

Soybean Production and Poverty Alleviation in Rural Conflict-Affected Communities of Plateau State, Nigeria

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Abstract

Poverty is a significant livelihood concern for many rural households in the conflict-affected communities of Nigeria. This study examined how soybean farming affects poverty reduction of smallholder farmers in Mangu and Bokkos Local Government Areas (LGAs) of Plateau State. The numbers of Smallholder farmers were 337 who were taken based on convenience sampling. A quantitative approach was used, employing descriptive statistics, Foster–Greer–Thorbecke (FGT) poverty measures and multiple regression analysis. The FGT results indicate that 33.5% of the sampled households were poor with a poverty gap of 0.04 and poverty severity of 0.01. The results of regression show that the soybean production, farm size and credit access positively and significantly influence the household income while formal education for number of years have no statistically significant impact. The results indicate that, proper access to productive resources and markets could generate positive contributions to poverty reduction in soybean growing. The research suggests that expansion of farmers' credit, better access to land, better extension service, practical training with farmers, and more membership in farmers association are needed.

Keywords: Soybean, Poverty Alleviation, FGT Measures, Smallholder Farmers, Plateau State.

Introduction

In Nigeria, poverty is a critical and persistent issue with a significant impact on millions of households. Despite the fact that the country is rich in natural and economic resources, poverty level is still unacceptable especially in rural communities. Poverty has been passed from generation to generation for many years, creating a vicious cycle of poverty in rural-household living conditions that is perpetuated by limited policies and governance. According to the World Bank's Macro Poverty Outlook for Nigeria (World Bank, 2023), approximately 13 million Nigerians would fall into poverty by 2025 if Nigeria's poverty rates were not controlled. Over 45 percent of the country's people live in rural areas with poverty rates that are much higher than in urban areas (World Bank, 2024; Macrotrends, 2024). Security has exacerbated rural poverty in some parts of the country and displacement has become a concern.

Banditry in rural areas has disrupted agricultural operations, displaced people, and heightened the poverty rate in Nigeria (Nwankpa, 2024). The disproportionate burden on rural households is evident as 72% of this population, compared to 42% in urban areas, are

living in multidimensional poverty, according to the 2022 Multidimensional Poverty Index (National Bureau of Statistics [NBS], 2022). Displacement due to insecurity has become a major element that has exacerbated rural poverty in Plateau State. Thousands of households have been displaced; others chased from their traditional farming lands due to violent farmer-herder conflicts and militia attacks, leading to a declining agricultural output, food security and livelihoods (Gwanshak & Zitta, 2024).

As government continues to make efforts in ensuring that many of them return to their regular farming activities, there is a great potential for decent life, productive employment and poverty alleviation that has not been tapped sufficiently (Abanigbe & Olutola, 2025). Because agriculture is a great source of employment for rural dwellers, farming is one of the important productive sectors that can be used to reduce poverty in rural Nigeria. An estimated 70 percent of all households, including more than 80 per cent of the rural households in Nigeria are involved in agriculture (FAO, 2022). Data from past research suggests that farmers have the potential to be more productive by implementing better seeds, fertilizers, irrigation technology, the use of machinery and participation in farmers groups. They can contribute to enhancing food security and rural livelihoods, lowering the production costs, and improving household income as well (Herath et al., 2021).

The Government of Nigeria has implemented a number of programmes to enhance food security and livelihoods of communities with particular focus on rural communities including those affected by insecurity. While some good outcomes have been obtained with these programmes at the specific sites, it is important to find out how focusing on specific crops can also contribute to the recovery of the households. In this respect soybean is relevant, as it can serve for food, for farm income and raw materials for processing, and for other livestock activities. Soybean production has been thus found to be a potential avenue with which rural households can reclaim productive capacity and eventually enhance their economic welfare in conflict-hit communities.

Statement of the Problem

The population in the violence affected localities of Plateau continues to suffer from significant hardship as families were displaced from their homes and farms in Bokkos and Mangu, where crops were unable to be grown due to the violence. The effects of the disruption have led to diminished yields, restricted market access, destroyed productive assets, and heightened food insecurity especially for smallholder farmers whose recovery capacity is constrained by low incomes.

Soybean production could offer a relatively accessible way of rehabilitating agricultural livelihoods since the crop can support household consumption and market income. But its role in farmers livelihoods in the affected communities of Plateau State in the context of conflict has garnered very little empirical analysis. Most current researches focus on agriculture, food security, or poverty in general, with few studies addressing the specific question of how production of soybeans can decrease the poverty rate in conflict affected communities. The link between research and policy in dealing with the challenges of

poverty also needs to be strengthened as suggested by other evidence (Umeonyirioha et al., 2025).

