



## ASSESSMENT OF THE CONTRIBUTION OF AGRICULTURAL EXTENSION SERVICE DELIVERY TO TOMATO FARMERS' LIVELIHOOD IN KADUNA STATE, NIGERIA

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# ABSTRACT

This study aimed to assess the contribution of Agricultural extension service delivery to tomato farmers' livelihood in Kaduna State, Nigeria. A multi-stage sampling procedure was employed in selecting 214 tomato farmers. Data were collected using questionnaire and analyzed Z-test estimation analysis. The findings revealed that there was a significant increase (Z-value = 9.336) in the yield of tomato production at 1% level of probability due to agricultural extension services delivery. Based on the income and level of living of the tomato farmers, the results show that income (Z-value = 2.643) and level of living (Z-value = 2.880) were significant at 1% probability level. It is concluded that there was an improvement in yield, income, and level of living of tomato farmers as a result of utilizing extension service activities in the study areas. The study therefore recommends that to build on the success of participating farmers in tomato production, ensuring the long-term sustainability of agricultural extension services is crucial, thereby solidifying the gains made and supporting continued progress in the sector.

Keywords: Assessment, Extension services, Tomato, Farmers, Livelihood.

#### **INTRODUCTION**

In Nigeria, agriculture forms the foundation of the rural economy, significantly impacting the national economy and providing ample entrepreneurial opportunities for a large portion of the population (Ahmed and Adisa, 2017). The quality of agricultural extension services is crucial in Nigeria, where agriculture employs about 70% of the workforce and contributes 23% of the Gross Domestic Product (GDP). Small-scale farmers are responsible for producing 80% of the total crops in the country (National Bureau of Statistics, 2022). However, despite agriculture's importance in job creation and its potential to drive economic growth, its full potential remains untapped. Agricultural extension is a significant determinant that helps agricultural value chain actors such as farmers increase agricultural productivity, thereby improving income, alleviating poverty, and enhancing food security. The success of agricultural extension services is contingent on effective communication, engagement with local communities, and a deep understanding of the socio-economic context in which these services are implemented (Umeh, et al., 2018). Agricultural extension has been widely reorganized by scholars as an essential ingredient for ameliorating the livelihood of farmers. Investments in extension services have Sa'Adu et al. (2017) identified as critical instruments for raising farmers' incomes and enhancing agricultural output. Thus, according to (Ibrahim et al., 2022) extension services need to begin where farmers are in their development and work their way up to higher standards of performance if it is to be effective.

One of the fundamental challenges confronting Nigerian agriculture is the limited adoption of modern farming techniques and technologies. Many farmers particularly those in rural areas, continue to rely on traditional, subsistence-oriented practices. The slow pace of





technology adoption is exacerbated by factors such as inadequate access to information, limited knowledge dissemination, and insufficient infrastructure to support advanced farming methods (Malabe *et al.*, 2021).

However, Nigeria continues to experience significant food shortages, struggling to meet the demands of its rapidly growing population, resulting in ongoing food scarcity. To address the worsening food challenges, the Federal and State Governments of Nigeria have implemented numerous food production policies and programs over the years to tackle the significant issues in the agricultural sector (Yohanna and Muhammad, 2019). Examples include Operation Feed the Nation (OFN), the Directorate for Food, Roads and Rural Infrastructures (DFRRI), the National Accelerated Food Production Programme (NAFPP), the National Agricultural Land Development Authority (NALDA), and the Fadama I, II, and III projects, among others. Despite these initiatives, they failed to achieve the goal of food self-sufficiency, raising serious concerns about Nigeria's ambition to become one of the world's twenty-strongest economies by 2020.

A livelihood refers to the way people combine and use their assets, and capabilities, and undertake activities to secure a means of living (Mukwedeya and Mudhara, 2023). The livelihood of rural residents is paramount in the development of the Nigerian State. Securing adequate livelihoods for rural residents has remained a huge challenge for most developing nations across the globe, particularly Nigeria. These rural areas contribute substantially to the overall development of the nation through the supply of food, raw materials for agro-allied industries, surplus labour, and markets for goods produced in other sectors of the economy, among others (Nwankwo, 2013). Achieving a sustainable rural livelihood is an essential element at the root of all human development and economic growth (Barad *et al* 2020).

