VOL. 13 NO. 1,
AUGUST, 2026
E-ISSN 3027-0995
P-ISSN 3026-8265

African Scholar Publications & Research International
www.africanscholarpub.com

Journal of Biotechnology and Agricultural Research (JBAR)

Assessment of Extension Services Delivery Bias on Crop Farmers and Pastoralists in Niger State, Nigeria

Adamu, M. G.; Ubandoma, G. A.; & Bwala, M. A.
Department of Agricultural Economics and Extension Services, Faculty of Agriculture, Ibrahim Badamasi Babangida University Lapai, Niger State, Nigeria
Corresponding Author: ubandomagarba@gmail.com
DOI: https://doi.org/10.70382/ajbar.v13i1.036

Abstract

This study analyzed extension services delivery bias on crop farmers and pastoralists in Niger State, Nigeria. Multistage sampling procedure was used to select 120 crop farmers and 40 pastoralists for the study. Data were collected with the aid of structured questionnaires. Data were analyzed using descriptive statistics, logit regression analysis, and Kendal coefficient of concordance. Results revealed that the mean age of crop farmers was 36 years while that of pastoralists was 27 years. Majority (89.2%) of the crop farmers and pastoralists (90.0%) were married with the mean household size of 7 people and 8 people respectively. Majority (87.0%) of the crop farmers were formally educated while majority (90.0) of pastoralists were none formally educated. Significant biases for crop farmers were training on farm record keeping (92.0%) and mobile extension services (90.0%). Pastoralists experienced biases in extension visits to remote areas and access to grazing reserves (73.0%). The logit regression results revealed that extension service delivery bias among crop farmers and pastoralists was significantly associated with language barrier (2.4201, $p<0.01$) and political interference in extension agent (1.1857; $p<0.05$). The perceived effects of extension services delivery bias were on reduce trust between crop farmers and extension service providers ($\overline{X}$=2.71) and increase economic disparity among pastoralists ($\overline{X}$=2.85). Extension agents should be trained in local languages for easy understanding and adoption of improved practices and extension agents should be trust worthy in their interactions with farmers and pastoralists were offered as recommendations.

Keywords: Extension, service, delivery, pastoralists, crop farmers

Introduction

The original concept of extension was that of bringing the gap between the farmers and pastoralists and the sources of information or knowledge. Such sources included organisations or institutions generating knowledge and technologies such as research centres, universities and administration; this can play a vital role in the dissemination of post-harvest practices by extension agents on food security issues. Looking at extension as being educational presupposes that doing extension work involves teaching and learning. The teaching should stimulate the farmer to learn, understand and demonstrate. The farmer as a learner should have interest and the willingness to learn. Extension services refer to a set of activities and programs designed to provide farmers and pastoralists and rural communities with access to information, knowledge, skills, and technical support to improve their agricultural practices, productivity, and overall livelihoods (Uzokwe, 2016). Extension services, also known as Extension service delivery or advisory services are crucial components of agricultural development and knowledge dissemination (Saliu 2019). These services aim to bridge the gap between research institutions and farmers and pastoralists by providing information, technical assistance, and training to enhance agricultural practices, improve productivity, and promote sustainable farming methods (Rivera and Cary, 2016). Extension agents, who are often the primary contact point for farmers and pastoralists, provide personalized advice, demonstrations, and hands-on training to address the specific needs and challenges faced by farmers and pastoralists (Nnaemeka, 2016).

Extension service delivery bias refers to the unequal distribution of extension services, which can result in preferential treatment or inadequate support for specific agricultural communities, practices, or regions. This bias can have significant implications for the effectiveness and equity of extension services. Extension service bias towards crop farmers and pastoralists refers to the unequal distribution of extension services, resources, and support, with a predominant focus on crop agriculture. This bias can result in limited attention and inadequate services for farmers and pastoralists engaged in other types of agricultural activities, such as livestock rearing or agro forestry.