This study fills this void by investigating the interaction between soybean production and welfare of households in the conflict affected areas of Plateau State. It establishes the socio-economic profile of the soybean farmers, quantifies poverty in the sense of Foster-Greer-Thorbecke (FGT) indices, and discusses factors associated with the achievement of household income by farmers producing soybean in Bokkos and Mangu. The study will be used to develop evidence that can help agricultural recovery and livelihood interventions in affected communities.

Research Objectives

This study aims to analyse the relative role of soybean cultivation in poverty reduction of small farmer communities in parts of Plateau State, Nigeria that are conflict affected. Specifically, it covers socio-economic characteristics of the farmers, assessment of poverty level of soybean farmers using Foster–Greer–Thorbecke indices and a multiple regression analysis of the selected soybean production factors in relation to household income for soybean farmers in Mangu and Bokkos LGAs.

The particular objectives are:

- i. To examine the effect of soybean output on household income among soybean farmers.
- ii. To assess the influence of farm size on household income among soybean farmers.
- iii. To determine whether access to credit affects household income among soybean farmers.
- iv. To evaluate the impact of years of formal education on household income among soybean farmers.

Research Hypotheses

To guide the analysis, the following hypotheses are proposed:

- i. H_{01} : Soybean output has no significant effect on household income among soybean farmers.
- ii. H_{02} : Farm size has no significant effect on household income among soybean farmers
- iii. H_{03} : Access to credit has no significant effect on household income among soybean farmers.
- iv. H_{04} : Years of formal education have no significant effect on household income among soybean farmers.

Literature Review

Concept of Poverty

It is not possible to define poverty at one dimension with only one measurement, which is why people have various attempts at definition. Poverty does not always depend on

income, but also on the living conditions of people. Poverty is not only monetary; it also entails deprivation, whether in terms of lack of food or water, or lack of health care, education or social engagement within a society (Halkos & Aslanidis, 2023). Under this lens, poverty is related to inequality and social exclusion, and aligns with the capability perspective, which considers poverty at least in part to be the lack of achieving basic human needs and exercising essential freedoms. The state of poverty is therefore not only about lack of income but also lack of possibility to have a dignifying life.

In Nigeria, poverty is generally known as low income and poor access to services. One is the cost-of-basic-needs approach, which is used in evaluating welfare by examining household consumption as opposed to income. In this method, poverty is considered to exist if people's income is less than the NPL of ₦137,430 per capita per year for basic food and non-food items (World Bank, 2022). Likewise, poverty is defined as a deprivation of people's ability to achieve food, housing and clothing security, which is exacerbated by the social, economic and political disadvantages (Asikhia, 2010, as cited in Victor et al., 2016; Nyasulu, 2010, as cited in Victor et al., 2016).

However, poverty can also be measured in an absolute and relative sense. Absolute poverty is the condition of living below a certain minimum standard that is needed to sustain a basic level of well-being, typically defined in terms of access to basic commodities, and nutrition. The concept of relative poverty is evaluated by observing the welfare of the lower groups and how it compares with the welfare of those higher in the distribution of income, usually using quintiles and deciles. The two ideas don't necessarily go together. A rise in absolute poverty can be accompanied by a decrease in relative poverty if the living conditions of the poorer groups get worse, while the gap between groups narrows. According to Sen's view, poverty is attributed to lack of absolute capabilities but is relative to commodities and social conditions. Streeten also noted that there is a degree of interaction between the two viewpoints, in that absolute deprivation can be influenced by the relative disadvantage (Sen, as cited in Wijekoon et al., 2021; Streeten, as cited in Wijekoon et al., 2021).

Concept of Poverty Alleviation

Poverty alleviation is not limited to increases in income and consumption, but also to social, economical, political and environmental aspects too. Poverty is multidimensional, which means that there is no single response. Singh and Chudasama (2020) argue that there are four general strategies to decrease poverty: community-based organisation and microfinancing, capability and social security enhancement, market-oriented interventions and good governance. They are most useful when combined, since several of these constraints may be present and institutionalising may be necessary at the same time.

The multi-dimensional focus is supported by an analysis of literature related to poverty and its causes and measurement. They differentiate between absolute deprivation, where an individual does not have the resources necessary to stay alive, and relative deprivation, where deprivation, inequality and social exclusion may affect their welfare status. They also differentiate between physiological deprivation (such as lack of food, shelter and health care) and sociological deprivation (such as limited participation, identity and agency). This

broader recognition is the reason why poverty alleviation is not only about betterment of material conditions, but about better opportunities and increased social and economic participation (Wijekoon et al., 2021).

