, including access to credit, extension support, rural infrastructure, input distribution, and programme awareness. It also captured policy refinements required for sustained food security, including agricultural financing, institutional coordination, climate-smart technologies, market access, storage, value-chain support, and continuous policy review. Secondary data were obtained from policy documents, government reports, academic studies, and other credible institutional sources.

The study was guided by the following model:

$$HFI=f(NSAIP,SB,PR,X)$$

Where HFI represents household food insecurity, NSAIP represents Niger State Agricultural Investment Plan implementation, SB represents systemic barriers, PR represents policy refinements, and X represents contextual factors such as climate variability, insecurity, market instability, and household characteristics. The model aligns with the Sustainable Livelihoods Framework, which views food insecurity as a livelihood outcome shaped by access to assets, institutional support, vulnerability conditions, and household strategies.

Quantitative data were analysed using SPSS version 26.0. Frequencies, percentages, and mean scores were used to summarise responses. A mean score of 3.00 and above indicated agreement, while a mean below 3.00 indicated disagreement. Qualitative interview data were analysed thematically and used to support the interpretation of the quantitative findings. The hypotheses were tested using the composite mean approach, with 3.00 as the benchmark. The null hypothesis was rejected where the composite mean exceeded 3.00 and was not rejected where the composite mean was 3.00 or

below. The results were interpreted as evidence of respondents' perceived agreement rather than proof of direct causality.

IV. DATA PRESENTATION AND ANALYSIS

4.1 Questionnaire Distribution and Retrieval

A total of 363 questionnaires were administered across the selected Local Government Areas using KoboCollect. Out of these, 360 were retrieved and found usable for analysis, representing a response rate of 99.2%. The distribution is presented in Table 4.1.

Table 4.1: Distribution and Retrieval of Questionnaires by Local Government Area

Local Government Area	Senatorial District	Sample Size	Percentage (%)	Questionnaires Returned	Questionnaires Not Returned
Kontagora	Niger North	78	21.5	77	1
Magama	Niger North	28	7.7	28	0
Shiroro	Niger East	36	9.9	35	1
Chanchaga	Niger East	76	20.9	76	0
Mokwa	Niger South	115	31.7	114	1
Bida	Niger South	30	8.3	30	0
Total		363	100.0	360	3

Table 4.1 shows that 360 out of 363 questionnaires were retrieved. This high response rate provides a reliable basis for analysing smallholder farmers' views across the selected Local Government Areas.

For decision-making, a mean score of 3.00 and above was interpreted as agreement, while a mean score below 3.00 was interpreted as disagreement, consistent with the treatment of Likert-type data in social science research (Boone & Boone, 2012).

4.2 Systemic Barriers Limiting Effective NSAIP Implementation

Table 4.2: Systemic Barriers Limiting Effective NSAIP Implementation (N = 360)

S/N	Statement	SD	D	N	A	SA	Mean	Decision
1	Limited access to affordable credit prevents me from fully benefiting from NSAIP agricultural technologies.	41	57	53	100	109	3.50	Agree
2	Inadequate extension support or follow-up guidance reduces my ability to use NSAIP technologies effectively.	31	97	34	111	87	3.35	Agree
3	Poor rural infrastructure such as roads, irrigation, storage, and electricity limits the impact of NSAIP interventions on my farming activities.	40	63	44	116	97	3.46	Agree
4	Some government agricultural inputs or services do not reach the intended smallholder farmers in my community.	28	51	59	108	114	3.64	Agree
5	Lack of clear information or awareness about NSAIP programmes reduces farmers' participation and benefits.	82	130	48	94	6	2.48	Disagree

Table 4.2 shows that most respondents agreed that systemic barriers limit the effectiveness of NSAIP interventions. The strongest barrier was the failure of some government inputs or services to reach intended

smallholder farmers, with a mean score of 3.64. This was followed by limited access to affordable credit (3.50), poor rural infrastructure (3.46), and inadequate extension support (3.35). However, respondents disagreed that lack of awareness was a major barrier, with a mean score of 2.48. This suggests that the main implementation problem is not awareness, but access, delivery, finance, infrastructure, and support systems.