Statement of the Problem

Despite the importance of extension service delivery in promoting agricultural development and improving rural livelihoods, the bias in extension service delivery can manifest in various forms, such as gender bias, ethnic bias, socioeconomic bias, and geographical bias. These biases can result in disparities in resource allocation, access to information and technology, and exclusion from decision-making processes. Such inequalities ultimately have negative impacts on the productivity, sustainability, and livelihoods of farmers, pastoralists, and rural communities. The challenges faced by extension services in delivering support to these agricultural groups are numerous, there is the need for a comprehensive analysis that compares and contrasts the challenges specific to crop farmers and pastoralists. These challenges can impede adoption of improved agricultural practices, hinder productivity, and limit ability to cope with environmental and market fluctuations among farmers and pastoralists. Therefore, it is imperative to conduct an investigation to understand the extent, nature, and consequences of bias in extension service delivery. By identifying and understanding the distinct obstacles faced by each group, it becomes possible to develop targeted strategies and interventions that address their specific needs. In view of the above discussions, the study seeks to find answers to the following research questions:

i. What are the socioeconomic characteristics of crop farmers and pastoralists in the study area?
ii. What are the extension services delivery bias among crop farmers and pastoralists in the study area?

iii. What are the factors responsible for extension service delivery bias in the study area?
iv. What are perceived effects of extension service delivery bias among crop farmers and pastoralists in the study area?

Objectives of the study

The main objective of the study is to assess extension service delivery bias between crop farmers and pastoralists in Niger State, Nigeria.

The specific objectives are to:

1. describe the socio-economic characteristics of crop farmers and pastoralists in the study area;
2. determine the extension service delivery bias among crop farmers and pastoralists,
3. examine factors responsible for extension service delivery bias in the study area and
4. determine the perceived effects of extension service delivery bias among crop farmers and pastoralists in the study area.

The study Area

The study was conducted in Niger State one of the 36 States in Nigeria. Niger state lies between latitude 8°22' and 11°30'N and longitude 3°30N and $7^0$20'E. It has land area of about 74,244km^2. The population of Niger state based on 2006 census was 3,950,249 projected (at annual growth rate of 3.4%, as against the national population growth rate of 3.2% per annum) to 5,556,200 in 2018 (as projected by the National Population Commission). The State comprises of 25 Local Government Areas (LGAs). The LGAs are grouped into three Administrative Zones: A, B and C with 8, 9 and 8 Local Government Areas respectively. The major tribes are Hausa, Gwari and Nupe and numerous other minority tribes like Kadara, Pangu, Kambari and Dukkawa. Also, there are numerous settlers like Yoruba, and Igbos (Ayinde *et al.* 2013).

The annual temperature ranges between 26.8^0 C to 30^0 C and the maximum temperature is recorded between March and June while the minimum is usually between December and January. The annual rainfall ranges between 1200mm to 2400mm and rainy seasons lasts for about 150 days in the other parts of the State and about 120 days in the other parts of the State. The climate, soil and hydrology of the State permit the cultivation of most of the Nigeria's staple crops and still allows sufficient opportunities for grazing, fresh water fishing and forestry development. The crops cultivated include; rice, yam, cassava, guinea corn, millet and sesame while the animal rearing include cow, sheep and goat (Mohammed *et al.*, 2015).

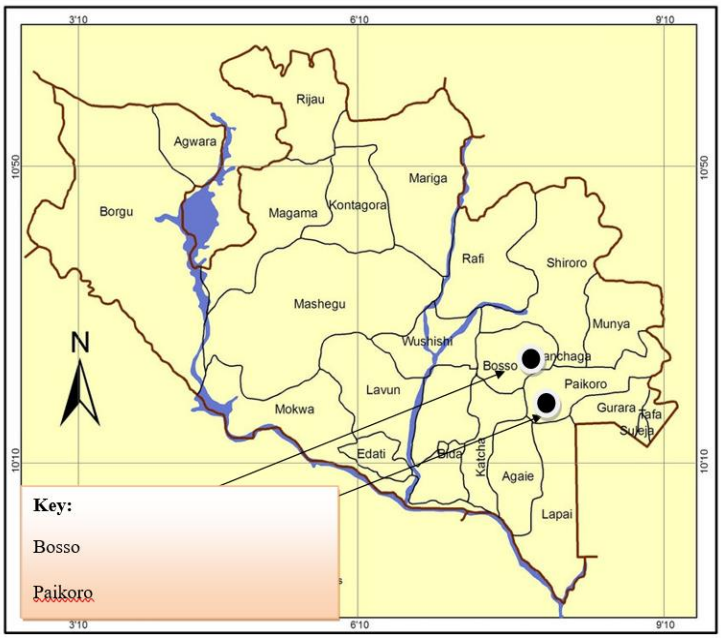


Fig 3.1 Map of Niger State showing the Study Areas. Source: https://nigerstate.gov.ng