Further, Cheng et al. (2019) extend the argument by saying that environmental resources play their part in reducing poverty, especially via forests. Forest resources serve vital functions as a source of food, fuel and raw materials for the poor, a source of refuge and a means of livelihood during crisis and as a means for exit from poverty through sustainable enterprises and ecosystem services. They find that poverty alleviation too has an environmental aspect – natural resources provide livelihoods for rural households and unsustainable use can degrade the resource base they rely upon in the long term.

These views collectively suggest that poverty alleviation entails a number of facets of households welfare. Comprising of growth in income, diversification of livelihoods, social inclusion, access to productive resources, capability development, governance and environmental sustainability. Poverty alleviation thus requires a focus not just on increasing the output of rural farmers, but also on access to land, credit, inputs, extension services, and markets, in the context of rural agriculture. With this wider perspective, it will be helpful to explore soybean production and welfare of households within communities affected by conflict.

Nurkse's Vicious Cycle of Poverty

Ragnar Nurkse's vicious circle of poverty is still very relevant in the classical development economics. His view that "a country is poor because it is poor" encapsulates the vicious cycle of impoverishment (Kumar, 2022). The low level of incomes on the supply side curtails their savings, the capital formation, and investment. Reduced investment reduces productivity, thus reducing the ability to earn higher incomes. It is on the demand side that low purchasing power leads to smaller markets, less incentives for enterprises, and less economic investment, thus reinforcing economic stagnation (Bass, 2008; Kumar, 2022).

According to Nurkse, this circular process can lead to a stable undesirable equilibrium, known as poverty trap. He suggested a 'big push' policy of balanced growth so that investment could be undertaken simultaneously in various sectors to increase productivity and markets. Despite the criticism on its neglect of institutional and political factors, the main tenet of the model holds true for rural households with limited assets, which reverts to a state of low productivity due to low investment capacity. The asset-based approach also allows to differentiate between temporary shocks and persistent poverty as well as to identify asset thresholds that affect poverty alleviation and households from falling in and staying out of poverty (Bass, 2008; Carter & Barrett, 2006).

The vicious circle can work on smallholder farmers in conflict affected zones along a number of connected paths. Conflict can lead to diminished access to farmland and markets, decreased productivity and household income losses. A low income then restricts the capacity to invest in productive assets, acquire more land or purchase better inputs. This low productivity can mean that households remain at, or in, the edge of poverty. Hence,

credit, access to productive land area and technologies to boost soybeans output can be understood as means to break this cycle by expanding productive means to the farming households.

Empirical Literature Review

Empirical investigations carried out in Nigeria and other African countries have demonstrated both the potential contribution of agriculture to poverty alleviation, and the importance of access to productive resources, markets, institutions and security. The literature is organized accordingly into three themes around which it is related: agricultural productivity and income; institutional and market constraints; impact of conflict and broader structural factors on rural livelihoods.

Theme 1: Food Productivity - Soybean Output and Household Welfare

Overall, there is positive evidence relating to the link between agricultural productivity and poverty alleviation in Nigeria. Increased agricultural productivity also increases the per capita income through autoregressive distributed lag approach, indicating that they can help in reducing poverty (Umar et al., 2023). Food security as a poverty reduction policy has also been analysed, and the short-run poverty-reducing effects of providing food and employment have been examined (Dalyop & Akims, 2024). On balance, these studies suggest that higher levels of agricultural output can lead to welfare improvements, but sustained poverty reduction will require conditions to be set such that productivity and income improvements can be made in the future as well.

Productivity is also key in soybean-producing countries, as evidenced by the following. Technological improvements in soybean also have potential for poverty effects in Malawi with the introduction of improved soybean varieties and adoption of management practices by soybean growers (Tufa et al., 2021). Soybean cultivation has also contributed to food security, supply and trade, and livelihoods of smallholder farmers in rural Zambia (Siamabele & Manda, 2024). These are important conclusions pertinent to the present study since the production gain is likely to result in marketable output, and soybeans can therefore be a benefit to the household welfare. The effect is not automatic though. Successful production needs to be backed up with resources and institutions that enable farmers to access inputs, operate their farms and market their produce.

Theme 2: Credit, Markets, Extension, and Production Constraints

Many studies have found that credit, markets, know-how and institutional support are important factors to limit the agricultural output if farmers do not have them. Gomina et al. (2024) found that agricultural funding is associated with poverty alleviation and economic growth in Nigeria implying that the public and institutional investments can impact on the capacity of the agricultural sector in the country to achieve welfare gains. Similarly, soybean farmers in Ogun State experienced challenges in soybean cultivation, utilisation, marketing and soybean processing knowledge (Oyekunle et al., 2014). The smaller difference between

soybean and other crops like cassava and yam in farmer's perception also influenced on the improvement of the farmers' welfare (Amusat & Ademola, 2013).