Qualitative responses support this pattern. Key informants noted that NSAIP had improved productivity for some farmers through access to tractors, power tillers, and other support services. However, they also identified financial constraints, high equipment costs, climate change, insecurity, and uneven programme reach as factors limiting sustained benefits. Overall, the evidence suggests that NSAIP has recorded some productivity gains, but its capacity to reduce household food insecurity remains constrained by financial, institutional, and infrastructural barriers.

4.3 Policy Refinements Required for Sustained Food Security Beyond 2025

Table 4.3: Policy Refinements Required for Sustained Food Security Beyond 2025 (N = 360)

S/N	Statement	SD	D	N	A	SA	Mean	Decision
1	Expanding access to affordable agricultural financing would improve the long-term food security benefits of NSAIP.	53	70	31	134	72	3.28	Agree
2	Stronger coordination among government agencies, extension services, and private partners would make NSAIP more effective.	38	59	57	109	97	3.47	Agree
3	Increased	39	38	25	133	125	3.74	Agree

S/N	Statement	SD	D	N	A	SA	Mean	Decision
	investment in climate-smart technologies would help sustain food production in my community.							
	Better market access, storage, and value-chain support would increase the food security impact of NSAIP.							
4	Continuous review and improvement of NSAIP policies based on farmers' experiences would strengthen food security beyond 2025.	29	68	87	94	82	3.37	Agree
5		46	38	41	90	145	3.69	Agree

Table 4.3 shows agreement across all policy-refinement indicators. The highest mean score was recorded for investment in climate-smart technologies (3.74), followed by continuous policy review based on farmers' experiences (3.69). Respondents also agreed on the need for stronger institutional coordination (3.47), improved market access, storage and value-chain support (3.37), and affordable agricultural financing (3.28). These findings indicate that sustaining NSAIP's food security outcomes beyond 2025 requires climate resilience, farmer-centred policy review, stronger coordination, better post-harvest systems, and improved access to finance.

Qualitative evidence also supports these findings. Key informants emphasised the need for stronger monitoring and evaluation, farmer participation in policy design, improved financial empowerment, stricter control of subsidised input distribution, and greater private-sector participation. The convergence between survey and interview findings suggests that NSAIP's long-term effectiveness depends on institutional reform, climate-smart investment,

inclusive policy governance, and stronger value-chain support.

4.4 Test of Hypotheses

The hypotheses were tested using the composite mean approach. The benchmark value was 3.00. The null hypothesis was rejected where the composite mean exceeded 3.00 and was not rejected where the composite mean was 3.00 or below.

Hypothesis One

H₀₁: Systemic barriers do not significantly limit the effective implementation of NSAIP's agricultural technology interventions in reducing household food insecurity among smallholder farmers in Niger State.

Table 4.4: Test for Hypothesis One

Variable	Test Value	Composite Mean	Mean Difference	Decision
Systemic barriers to NSAIP implementation	3.00	3.29	+0.29	Reject H ₀₁

Table 4.4 shows that the composite mean for systemic barriers was 3.29, which is above the benchmark value of 3.00. The null hypothesis was therefore rejected. This indicates that respondents agreed that systemic barriers limit the effective implementation of NSAIP agricultural technology interventions in reducing household food insecurity among smallholder farmers in Niger State.

Hypothesis Two

H₀₂: There is no significant relationship between current NSAIP implementation frameworks and the prospects for sustained reduction of household food insecurity among smallholder farmers in Niger State beyond 2025.

Table 4.5: Test for Hypothesis Two

Variable	Test Value	Composite Mean	Mean Difference	Decision
Policy refinement and sustained food security	3.00	3.51	+0.51	Reject H ₀₂

Table 4.5 shows that the composite mean for policy-refinement indicators was 3.51, which is above the benchmark value of 3.00. The null hypothesis was therefore rejected. This suggests that respondents agreed that policy and institutional refinements are important for sustaining reductions in household food insecurity beyond 2025.

