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Perception and Accessibility of Agricultural Extension Service Delivery among Smallholder Sorghum Farmers in Zuru Agricultural Zone, Kebbi State, Nigeria

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Abstract: This study evaluated the accessibility and perception of agricultural extension services among smallholder sorghum farmers in the Zuru Agricultural Zone of Kebbi State, Nigeria. A multistage sampling procedure was used to select 160 smallholder sorghum farmers, and primary data were collected using structured questionnaires. Data were analysed using descriptive statistics and a five-point Likert scale with a decision threshold mean of 3.39. The findings showed limited extension coverage: 61.9% of respondents had no contact with extension personnel, 75.6% lacked access to good rural roads, and 84.4% received no operational or logistical support. Fellow farmers were the main source of agricultural information for 62.5% of respondents, followed by family and friends (28.1%) and radio or television (9.4%). Respondents had positive perceptions of the technical competence of extension agents (mean = 4.25), the relevance of their advice (mean = 4.06), and the contribution of extension services to sorghum yield improvement (mean = 3.93). However, perceptions were negative regarding agent availability (mean = 2.75), communication clarity (mean = 2.91), visit scheduling (mean = 2.85), practical demonstrations (mean = 2.66), and overall service quality (mean = 2.87). The weighted mean of 3.39 indicated a low overall perception under the stated decision rule. The study recommends recruiting local extension agents, decentralising operational bases, providing mobility and demonstration support, and integrating voice- and SMS-based advisory services with face-to-face extension.

Keywords: Agricultural extension services; accessibility; information channels; smallholder farmers; sorghum productivity; Zuru Agricultural Zone.

Introduction: Sorghum (Sorghum bicolor (L.) Moench) is an important staple food crop and a major contributor to rural food security in Nigeria, particularly in the semi-arid northern agroecological zones. Nigerian smallholder farmers face low sorghum productivity because of limited access to improved seed, inadequate varietal information, and low adoption of improved varieties (Kamara et al., 2025). Yahaya et al. (2022), using FAO data, reported a national sorghum yield of 1.23 t/ha, compared with 1.45 t/ha globally and 4.58 t/ha in the United States. Agricultural extension services link agricultural innovations with farmers and support the adoption of improved practices. Ibrahim et al. (2025) reported that effective extension delivery in Kebbi State depends on staff competence and institutional support, while inadequate personnel, funding, and operational facilities continue to constrain service delivery in Kebbi and Sokoto States. The effectiveness of extension advisory systems depends partly on farmers' access to agents and their perception of the services provided. Abioye et al. (2025) found that agricultural extension services increased smallholders' adoption of mobile advisory technologies. Conversely, irregular contact, poor logistical support, and unfulfilled service commitments may erode institutional trust and discourage the adoption of improved practices. Although studies have examined agricultural challenges in northern Nigeria, limited empirical evidence exists on the relationship between the operational delivery of extension services and farmers' perceptions in the Zuru Agricultural Zone. This study therefore addressed two questions: (1) How accessible are agricultural extension services to smallholder sorghum farmers in the Zuru Agricultural Zone? and (2) How do these farmers perceive the quality and effectiveness of public extension service delivery? Methodology: Study area**:**The study was conducted in the Zuru Agricultural Zone of Kebbi State, Nigeria. The zone comprises four Local Government Areas (LGAs): Zuru, Fakai, Sakaba, and Danko/Wasagu (Adamu, 2018). It has a tropical continental climate with distinct wet and dry seasons and receives approximately 800–1,000 mm of annual rainfall (NIMET, 2022). The climate supports the cultivation of sorghum, millet, and maize, and rural livelihoods depend predominantly on small-scale rainfed agriculture.

Sampling technique and sample size:A multistage sampling procedure was used. First, one administrative district was purposively selected from each of the four LGAs based on the intensity of sorghum production. Second, two rural farming communities were randomly selected from each district, producing eight communities. Third, 20 smallholder sorghum farmers were selected from each community by simple random sampling using sampling frames provided by local farm leaders. The final sample comprised 160 respondents.

Data collection and measurement of variables: Primary data were collected through structured questionnaires administered by trained enumerators. Secondary sources, including academic journals, official policy documents, and FAO/USDA repositories, were used to contextualise the findings. Accessibility was assessed using dichotomous and categorical measures covering extension contact, primary information source, road access, and logistical support.

Perception was measured with ten statements on a five-point Likert scale: Strongly Agree = 5, Agree = 4, Undecided = 3, Disagree = 2, and Strongly Disagree = 1. The decision threshold was calculated as the arithmetic mean of the ten item means and was reported as 3.39 (unrounded value = 3.3863). Item or grand means above the threshold were classified as high/positive perception, while means below the threshold were classified as low/negative perception.

Data analysis

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to analyse the data. The mean score for each perception statement was calculated as:

Mean score = $\Sigma(f_i x_i) / N$

where f_i is the frequency of responses in category i, x_i is the Likert score assigned to category i, and N is the total number of respondents. Results and Discussion: Accessibility of extension services: Table 1 shows limited access to agricultural extension services and infrastructure. Of the 160 respondents, 99 (61.9%) had no contact with extension personnel, while 61 (38.1%) had experienced formal extension contact. Limited extension coverage can disrupt the dissemination of information on planting density, climate-smart agronomy, integrated pest management, and improved crop varieties (Adzenga & Dalap, 2023; Mulungu et al., 2025). Because formal advisory services were limited, respondents relied mainly on informal channels. Fellow farmers were the primary source of information for 100 respondents (62.5%), followed by family and friends (28.1%) and radio or television (9.4%). Peer communication is valuable in rural communities; however, reliance on peer sources alone may reproduce unverified or outdated practices when it is not complemented by research-based advice (Muyombano & Espling, 2020; Mulungu et al., 2025). Infrastructure and operational support were also inadequate. Most respondents (75.6%) reported no access to good rural roads, and 84.4% reported receiving no logistical support. These constraints may limit the ability of extension personnel to reach remote communities and provide timely services (Adzenga & Dalap, 2023; Mulungu et al., 2025).