The realization of the potential of tomato production to meet the necessities of life has made farmers embark on its production, not just for immediate consumption, but also for sale to improve their livelihood and well-being (Asadu *et al.*, 2018). Tomato does not serve as a means of livelihood to farmers alone but to many intermediaries such as wholesalers, retailers, and farm agents who are involved in its value chain and responsible for its movement from the farmers to the consumers. Thus, tomato production has a great tendency to curb the problem of malnutrition and the high poverty rate among rural people (Imathiu, 2021; Schreinemachers *et al.*, 2018).

Tomato farming has been ongoing for decades in Nigeria, contributing to income and serving as a means of employment for the growing population, especially dry season tomato farming (Mukaila et al., 2021). Despite Nigeria ranked 2nd to Egypt in Africa and 13th position in the world hierarchy of tomato production, the country is still lagging in tomato production compared to Egypt and the USA. The yield of tomato in Nigeria is low, estimated to be 20-40 tons per ha/year on average, and due to inadequate handling, processing, and preservation techniques, 40 to 50 percent of the production in the nation is wasted (FAOSTAT, 2021) and have significant effects on the livelihoods of smallholder tomato farmers and the overall national food security in general. The shortfall necessitated the importation of processed tomato worth ¥11.7 billion (\$ 75.5 million) yearly. The fact is that Nigeria only produces between 20-30 percent domestically far from expectation. Besides, 25-50 percent of the import of this domestic paste is from China (CBN, 2011) thus leaving the market for domestically produced tomato paste underserved. This makes Nigeria one of the primary importers of tomato globally and a major consumer of tomato paste. Engaging in tomato production can play a significant role in alleviating poverty, ensuring food security, and improving nutritional status and livelihood.





Even though studies have been conducted on the contribution of extension services in Nigeria (Tarus, *et al.*, 2015; Yohanna and Muhammad, 2019; Saleh, 2019; Oke, *et al.*, 2020) these studies concentrated only on the contribution of extension services on cereal (maize and rice), cash crop (cocoa) and livestock. Also, most studies that seek to address the issue of the contribution of extension services as it relates to farmers and their activities focus on climate, ICT, and adoption neglecting the utilization of extension services and its effects on farmers' yield, income, and level of living. There is thus a need to assess if tomato production has improved the yield, income and level of living of rural people. This is important as it would allow policymakers to intervene in its production improving rural households' well-being. Because of this, this study aimed to fill the research gap by assessing the contribution of agricultural extension services delivery to tomato farmers' livelihoods in Kaduna State, Nigeria.

It was hypothesized that the contribution of extension service delivery has no significant effect on tomato farmers' yield, income, and level of living.

The objective of the study is to determine the effect of utilization of agricultural extension service delivery on yield, income and level of tomato farmer livelihood.

## METHODOLOGY

#### **Study Area**

The study was conducted in Kaduna State. It is located in the North-west geo-political zone of Nigeria and shares common borders to the north with Zamfara and Katsina State, to the north-east with Kano State, to the east with Platea State, to the west with the Niger States, to the south with Nasarawa State and the Federal Capital Territory. The State has a land area of about 48,473 km with a population of 8, 324, 285 as at 2023. The global location of the State is between latitude 1<sup>o</sup> and 12<sup>o</sup> N and extends from longitude 6<sup>o</sup> and 9<sup>o</sup> E of Greenwich Meridian. The State extends from the tropical grassland known as the Guinea Savannah to the Sudan savannah in the north. There are two distinct seasons in Kaduna State and late June in the Northern part (KADA, 2023). Kaduna State is known as one of the high thresholds of tomato production in Nigeria (Amurtiya and Adewuyi (2020). According to Growth Employment State, (2015) affirmed that Kaduna State is one of the highest tomato producers in Nigeria, with a total produced of 1,095,513 tonnes of tomato yearly.