Sampling Procedure and Sample Size

Multistage sampling procedure was employed in the selection of the respondents for the study. The first stage involved purposive selection of the Zone. Zone II was selected due to large number of crop farmers and pastoralists. The second stage involved the selection of two Local Government Areas (LGAs) namely: Paikoro and Bosso Local Government Areas in the Zone. The selection was done purposively. The third stage involved the selection of four (4) villages from each of the selected LGAs to get a total of eight (8) villages. The fourth stage involved a random selection of one hundred and twenty (120) crop farmers at 10% proportionate selection as sample size for the study. The list of registered crop farmers was obtained from Niger State Agricultural Development Project (NSADP). Snowball sampling method was employed for selection of pastoralists. A total of fourty (40) pastoralists were selected based on random selection of 5 pastoralists per transit camp in the eight (8) selected villages within the selected LGAs. (Table 3.1).

Table 1: Sampling procedure, Location and Sample size

Zone selected	Local Government Areas selected	Villages selected	Sampling frame (respondents per Selected village)	Respondents selected @ 10%
Zone II	Paikoro	Gwam	144	14
		Tutungo	141	14
		Paiko I	142	14
		Paiko II	130	13
	Bosso	Kampala	168	17
		Kodo	150	15
		Pyata	151	15
		Garatu	174	17
	Total	**8**	**1200**	**120**

Source: Field Survey data, 2024

Data Collection

Both Primary data and secondary information were used for the study. The primary data was obtained with the aids of structured questionnaires administered by the researcher and extension agents from the two Local Government Areas using kobo tool installed on android phone. The questionnaire consists of information on research specific objectives namely: socioeconomic characteristics, extension service delivery bias; factors responsible for extension service delivery bias and effects of extension service delivery bias among crop farmers and pastoralists. The secondary information was obtained from journals, bulletin; Central Bank publication (CBN); National bureau of Statistics (NBS), Food and Agricultural Organization (FAO) and any other literature relevant to the study.

Data Analysis

Data were analyzed using both descriptive and inferential statistics. Descriptive statistics such as frequency counts, percentages, means were used to achieve objectives i, ii and v. and Logit regression model to achieve objective iii.

Extension service delivery bias

Extension service delivery bias (objective ii) expressed as:

$$Bias = forecast\ value - eventual\ value$$

It is expressed in percentage as;

$$Bias = \frac{extension\ service\ delivery\ bias}{extension\ service\ required}\ X\ 100$$

$$Crop\ Bias = \frac{227}{498} = 0.45 \quad While\ Pastoralist = \frac{92}{143} = 0.63$$

Generally, there is bias in extension services delivery for both crop farmer and pastoralist

Logit Regression Model

The logit regression model was used to determine factors responsible for extension service delivery bias in the study area (objective iii). The implicit form of the model is expressed as;

$$Y = \ln\left(\frac{Q_1}{1-Q_1}\right) = \beta_0 + \sum_{j+1}^{i} \beta_1 X_1 + e_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where:

Y = dependent variable (the binary variable)

β_0 = intercept,

β_1 = estimated parameters

x_1 = explanatory variables

$e_1 = error\ term$

The explicit form is expressed as;

$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X+\ldots\ldots..+\beta_nX_n + e_i$ 3

Where;

Y = Extension bias (1 = if yes and 0 otherwise)

X_1 = Specialization of extension Agents (if crop farmers/pastoralists to extension =1, if otherwise = 0);

X_2 = Budgetary allocation to extension (in naira)

X_3 = Accessibility of crop farmers/pastoralists to extension (Distance in km or travel time in hour)

X_4 = Extension agents' perception of crop farmers/pastoralists (favourable = 1, if otherwise =0)

X_5 = Farming/herding experience (Year)

X_6 = Mode of extension service delivery (If group meeting =1 or if individual =0)

X_7 = Location (urban =1 or rural =0)

X_8 = Availability of demonstration site (Dummy)

X_9 = Income (Income)

X_{10} = Language barrier (Yes =1 or 0 if otherwise)

X_{11} =Political interference in extension service (perception scores)

X_{12} =Farmers and pastoralists perception towards extension agent (favourable 1, if otherwise =0)