Farmers' perception of extension service delivery: Respondents rated ten dimensions of extension delivery (Table 2). Positive perceptions concerned agents' technical knowledge, the relevance of advice, improved knowledge of sorghum production, improved yield, and access to modern technologies. Negative perceptions concerned agent availability, communication clarity, the timing of visits, practical demonstrations, and overall service quality. The weighted mean of 3.39 was classified as low under the decision rule used in this study.

Theoretical implications: structural breakdown in innovation diffusion: The findings provide insight into Rogers' (2003) Diffu sion of Innovations Theory in a resource-constrained agricultural system. The theory presents adoption as a process mediated by communication channels over time within a social system, with extension workers acting as change agents who establish contact, assess needs, demonstrate relative advantage, and reduce uncertainty.

In the Zuru Agricultural Zone, the diffusion process is compromised at its initial stages because more than 60% of respondents reported no direct contact with extension agents. Farmers consequently depend heavily on peer networks, which may reproduce traditional practices without sufficient exposure to research-based recommendations. The low rating for practical demonstrations (mean = 2.66) also limits farmers' ability to observe the relative advantage and trialability of improved sorghum technologies. These findings suggest that negative perceptions are linked more to institutional delivery failures than to inherent resistance to innovation.

Conclusion and recommendations: Smallholder sorghum farmers in the Zuru Agricultural Zone experience substantial institutional gaps in extension delivery. Although farmers recognise the technical expertise of extension agents and the potential yield benefits of advisory services, overall perception is weakened by poor agent availability, inconvenient visit scheduling, limited practical demonstrations, inadequate infrastructure, and insufficient logistical support. Restoring regular, field-oriented advisory coverage is therefore important for improving sorghum productivity and rural food security. The Kebbi State Ministry of Agriculture and the Agricultural Development Programme should recruit and deploy suitably qualified local extension agents who understand the local agroecology, languages, and cultural context. Extension personnel should be stationed in village-level operational nodes rather than concentrated at LGA headquarters to improve accessibility and the regularity of farm visits. State agricultural agencies should provide field agents with motorcycles, fuel allowances, and demonstration kits to improve mobility and practical service delivery. Agricultural authorities should complement face-to-face visits with

voice- and SMS-based advisory platforms, radio programmes, and interactive digital channels in locally appropriate languages.Extension programmes should monitor not only the number of farmer contacts but also contact frequency, timeliness, relevance, practical demonstrations, and farmer satisfaction.

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Table 1. Distribution of respondents according to access to extension services and infrastructure (n = 160)

Variable	Category / Item	Frequency	Percentage (%)
Extension Contact	Had Contact	61	38.1
	No Contact	99	61.9
Primary Information Source	Media (Radio/TV)	15	9.4
	Family and Friends	45	28.1
	Fellow Farmers	100	62.5
Access to Good Roads	Yes	39	24.4
	No	121	75.6
Logistical Support	Yes	25	15.6
	No	135	84.4
Total		**160**	**100.0**

Source: Field survey, 2025.

Table 2. Farmers' perception of agricultural extension service delivery (n = 160)

S/N	Statement	SA (%)	A (%)	U (%)	D (%)	SD (%)	Mean	σ	Decision
1	Extension agents are readily available to provide advice and support when needed	20 (12.5)	30 (18.8)	20 (12.5)	70 (43.8)	20 (12.5)	2.7500	1.25392	Low perception
2	The advice provided by extension agents is relevant to my farming practices/needs	80 (50.0)	40 (25.5)	20 (12.5)	10 (6.3)	10 (6.3)	4.0625	1.20109	High perception
3	Extension services have improved my knowledge of sorghum farming practices	55 (34.4)	64 (40.0)	10 (6.3)	16 (10.0)	15 (9.4)	3.7063	1.49463	High perception
4	Extension agents uses clear and understandable language during training and visit	27 (16.9)	29 (18.1)	27 (16.9)	57 (35.6)	20 (12.5)	2.9125	1.30980	Low perception
5	The timing of extension visits is convenient for my farming scheduled	23 (14.4)	32 (20.0)	21 (13.1)	66 (41.3)	18 (11.3)	2.8500	1.27482	Low perception
6	Extension services have helped me increase my sorghum yield	44 (27.5)	86 (53.8)	10 (6.3)	15 (9.4)	5 (3.1)	3.9313	.99762	High perception
7	Extension agents provided practical demonstration during their visits	20 (12.5)	25 (15.6)	30 (18.8)	50 (31.3)	35 (21.9)	2.6563	1.31774	Low perception
8	I have access to modern farming technologies through extension services	47 (29.4)	83 (51.9)	3 (1.9)	17 (10.6)	10 (6.3)	3.8750	1.13686	High perception
9	Extension agents are knowledgeable about sorghum farming	78 (48.8)	62 (38.8)	6 (3.8)	10 (6.3)	4 (2.5)	4.2500	.97129	High perception
10	I am satisfy with the overall quality of extension services provided	25 (15.6)	28 (17.5)	30 (18.8)	55 (34.4)	22 (13.8)	2.8688	1.29887	Low perception

Source: Field survey, 2025.

Note: SA = Strongly Agree; A = Agree; U = Undecided; D = Disagree; SD = Strongly Disagree; SD (in the separate statistical column) = standard deviation. Decision threshold mean = 3.39.