#### Sampling Procedure and Sample Size

The study employed a multi-stage sampling technique. In the first stage, the Maigana Zone was purposely selected out of the four (4) zones (Birnin/Gwari, Lere, Maigana, and Samaru zones) of the KADA in Kaduna State. This is because it is one of the areas where tomatoes are cultivated in high quantities (KADA, 2023). In the second stage, four communities with more threshold of tomato cultivation were purposely selected from each LGA making a total of eight communities. The third stage was based on a random selection of 47% of 461 sampling frames of tomato farmers, making 214 were randomly selected using Slovian's formula (1967) (adopted from Abdulazeez *et al.*, 2018) to calculate the sample size with 95% confidence level and 5% sampling error assumption. Giving a total sample size of 214 farmers in all. The formula is expressed as follows:

$$n_0 = \frac{N}{1 + N \left( e^2 \right)}$$

Where:

n= Sample size

N= Total number of observations





1= Statistical constant e= Level of significance which is set at 0.05 Hence,  $n_0 = \frac{N}{N}$ 

$$n_0 = \frac{N}{1+N(e^2)}$$

$$n_0 = \frac{461}{1+461(0.05)^2} = \frac{461}{1+461(0.0025)}$$

$$n_0 = 214$$

Therefore, a total of two hundred and twenty-four (214) farmers was used as the sample size in the Study (table 3.1).

Zone	LGAs	Villages	Farmers' sample frame	Farmers' sample size (47%)
Maigana	Ikara	Kurmi kogi	50	23
		Ikara	62	29
		Janfalam	68	32
		Paki	40	18
	Soba	Takia-lafiya	60	28
		Maizare	60	28
		Dawata	57	26
		Dinya	64	30
TOTAL	2	8	461	214

#### Table 1: Population and Sample Size of Farmers

Source: Reconnaissance Survey and Farmers Village Listing Survey (KADA, 2023)

# **Data Collection and Analysis**

Primary data were collected through the use of a questionnaire instrument and were administered to the farmers by well-trained enumerators from national agricultural extension and research liaison services (NEARLS). The analytical tool used for the objective and hypothesis of the study was the Z-test estimation to determine the contribution of extension services delivery on tomato yield, income, and level of living. This was done by comparing the differences in yield, income, and level of living of the farmers before and after the utilization of extension services delivery activities.;

The Z-test model is represented as follows:

$$Z = \frac{|X - \mu|}{S\overline{X}}$$
Where:  

$$Z = \text{calculated } Z \text{ value}$$

$$\overline{X} = \text{Mean of the sample}$$

$$S^{\overline{X}} = \text{Standard error of the mean}$$

$$S = \sqrt{\frac{\sum(x_1 - \overline{x})^2}{n-1}}$$
(2)

W here;

 $z = calculated z-value, \vec{x}_2 = mean yield, income, and level of living of farmers with utilization of extension services, <math>\vec{x}_2 = mean$  yield, income, and level of living of farmers without





utilization of extension services,  $s_1$ = standard deviation of farmers with utilization of extension services,  $s_2$  = standard deviation of farmers without utilization of extension services,  $n_1$ = sample size of farmers with utilization of extension services,  $n_2$  = sample size of farmers without utilization of extension services.

# RESULTS AND DISCUSSION

# **Contribution of AESD on Yield of Tomato Farmers**

The result in Table 2 presented the Z-test estimation of the yield of tomato farmers before and after the utilization of AESD in the study area. The result showed that the mean yield before the utilization of AESD was 261.815 kg/ha, while the mean yield after the utilization of AESD was 354.029 kg/ha, with a mean difference of 92.214 kg/ha. Thus, indicating a significant difference (Z-value = 9.336) in the contribution of AESD to the yield of tomatoes among the farmers in the study area. This implied that the contribution of AESD to farmers in the study area has a significant and positive impact on tomato yield. This could be attributed to the increase in the contribution of extension services delivered in the study area. This is in line with Makate *et al.* (2019), who reported that the utilization of agricultural extension activities had positive effects on the productivity of the households in the study area.