β_0 = Constant

$\beta_1 - \beta_{10}$ = coefficient of the independent variables

$X_1 - X_{10}$ = independent variables

ε_i = error term

Socioeconomic Characteristics of Respondents

Table 2 revealed the mean age of crop farmers and pastoralists as 36 years and 27years respectively. This implies that both crop farmers and the pastoralists were in their active and productive years. Farmers in this age range are likely to be more receptive to adopting innovative agricultural technologies. Also, pastoralists will be able to withstand the pressure and rigors involved in cattle

production activities. This finding was corroborated by Abubakar *et al.* (2019) who stated that majority of the farmers in Niger State were within the youthful age group and are regarded as economically active, innovative and productive. Also, Adegoroye and Fasae (2020), reported that majority of pastoralists in Niger State were in the mid-age. Majority (89.2%) of the crop farmers and pastoralists (90.0%) were married. This implies that farming and livestock rearing in the study area were largely practiced by married people. This finding is in line with the finding of Ibrahim and Habila (2020), who reported that majority of the farmers were married. In the same vein, Oni *et al*. (2017) also, reported that large percentages of pastoralists in Niger State were married.

Table 2: Distribution of respondent based on socioeconomic characteristics

	Crop farmers n=120			Herders n=40		
Variable	**Frequency**	**Percentage**	**Mean**	**Frequency**	**Percentage**	**Mean**
Age (years)						
21 – 30	42	35.0		28	70.0	27yrs
31 – 40	38	32.0	36	4	10.0	
41 – 50	27	22.0		8	20.0	
51 and above	13	11.0		0	0.0	
Marital Status						
Married	107	89.2		36	90.0	
Separated	3	2.5		0	0.0	
Single	10	8.3		4	10.0	
Household Size (persons)						
1 – 5	75	63.0		16	40.0	
6 – 10	42	35.0	7	4	10.0	8 person
Above 10	3	2.0		20	50.0	
Level of Formal Education						
None formal	16	13.0		36	90.0	
Primary	8	7.0		4	10.0	3
Secondary	38	32.0	11	0	0.0	
Tertiary	58	48.0		0	0.0	
Farming / herding experience (years)						
1 – 10	80	67.0		21	53.0	
11 – 20	29	24.0	12	16	40.0	18 yrs
21 – 30	5	4.0		1	2.0	
31 – 40	6	5.0		2	5.0	

Source: Field survey data, 2024

Table 2 revealed the mean household size of crop farmer and pastoralists were 7 persons and 8 persons respectively. This implies that both crop farmers and pastoralists in the study area had moderate household size. This household size could be advantageous for farming, as family members often contribute to labour on the farm. Also, in pastoralist communities, large families are culturally valued due to the significant labour demands associated with livestock herding. This result agrees with that of Salihu *et al.* (2019) who reported that most families in farming communities of Niger State have an average family size of 7 members.

Table 2 showed that the mean years of formal education among crop farmers and pastoralists were 11 years and 3 years respectively. This implies that most crop farmers have attained at least a secondary school education, which equipped them with basic literacy, numeracy, and communication skills.

Farmers with moderate educational levels are more likely to actively engage with extension services, as they can comprehend technical instructions and apply new farming methods effectively. The low literacy level among pastoralists can significantly increase extension bias. This creates a gap between pastoralists and extension agents, leading to a potential neglect in favor of crop farmers. Also, Ogunbameru (2022) reported that majority of pastoralists had non-formal education.

Table 2 revealed the mean crop farming experience and herding experience were 12 years and 18 years respectively. This implies that both crop farmers and pastoralists in the study area had experienced in farming herding. Experienced farmers are generally more adapted to challenges such as pest infestations, soil management, and climate variations, as they have likely encountered these issues over the years and have refined their skills to handle them effectively. Their experience allows them to engage more effectively with extension agents, providing them with a clear understanding of their challenges and needs. Also, this early start in herding ensures that pastoralists acquire substantial experience in livestock management over the years, even before reaching adulthood. However, this could lead to extension bias if agents are not equipped to adapt their approaches to meet the needs of pastoralists. This result is in consonance with that of Olatunji *et al.* (2021) who reported that majority of farmers in South Western Nigeria had between 18 -20 years of experience in crop farming. Also, Salihu *et al.,* (2019) reported that most of the pastoralist in Bauchi State had high experience in herding because of the number of years spent in cattle herding.

Extension service delivery bias for crop farmers

Table 3 revealed the total extension services required by the crop farmers summed to 498 but only 271 were actually received. This yielded a bias of 227, indicating that 45.6% of requested and/or required services by the crop farmers went unachieved. The largest gaps in the service delivery were in accessing agricultural loans, training on improved crop varieties, and financial management training.