The results of these studies suggest that the decisions in choice of crops may not be enough to account for households outcomes. Whether or not farmers choose to buy improved seeds and fertiliser, or to continue farming at a low input, farmers prior access to credit can make all the difference. Market access influences the farmers marketing price and time of selling the produce. Extension services affect improved production and post harvest practices. Cooperation can also enhance bargaining power and availability of inputs and buyers.

Banda and Kabubi (2025) also report that age and level of farming experience affect profitability; and an increase in fertiliser and/or transport costs lowers farm returns, in their analysis of soybean profitability in Zambia. Their findings corroborate the importance of better management and technologies emphasized by Tufa et al. (2021), and that of small farm and local food system to food security in Nigeria as emphasized by Olugbire et al. (2021). In sum, the studies indicate that the profitability and poverty-reducing potential of soybean varies with farm characteristics, production costs, access to resources, farmer capability, and the general policy context.

Theme 3: Agricultural Livelihoods, Conflict, and Insecurity

Security issues offer another perspective of agriculture-poverty nexus. Farmer-herder conflict may be contributing factors in rural Nigeria to food insecurity (Nnaji et al., 2022). Their studies reveal a potential for reduced impacts of agricultural programmes in locations where insecurity has hindered farmers access to farms, markets and other productive resources. This is particularly pertinent to Plateau State where violent attacks have had a negative impact on farming and have consequently displaced households. The productive potential of a crop cannot be viewed in isolation when the security situation of farmers is being considered under such circumstances.

There are multiple ways in which conflict can have an impact on agriculture. Farmers can lose access to land and may find themselves cultivating less than usual land, may be unable to plant or harvest at the right time, may lose productive assets, and facing increased transport and transaction costs. Labor, credit, information, and access to markets can all be eroded by displacement which can also disrupt social networks that would otherwise provide these services. These impacts decrease the output from the farm and income from the household.

Theme 4: Agricultural Growth, Public Policy, and the Distribution of Benefits

There are examples from Argentina and Brazil indicating that soybean growth need not be linked to economic growth and poverty alleviation alone; the role of public revenue and the distribution of economic increases must also be considered (Bianchi & Szpak, 2017). Their analysis is relevant to the present study as they have shown that the impacts of soybean production on poverty cannot only be assessed at the farm level. Household welfare gains

from agricultural investment growth depend also on the institutions and policies that control agricultural investments and distribute the benefits obtained from them.

The overall literature thus suggests a similar conclusion. Agricultural production has the potential of alleviating poverty, however such conditions surrounding production are required to achieve this. Overall, welfare gains from productivity increases will be more likely to occur when farmers have access to land, credit, inputs, extension services, markets, and secure production environments. Looking further into the evidence from Nigeria, agricultural interventions seem to yield less benefits where conflict, access to markets and institutional support are not addressed. These findings form the foundation for looking at Soybean output, Farm size, access to credit, Farm education and household income as correlates of farm income of farmers in Mangu and Bokkos.

Gap in Empirical Literature

While previous studies have shown that adoption of soybean and investment in agriculture creates resources and income and that these have contributed to poverty alleviation, most have been undertaken in relatively stable environments or augured from a more general point of view of agriculture. There are few studies that document when and how the livelihood conditions of smallholder farmers might change in a conflict-affected community, due to a state of displacement and insecurity, and how it affects access to land, markets, labour and productive assets. Given the rural insecurity, the existing literature is thus limited in their statements of the relationship between soybean cultivation and household welfare.

Another gap is related to the measurement of poverty. Among the different studies, some make a welfare assessment using income, productivity, profitability or food security approaches and few studies have used comprehensive indicators like Foster-Greer-Thorbecke (FGT) poverty indexes in soybean producing households in conflict affected households. This study questions and tries to fill these lacunae by getting the facts on soybean cultivation and farmer poverty in Mangu and Bokkos LGAs and sorting out the FGT poverty measures with regression of farmers income using household survey data. This approach will be framed in the context of local conflict, displacement and agro ecological collapse.

Methodology

Study Area

Plateau State, Nigeria, with a study area of Mangu and Bokkos Local Government Areas (LGAs) was used for the study. Mangu LGA has six districts namely: Mangu, Panyam, Kerang, Ampang West, Pushit and Kombun. Bokkos LGA is divided into 7 districts; Bokkos, Mushere, Manguna, Daffo, Toff, Sha and Richa.

These LGAs were chosen based on their agroeconomical conditions, as they are well known to produce soybeans, and on the grounds that they faced strong attacks in 2023, adding to the vulnerability of the population and causing a complete disruption of the farming activities of the seminary. Since the two LGAs have a high agricultural potential and the

effects of conflict-related disruption, they seem to be appropriate for exploring the link between soybean production and household welfare.