4.5 Discussion of Findings

The findings show that the major barriers limiting NSAIP implementation are structural rather than informational. Respondents agreed that limited access to affordable credit, weak extension follow-up, poor rural infrastructure, and uneven distribution of agricultural inputs constrain the programme's food security outcomes. However, lack of awareness recorded a mean below 3.00, suggesting that many farmers are not simply uninformed; rather, they are constrained by access, finance, delivery, and support-system weaknesses.

These findings are consistent with the Sustainable Livelihoods Framework, which explains food insecurity as an outcome of weak livelihood assets, institutional constraints, and exposure to vulnerability. Limited credit reflects weak financial capital, poor roads and storage indicate weak physical capital, while inadequate extension support reflects gaps in human and institutional capacity. The findings also align with Awotide et al. (2016), who found that agricultural technology adoption improves welfare where farmers are supported by input systems, market access, and institutional structures. Similarly, Nazifi et al. (2024) found that climate-smart agricultural practices improved yield, income, and food security, but sustained benefits depended on credit, awareness, and institutional support.

The findings further show that policy refinement is necessary for sustained food security beyond 2025. Respondents agreed on the importance of affordable agricultural financing, stronger institutional coordination, climate-smart technologies, market access, storage support, and continuous policy review based on farmers' experiences. This supports Abdul et al. (2022), who found that agricultural credit positively relates to food security in Nigeria, while high interest rates weaken food security outcomes. It

also agrees with Kolapo et al. (2024), whose study showed that technology adoption among smallholder farmers depends on exposure, training, and effective support systems.

Overall, the findings indicate that NSAIP has the potential to support agricultural transformation, but its capacity to reduce household food insecurity depends on the strength of the livelihood-support environment around smallholder farmers. In line with the Sustainable Livelihoods Framework, technology investments must be linked to finance, extension services, infrastructure, climate resilience, market access, and farmer-centred governance if they are to produce sustained food security outcomes.

V. CONCLUSION

The study examined the Niger State Agricultural Investment Plan and household food insecurity among smallholder farmers in Niger State. The findings show that NSAIP-related interventions are relevant to agricultural transformation, but their effectiveness is limited by systemic barriers such as inadequate access to credit, weak extension support, poor rural infrastructure, uneven input distribution, and vulnerability to climate and market shocks.

The study also found that sustained reduction in household food insecurity beyond 2025 requires stronger policy and institutional reforms. These include improved agricultural financing, better coordination among implementing agencies, climate-smart investment, storage and market support, and continuous policy review based on farmers' experiences. The study concludes that NSAIP can contribute more effectively to food security if it moves beyond input distribution and becomes a broader livelihood-support framework for smallholder farmers.

5.2 Recommendations

First, to remove systemic barriers limiting effective NSAIP implementation, the Niger State Ministry of Agriculture, in collaboration with NAMDA, AFAN, the Bank of Agriculture, microfinance institutions, cooperative societies, and development partners, should establish an integrated smallholder support

framework. This framework should provide affordable seasonal credit, equipment-hiring support, improved extension follow-up, transparent input distribution, and targeted support for farmers in underserved communities. It should also prioritize feeder roads, irrigation, storage facilities, and other rural infrastructure needed to ensure that agricultural technologies translate into stable production, improved income, and better household food access. Second, to sustain food security outcomes beyond 2025, the Niger State Government, through the Ministry of Agriculture, should institutionalize a post-2025 NSAIP review and coordination platform involving extension officers, farmer associations, private agribusiness actors, development partners, and local government representatives. The platform should guide continuous policy review, strengthen monitoring and evaluation, expand climate-smart technologies, improve market and storage linkages, and ensure that farmers' experiences shape future agricultural investment decisions. This will improve policy responsiveness, reduce implementation gaps, and strengthen the long-term capacity of NSAIP to reduce household food insecurity among smallholder farmers.

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