Table 3: Distribution of Extension services delivery bias for crop farmers

	Extension Required		Extension Received	
Agricultural Extension Service	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Information on Pest Control	92	77.0	83	69.0
Financial management training	32	27.0	10	8.0
Assistance with Soil Fertility Management	0	0.0	0	0.0
Help with irrigation techniques	19	16.0	19	16.0
Support with post-harvest handling	54	45.0	32	27.0
Information on Market Access	39	33.0	39	33.0
Guidance on Crop Rotation Practices	0	0.0	0.0	0.0
Advice on organic farming methods	32	27.0	16	13.0
Training on improved crop varieties	110	92.0	47	39.0
Support with Accessing Agricultural Loans	120	100.0	25	21.0
Total	498		271	54.4

Source: Field survey, 2024

Extension service delivery bias for crop farmers:
Bias = forecast value – eventual value
= 498 – 271
= 227

Fulfillment rate = $\frac{227}{498} \times 100 = 45.6\%$

Accessing agricultural loan has 120 requests and/or extension service required by crop farmers but only 25 were delivered. Training on improved crop varieties with total of 110 requests out of which 43% of the required extension service was achieved. Similarly, financial management training has 32 required extension services however 31% of the request by crop famers was achieved. By contrast, irrigation technique was the only extension service where demand equaled delivery (100%).

Extension service delivery bias for pastoralists

Table 4 showed the total extension services required by the pastoralists were summed to be 145 but only 53 received; yielding a bias of 92 that is 63% of the services required were unachieved. Extension service delivery was particularly poor for livestock disease control and livestock disease diagnostics where 40 of the services were required and 19 were received. Implying that high unachieved required in disease control and diagnostics directly threatens herd health and pastoralists' livelihoods. All other categories such as pasture management, breeding technique, financial management registered zero delivery. This could be that the demand for these services was not offered by the extension personnel. Also, it may be due to the migratory behavior of the pastoralists that would make them not to benefit from the services.

Table 4: Distribution of Extension services delivery bias for pastoralists

	Extension Required		Extension Received	
Livestock Extension Service	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Livestock disease control	40	100.0	19	48.0
Training on improved breeding Techniques	25	63.0	0	0.0
Pasture management	0	0.0	0	0.0
Water Management for Livestock	0	0.0	0	0.0
Livestock Nutrition and Feeding Practices	0	0.0	0	0.0
Market Access for Livestock Products	0	0.0	0	0.0
Animal health and veterinary services	40	100.0	15	38.0
Sustainable Grazing Practices	0	0.0	0	0.0
Financial Management	0	0.0	0	0.0
Climate Adaptation for Livestock	0	0.0	0	0.0
Livestock disease diagnostics	40	100	19	48.0
Accessing Loans for Livestock Farming	0	0.0	0	0.0
Total	145		53	37.0

Source: Field survey, 2024

Extension service delivery bias for pastoralist:
Bias = forecast value – eventual value
= 145 – 53
= 92

Fulfillment rate = $\frac{92}{145} \times 100 = 63.4\%$

Factors responsible for extension services delivery bias among crop farmers

Table 5 revealed the computed Pseudo R^2 value was 0.4823 which suggested that the independent variables in the model explain approximately 48.23% of the variations in extension service delivery bias among crop farmers. The Prob > chi^2 value of 0.0000 is statistically significant, meaning that the overall model is robust and the included variables significantly influence the likelihood of extension service delivery bias. The coefficient of accessibility of crop farmers to extension (0.1298, $p<0.05$), extension agents' perception of crop farmers (0.1856, $p<0.01$), location (0.8796, $p<0.01$), language barrier (2.4201, $p<0.01$) and political interference in extension agent (1.1857; $p<0.05$) were positive and statistically significant suggesting that a unit increase in any of the variables may likely increase extension service delivery bias among crop farmers.

The coefficient for the accessibility of crop farmers to extension services is 0.1298, with a p-value of 0.05. This positive coefficient suggested that as the distance between crop farmers and extension service increases, the likelihood of experiencing extension service delivery bias also increases. This is similar to the study of Yusuf *et al*. (2023) who reported that distance from extension service has often been cited as a key constraint to service access.