Sampling Procedure and Sample Size

Soybean smallholders in Mangu and Bokkos LGAs were the study population. Since no comprehensive set of farmers was available, the accessible population was determined to be farmers who are enrolled in internally displaced persons camps and other areas visited during the fieldwork with the Wise Youth Development Foundation. Considering the size of the accessible population of 2,108 farmers, a sample of 337 agreed to participate in the study and answer the questionnaire. The study determined the sample size using Taro Yamane's formula with a 5% margin of error to guide the precision of estimates.

LGA	District	Accessible Population	Sample Size
Bokkos	Bokkos	200	32
Bokkos	Daffo	90	14
Bokkos	Manguna	110	18
Bokkos	Mushere	160	26
Bokkos	Richa	18	3
Bokkos	Sha	20	3
Bokkos	Toff	70	11
Mangu	Ampang West	180	29
Mangu	Kerang	260	41
Mangu	Kombun	120	19
Mangu	Mangu	310	50
Mangu	Panyam	420	67
Mangu	Pushit	150	24
Total		2108	337

Source: Field Survey, 2024

Convenience sampling was used due to inaccessibility of farmers caused by displacement, insecurity, and the dispersed population. The results are thus applicable to only the accessible population in the study and not to all the soybean farmers in Plateau State. The limitation is taken into account when interpreting the results.

Method of Data Collection

The data was gathered by means of a structured questionnaire with items and questions on measurable household and farm characteristics on a Likert scale. The questionnaire included socio-economic background, farm practices, land size and production inputs, level of harvest, market access, income and expenditure of households, access to credit, cooperatives and extension services. Farmers were also given information to evaluate

household welfare and poverty status. One more section showcased the impact of the events of 2023 on farming activity and life.

A pilot test was carried out to evaluate the clarity and consistency of the questionnaire. Cronbach's alpha showed a reliability coefficient of 0.82 which is above the accepted threshold of 0.70. The outcome shows good internal consistency of the items in the questionnaire for the study.

Method for Analysing the Data.

The data were analysed in R 4.5.0. Socio-economic characteristics of respondents and their production pattern were summarised using descriptive statistics such as means, frequencies and percentages. The Foster–Greer–Thorbecke (FGT) indices were used for the measurement of poverty, taking into account incidence, depth and severity. For analyzing the relationship between household income and soybean output, farm size, access to credit and years of formal education, multiple regression was used.

The FGT model is specified as:

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^H \left(\frac{Y_p - Y_i}{Y_p} \right)^{\alpha}$$

Where:

- P_{α} = poverty index ($\alpha = 0, 1, 2$ for incidence, depth, and severity respectively)
- N = total number of households in the sample
- H = number of households below the poverty line
- Y_p = poverty line (one-third of mean per capita household expenditure)
- Y_i = per capita household expenditure of the i th household

Results and Discussion

The socio-economic characteristics of the respondents are as follows:

A total of 337 soybean farmers were surveyed in Mangu and Bokkos LGAs. The majority of the respondents (76.6%) were men and the majority of the age group was 31-50 years (43.6%). The households were fairly large, with 66.2% of the households with six to ten members, reflecting the potential importance of family labour in farm operations. The majority of people were educated up to the primary (61.1%) and secondary (38.6%) levels. There were only 0.3% who had no formal education. Farming experience was also high, with 39.8% having 6 to 10 years experience and 35.0% having more than 10 years of experience. Credit availability was also low, just 41.3% reported having access to credit, and only 33.8% were members of a cooperative.

Table 3: Socio-Economic Characteristics of Soybean Farmers in Mangu and Bokkos LGAs

Variable	Category	Frequency	Percentage
Gender	Female	79	23.44
Gender	Male	258	76.56
Age Group (years)	31–50	147	43.62
Age Group (years)	>50	113	33.53
Age Group (years)	≤30	77	22.85
Household Size	6–10	223	66.17
Household Size	>10	28	8.31
Household Size	≤5	86	25.52
Educational Level	No formal education	1	0.30
Educational Level	Primary	206	61.13
Educational Level	Secondary	130	38.58
Farming Experience	6–10 years	134	39.76
Farming Experience	>10 years	118	35.01
Farming Experience	≤5 years	85	25.22
Access to Credit	No	198	58.75
Access to Credit	Yes	139	41.25
Membership of Cooperative	No	223	66.17
Membership of Cooperative	Yes	114	33.83

Source: Author's Computation, 2024

The above features suggest that the farmers have a lot of hands-on farming experience and some formal education, but their access to financial and collective resources is limited. Low credit availability could impact farmers' procurement of improved seed, fertilizer and other inputs, while limited cooperation could limit the power of the farmers to bargain. These constraints are important for the regression results because the potential for production capacity to be translated into higher household income is partially dependent on the availability of complementary resources.