Parameters	Before the contribution	After the contribution
Mean	261.8146	354.029
Standard error	0.069843	0.06984
Mean difference	92.214	
Z-value	9.336***	
P-value	0.0000	

Table 2: Z-test Estimation of the Contribution AE SD on the Yield of Tomato Farmers

**Source:** Field Survey, 2024 *Note:* \*\*\* *significant at 1% level of significance* 

# **Contribution of Agricultural Extension Services on Income of Tomato Farmers**

The result in Table 3 presented the Z-test estimation of the contribution of AESD on the income of tomato farmers before and after the utilization of AESD in the study area. It was found that the mean income before the utilization of AESD in the study area was N1,176,568 while the mean after the utilization of AESD was N1,433,171 with a mean difference of N256,603. This indicated a significant difference (Z-value = 2.643) in the contribution of AESD to the income of tomato farmers in the study area. This implies that the utilization of AESD in the study area experienced a significant increase in income (Z-value = 2.643). This is in line with Alhassan and Muhammad (2019) findings, in the study of analysis of agricultural extension services in improving the standard of living of tomato farmers in Kebbi State. It was observed that farmers who participate in extension services had a higher income (F =3.95) than the non-participating farmers.





Table 3	: Z-test	Estimation	of the	Contribution	of	Agricultural	Extension	Services	on	Income	of
Tomato	Farmers					-					

Parameters	Before the contribution	After the contribution
Mean	1176568	1433171
Standard error	0.0843	0.0984
Mean Difference	256603	
Z-value	2.643	
P-value	0.0000	

**Source:** Field Survey, 2024 *Note:* \*\*\* *significant at 1% level of significance* 

## **Contribution of AESD on the Level of Living of Tomato Farmers**

The result in Table 4 presented the Z-test estimation of the contribution of AESD to the level of living of tomato farmers before and after the utilization of AESD in the study area. It was found that the mean level of living before the utilization of AESD (summing up the value of the material owned by the farmer in naira  $\mathbb{N}$ ) in the study area was  $\mathbb{N}1,779,263$ , while the mean after the utilization of AESD was  $\mathbb{N}3,564,191$  with a mean difference of  $\mathbb{N}1,784,928$ . This indicated a significant difference (Z-value = 2.880) in the contribution of AESD to the level of living of tomato farmers in the area. This implies that AESD has contributed to the level of living of the tomato farmers in the area. This is in line with Alhassan and Muhammad (2019) reported that agricultural extension services had a positive impact on improving the living standard of tomato farmers in the study area.

Parameters	Before the contribution	After the contribution
Mean	1779263	3564191
Standard error	0.0798	0.0898
Mean difference	1784928	
Z-value	2.880	
P-value	0.0000	

 Table 4: Z-test Estimation of the Contribution of AESD on the Level of Living of Tomato Farmers

Source: Field Survey, 2024 Note: \*\*\* significant at 1% level of significance

#### **Hypothesis:**

It was hypothesized that the contribution of agricultural extension services delivery has no significant effect on yield, income, and level of living. The finding showed that the AESD had contributed to the yield, income, and level of living of tomato farmers at a 1% level of probability. Hence, the null hypothesis was rejected.

#### **CONCLUSION AND RECOMMENDATIONS**

The study concludes that agricultural extension services delivery (AESD), had positive and significant effects on tomato yield, income, and level of living of the tomato farmers in the study area.

To improve extension service utilization, structured training should focus on planting techniques, proper fertilizer application, agro-chemical usage, mulching, weed control, and efficient harvesting. Therefore, efforts should be made by extension agents to organize field demonstrations and practical workshops that will equip farmers with hands-on skills to optimize yields and improve farm management practices.





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