The coefficient for extension agents' perception of crop farmers stands at 0.1856 with a p-value of 0.01. A positive coefficient implies that unfavorable attitudes from extension agents towards crop farmers are associated with a higher likelihood of experiencing service delivery bias. This bias could manifest in various forms, such as prioritizing certain farmers based on personal biases, offering more support to wealthier or more educated farmers, or dismissing the needs of those who are perceived as less capable or engaged. This finding is consistent with Alabi *et al*. (2021) who found that farmers who felt that extension workers neglected their needs were less likely to participate in training programmes or adopt new technologies.

Table 5: Factors Responsible for Extension Service Delivery Bias among Crop Farmers

Variable	Coefficient	Standard Error	Z-value
Specialization of Extension Agents	-1.0153	0.3825	-2.65**
Budgetary Allocation to Extension	-0.3158	0.4124	-0.77
Accessibility of Crop Farmers to Extension	0.1298	0.0621	2.09**
Extension Agents' Perception of Crop Farmers	0.1856	0.0583	3.18***
Farming Experience	-1.9874	0.4189	-4.74***
Mode of Extension Service Delivery	-1.1253	0.5412	-2.08**
Availability of Demonstration Site	-0.8432	0.4231	-1.99*
Income	1.0158	0.6895	1.47
Language Barrier	2.4201	0.4728	5.12***
Political Interference in Extension Service	1.1857	0.5096	2.33**
Attitude Towards Extension Agent	0.7325	0.5642	1.3
Constant	-1.5234	0.9442	-1.61
LR Chi^2:	82.41		
Prob > Chi^2	0		
Pseudo R^2	0.4823		

Source: Field data survey, 2024

The coefficient for the language barrier is 2.4201, with a p-value of less than 0.01, indicating that language barriers significantly influence extension service delivery bias. This suggested that language differences between farmers and extension agents can create communication difficulties, reducing the effectiveness of information transfer. As a result, some farmers may be neglected in favour of farmers who can easily communicate with extension agents. Haile *et al.* (2022) indicated that language barriers significantly hinder farmers' ability to understand and utilize extension services, especially in multilingual regions of Nigeria. This leads to a bias in service delivery as extension officers may focus on farmers with whom they can easily communicate.

The coefficient for the specialization of extension agents is 1.0153 with a p-value of 0.05. This implies that specialization of extension agent in crop production reduce extension bias. In areas where crop farming is the dominant livelihood activity, having extension agents with in-depth knowledge of specific crops and farming practices ensures that the advice and services provided are suited to the needs of the farmers. As a result, farmers are more likely to adopt recommended agricultural practices, leading to improved productivity and better access to extension services. Specialization can reduce biases that may arise from the generalization of agricultural advice and providing more personalized and relevant assistance. This is similar to the study of Oni *et al.* (2017) who reported that tailored approach minimizes the likelihood of a one-size-fits-all approach that can lead to biases in service delivery.

The coefficient for the mode of extension service delivery through individual contacts is 1.1253, with a p-value of less than 0.05, suggesting that this variable significantly reduces extension service delivery bias. A positive coefficient in this case signifies that individual contact between extension agents and farmers has a significant effect on the equitable distribution of services. This mode of delivery is considered more effective compared to group-based methods or impersonal mass communication channels. Individual contacts allow for more personalized, direct, and meaningful interactions between extension agents and farmers. This personalized attention reduces the chances of biases, such as those based on wealth or social status, as all farmers are treated on an individual basis. This agrees with Saliu (2019) who reported that farmers who have access to individual extension contacts tend to benefit more from extension services.

The coefficient for the availability of demonstration sites is 0.8432, with a p-value of less than 0.10, indicating that access to demonstration sites reduces bias in extension services delivery. Demonstration sites provide a practical, hands-on learning experience for farmers, where they can directly observe and engage with new agricultural practices, technologies, or crop varieties. Farmers are more likely to trust and adopt agricultural practices they can observe and experience firsthand, rather than relying solely on verbal or written instructions from extension agents. Demonstration sites can reduce biases in service delivery by providing equal opportunities for all farmers to access the same information and resources. This agrees with the study of Ajiboye *et al.* (2022) who reported that improved access to demonstration sites enables farmers to adopt and continue usage of new technologies.

Factors Responsible for Extension Service Delivery Bias among Pastoralists

Table 6 showed the computed Pseudo R^2 value was 0.4745 which suggested that the independent variables in the model explain approximately 47.5% of the variations in extension service delivery bias among pastoralists. The Prob > chi^2 value of 0.0000 is statistically significant, meaning that the overall model is robust and the included variables significantly influence the likelihood of extension service delivery bias. The coefficient of political interference in extension service (1.2314, $p<0.05$) and attitude towards extension agent (0.7618, $p<0.01$) were positive and statistically significant suggesting that a

unit increase in any of the variable may likely increase extension service delivery bias among pastoralists.