Poverty Status of Soybean Farmers

The Foster–Greer–Thorbecke (FGT) indices were used to measure poverty and the poverty line was set at ₦137,430 per person per year. The results show that 33.5% of the sampled households fell below the poverty line. The poverty gap of 0.04 represented a poverty gap at an average 4% of the poverty threshold for the sampled population using the FGT measure. The severity of poverty for poor households was 0.01, which indicates that the distribution of poverty was not very severe.

There were some variations between districts. The poverty rates of Pushit (45.8%) and Toff (45.5%) registered the highest poverty incidence while the poverty rate of Mushere (19.2%) and Panyam (23.9%) were comparatively low. Other districts were in between these ranges. The differences indicate that household poverty is not even across the study area and could

be explained by variation in access to land, markets, productive resources and the impact of the disruption caused by conflict. Table 4 shows that the percentage of farmers living below poverty line in Mangu and Bokkos LGAs is 78.4% and 72.8% respectively.

Table 4: Poverty Status of Soybean Farmers in Mangu and Bokkos LGAs

LGA	District	Sample Size	Number Poor	Headcount Ratio	Poverty Gap	Poverty Severity	Mean Income (Poor)	Mean Income (Non-Poor)
Bokkos	Bokkos	32	12	37.50	0.03	0	125049	151050
Bokkos	Daffo	14	4	28.57	0.04	0.01	118999	150179
Bokkos	Manguna	18	5	27.78	0.03	0	123847	150629
Bokkos	Mushere	26	5	19.23	0.02	0	124297	151102
Bokkos	Richa	3	1	33.33	0.07	0.02	108223	151980
Bokkos	Sha	3	1	33.33	0	0	136736	151352
Bokkos	Toff	11	5	45.45	0.05	0.01	123815	151405
Mangu	Ampang West	29	11	37.93	0.05	0.01	120801	151502
Mangu	Kerang	41	15	36.59	0.04	0.01	123009	150130
Mangu	Kombun	19	6	31.58	0.02	0	127276	149619
Mangu	Mangu	50	21	42.00	0.05	0.01	119841	150245
Mangu	Panyam	67	16	23.88	0.03	0	122040	150889
Mangu	Pushit	24	11	45.83	0.07	0.01	115545	148948
Total		337	113	33.53	0.04	0.01	122268	150695

Source: Author's Computation, 2024

The overall rate of 33.5% suggests that a significant share of the soybean farming households are still poor even though they are engaged in agricultural activity. This is important to the argument of the study because it demonstrates that joining the soybean production system is not enough for households to reach out of poverty. There are still other factors such as resources available to the farmers, size of production, and conversion of production into income that are still important.

Regression Analysis of Soybean Production and Household Income

Soybean production and household income were regressed to determine the nature of the relationship between them. The regression analysis compares the level of soybean

production to household income and how the production and household characteristics relate to differences in income. The aim is to see if there are statistically significant relationships between soybean yield, farm size, credit availability, years in school and household income. The findings give some indication of the pathways by which farm production can help reduce poverty.

Model Specification

A multiple regression model was employed:

$$\text{Income} = \beta_0 + \beta_1 \cdot \text{SoybeanOutput} + \beta_2 \cdot \text{FarmSize} + \beta_3 \cdot \text{AccessToCredit} + \beta_4 \cdot \text{EducationYears} + \epsilon$$

Where:

- Income: Annual household income (₦)
- Soybean Output: Soybean produced (kg)
- Farm Size: Size of farm (hectares)
- Access To Credit: 1 = Yes, 0 = No
- Education Years: Years of formal education

Dataset Summary

Table 5: Dataset Summary

Variable	Minimum	Mean	Maximum
Household income (₦)	75,441	140,927.94	154,979
Soybean output (kg)	486	1,175.60	1,771
Farm size (ha)	0.66	2.32	4.34
Education (years)	0	5.93	12

Source: Author's Computation, 2024

Regression Results

Table 6: Regression Results

Variable	Estimate	Std. Error	t-value	p-value
(Intercept)	69,663.04	3,589.60	19.41	<0.001
Soybean Output (kg)	50.02	2.22	22.53	<0.001
Farm Size (ha)	3,419.46	842.74	4.06	<0.001
Access to Credit	6,842.84	1,046.68	6.54	<0.001
Education Years	286.81	253.44	1.13	0.26

Source: Author's Computation, 2024

The regression analysis shows that there is a positive and statistically significant relationship between soybean output and the household income. This coefficient of 50.02 indicates that for every additional kilogram of soya bean produced, while controlling for other factors, there is an estimated increase of ₦50.02 in annual household income (p-

value<0.001). The implication is that the ability of soybean farmers to earn income from production is directly related to productivity.

Farm size also has a positive and statistically significant coefficient of 3,419.46 ($p < 0.001$). The findings show that, in addition to the annual household income gained from one hectare of cultivation, an additional hectare is estimated to add ₦3,419.46 in annual income, *ceteris paribus*. The discovery highlights the importance of access to productive land to the size of a farmer's operation. If the farmers have available larger and usable plots of land they may be able to grow and sell more soybean.

The coefficient of access to credit is positively and significantly 6,842.84 ($p < 0.001$). All things being equal, therefore, it is estimated that farmers who have access to credit have an annual household income of ₦6,842.84 higher than farmers who do not have access to credit. Credit can help farmers to access production inputs, cover seasonal needs and increase production. Access to finance can also be important in a conflict-affected environment for the recovery of productive assets and for sustaining production after disruption.

The coefficient of years of formal education is positive but not statistically significant in this study, 286.81 ($p = 0.26$). This suggests that in the estimated model, further years of schooling are not statistically related to household income. But this does not mean that education does not have other social and economic significance. Instead, in this particular sample and model, the factors that are most obviously related to the production process, immediate output, land, and credit, are more highly associated with household income in this sample.

The overall model accounts for 53.4% of the variation of household income. Results suggest that the output of the main crops (soya beans), size of farming operations and access to credit are important factors in determining income in the sampled households, as are other factors not explicitly modelled, such as market access, production costs, climate, labour available to the household, and shocks from conflict.

Discussion of Findings

The results offer some evidence that soybean production can be a source of household income and poverty reduction in conflict-stricken areas, but only if access to productive resources is available. The positive sign of the coefficient of the soybean output variable suggests that the more soybean output, the greater the household income. The findings are consistent with those of Umar et al. (2023) on the positive relationship between agricultural productivity and income in Nigeria and those of Tufa et al. (2021) on poverty impact of improved soybean technologies in Malawi. It is assumed that productivity-enhancing interventions can contribute to increase in the household welfare if the farmer can sustain the production while competing with markets.

The impact of farm size is also important, further confirming the importance of the scale of production. The more land farmers have to farm, the more they can grow of soybeans that are marketable, if land is productive and other factors are available. Overall, the findings are consistent with the larger body of evidence that shows that the outcome of a

smallholder is influenced not only by the crop they grow, but also by their access to productive assets. An increase in farm size, however, might not bring the same income benefits if there is a lack of adequate inputs, labour, security, and market access. Therefore, in order to allow for land access, it is necessary to go in tandem with measures to ensure productive use of land.

In the model, the access to credit has one of the most unambiguous positive association with household income. The estimated coefficient suggests that there is a significant difference in income between farmers with and without credit. This is in line with Gomina et al. (2024), which equate funding for agricultural activities towards poverty alleviation and economic growth. Credit can impact the welfare of households in many ways. It can cover better seed, fertiliser, labour, transport and any other seasonal costs. It can also enable farmers to continue farming due to losses incurred by war as opposed to cutting their agricultural activities due to shortage of working capital. The results of the descriptive analysis in this study, thus, indicate finance as a domain of intervention because of the small percentage of farmers who reported having access to credit.

The little coefficient for formal education should be interpreted with care. Education is normally linked with the human capital, information access and the adoption of better practices. But the present finding indicates that the educational variable is not sufficient to account for the difference in household income between these farmers. This could be attributed to the sample as well, since primary/secondary school education dominates the schooling experience for the sample, and that most of them rely directly on farming for their living. Other factors, such as practical farming experience, land access, production inputs, credit, and markets, may have a more direct impact on income than extra years of formal schooling. It is important to realize that this should not be read as evidence of the unimportance of education, but rather as evidence that formal education is not statistically significant in the estimated model.

There are also district-level poverty differences that have policy implications. Pushit had the highest incidence of poverty and Toff had the lowest incidence of poverty, Mushere and Panyam had lesser incidences. These disparities could be due to access to markets, land, infrastructure, productive resources, and disruption from conflict. A one-size-fits-all intervention could thus result in inconsistent outcomes in various communities. This would imply that poor incidence areas will need more robust packages of credit, extension, market access and livelihood recovery support. The findings also confirm the study of Nnaji et al. (2022) which found that insecurity can have a negative impact on food and agricultural progress. It is therefore advisable that poverty reduction programmes be adopted in the study area together with measures that would enable the farmers to access and utilise the productive resources safely.

The results also have theoretical implications stemming from the study. Low income leads to low investment which leads to low productivity which leads to low income, this is known as the vicious circle of poverty (Nurkse). Such a cycle can be disrupted in a number of ways, as revealed by the present results. Soybean production is positively correlated with income,

and credit enables resources that can be used for production. The larger the size of the farm, the more productive base available to farmers. These factors can enhance the income and investment potential of households. Meanwhile, constraints in credit availability and the continued presence of poverty suggest that many households might continue to be limited in their productive resources.

The study has several limitations that should be taken into consideration when interpreting the findings. The first is that convenience sampling was employed as a sampling method, due to lack of a complete sampling frame and dislocations and insecurity of access to farmers. The results are, therefore, not expected to be representative of all soybean farmers in Plateau State. Second, the study relies on cross section data and thus it is difficult to calculate the long term causal effect. Third, this regression model accounts for some production and household variables, whereas others, such as market prices, input costs, climate shocks, household labour, and the duration or intensity of the displacement may also impact income. The limitations should not preclude the associations observed, but should be taken into consideration when interpreting the results in relation to the communities sampled.

Summary, Conclusion, and Recommendations

Summary of Key Findings

This study involved the socio-economic profile of the soybean farming households and the role of the production of soybean in the improvement of the welfare of farming households in conflict affected communities of the two LGAs—Mangu and Bokkos. There was a higher proportion of those in the working age groups than there were of those in other age groups, and most had at least primary education. The farming experience was relatively low while access to agricultural credit and cooperative membership was low.

The poverty rate obtained from the FGT conducted is 33.5% for the sampled households with poverty line of ₦137,430 per person per year. The poverty gap was 0.04 and the poverty severity was 0.01. There were district variations in poverty incidence, with Pushit and Toff having the highest poverty rates, and Mushere and Panyam having lower rates.

The regression results indicate that the soybean output, size of farm and availability of credits have positive and statistically significant effects on household income while education in years has a positive but statistically insignificant effect. The results, therefore, indicate that the cultivation of soybean may be a source of income and poverty alleviation for the farmers, especially if they are able to access productive resources to expand and sustain cultivation.

Concluding Insights

The study further enriches the literature by analyzing the production of soybean and the poverty of households in a conflicted environment and by performing a regression of household income using FGT poverty measures. This focus is a response to the lack of research in the empirical literature on poverty among soybean farmers in displacement and insecurity. The study reveals that 33.5% of the sampled households lived below the poverty

line, and soybean harvest, farm size, credit availability were found to be significantly correlated with household income.

The results suggest that the production of soybean has potential as a tool for rural livelihood recovery and that its poverty alleviation depends on the conditions in which the farmer operates. Growth in production, if not accompanied by an increase in access to credit, land, markets, extension services and security, will not lead to a sustained increase in the welfare of households. Government and development agencies then should consider soybean production as a component of a larger agricultural recovery plan and not as an individual program.

Convenience sampling used reduces the applicability of results. The probability sampling should be used in future research as security conditions and sampling frame availability allows. Long-term period of time studies also would provide valuable insights into how soybean productivity and access to productive resources can result in persistent poverty reduction over time.

Policy Recommendations

Credit support: Smallholder farmers have limited credit resources and rely on their own funds or informal credit sources. Credit schemes would be developed based on their production conditions, farmers would get their input (seed, fertiliser, basic equipment etc.). The seasonality of soybean production and the challenges encountered by conflict vulnerable households should be taken into account when establishing loan arrangements.

Land access: There is a strong positive association between the size of the farm and the household income. Development of policies that deal with land access and also enhance land tenure security will be useful in helping farmers grow adequate acreage for profitable soybean production. Displaced households which have been deprived of ancestral farmlands should also be taken into account during land intervention.

Extension services: Extension support is still inconsistent between the communities. There are differences between farmers in access to technical support and information on better farm practice, inputs use, harvesting, storage and post harvest handling. Extension services can be enhanced to increase the productivity of farmers, given access to land and inputs.

Practical training: Formal training did not have a significant impact on household income, though specific training on agribusiness management and basic financial skills can aid in farm-level decision making. The importance of training farmers in record keeping, cost tracking, post-harvest management and pricing could help farmers assess their production performance and make better marketing decisions.

Cooperatives: When farmers act together they can have better bargaining power when getting inputs, or when selling their output. Cooperative organisations can be useful in enabling farmers to pool their resources, lower input costs, increase their access to buyers and disseminate information. Enhancing cooperative participation can thus complement the credit and extension interventions.

Market and recovery support: Recovery and market support are essential to improve income if the output of soybeans is to improve. Therefore links with the market, storage, transport etc. and local processing opportunities should be part of the recovery programmes. In situations of conflict, the interventions should be linked to safe access to farm/markets improvement.

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