Table 6: Factors responsible for Extension Service Delivery Bias among Pastoralists

Variable	Coefficient	Standard Error	Z-value
Specialization of Extension Agents	0.2754	0.3912	0.70
Budgetary Allocation to Extension	-0.4941	0.1198	-4.12***
Accessibility of Pastoralists to Extension	0.0412	0.0673	0.61
Extension Agents' Perception of Pastoralists	0.0923	0.0568	1.62
Herding Experience	0.1345	0.4321	0.31
Mode of Extension Service Delivery	-0.1956	0.5623	0.34
Location	0.7923	0.2417	3.28***
Availability of Demonstration Site	-0.8017	0.4405	-1.82*
Income	1.0624	0.7052	1.51
Language Barrier	2.5387	0.4863	5.22***
Political Interference in Extension Service	1.2314	0.5178	2.38**
Attitude Towards Extension Agent	0.7618	0.2721	2.80***
Constant	-1.6125	0.4684	3.44***
LR Chi^2 (15):	79.63		
Prob > Chi^2:	0.0000		
Pseudo R^2	0.4745		

Source: Field survey, 2024

The positive and statistically significant coefficient for language barriers was (2.5387, $p<0.01$). This communication gap often leads to misinformation, misunderstanding, and lack of trust in the services provided, all of which contribute to extension service delivery bias. Language differences may also exacerbate existing inequalities, as pastoralists who are more fluent in the language of the extension agent may have better access to services, while others are left at a disadvantage. This agrees with Yusuf and Adeola (2023) who reported that language barrier is one of the factors responsible for extension bias.

The positive coefficient and statistically significant for political interference was (1.2314, $p<0.05$) leads extension services delivery bias. The political interference often leads to preferential treatment for certain groups of pastoralists over others. Extension agents may be directed to prioritize certain pastoralist groups or regions due to political considerations, leading to the neglect of other equally deserving groups

The coefficient for attitudes towards extension agents (0.7618, $p<0.01$) shows the effects of extension agents' perceptions of the pastoralists on service delivery. If extension agents have unfavorable attitudes towards pastoralists, this can result in biased service delivery. Negative perceptions might stem from cultural misunderstandings, historical tensions, or stereotyping of pastoralists as less educated or less receptive to new agricultural techniques. Moreover, extension agents with negative attitudes may prioritize other groups of farmers over pastoralists, leading to unequal service delivery and exacerbating existing disparities.

The coefficient for budgetary allocation to extension services (-0.4941, $p<0.05$) was negative and statistically significant, suggesting that an increase in funding for extension services could reduce bias.

The availability of demonstration sites was also found to have a negative relationship with extension service delivery bias (-0.8017, p<0.10). Demonstration sites offer a practical, hands-on approach to extension services, allowing pastoralists to directly observe and engage with new techniques, technologies, and best practices. This ensures that extension services are not disproportionately directed towards wealthier or more influential pastoralists but are available to everyone in the community.

Perceived Effects of Extension Service Delivery Bias among Crop Farmers

Table 7 revealed that reduces trust between farmers and extension service providers ($\overline{X}$=2.71) was ranked first among the perceived effects of extension service delivery bias among crop farmers. The perception that extension service delivery bias reduces trust between farmers and service providers suggested a critical breakdown in the relationship necessary for effective agricultural support. When farmers perceive that extension services favor certain groups, such as wealthier or more politically connected individuals they may feel marginalized and less valued in the service delivery process.

Table 7: Perceived Effects of Extension Service Delivery Bias by Crop Farmers

Perceived effects	Weighted Sum	Weighted Mean	Rank	Remark
Reduces trust	325	2.71	1st	Agreed
Farmers receiving biased services are less likely to adopt new technologies	290	2.42	2nd	Agreed
Tribal biases in service delivery hinder social cohesion in farming communities	267	2.23	3rd	Agreed
unequal access to information and resources	237	1.98	4th	Disagree
Regional bias in services affects overall agricultural development in neglected areas	234	1.95	5th	Disagree
extension services discourage innovation and diversification in agriculture	231	1.93	6th	Disagree
Monopolization of agricultural benefits	224	1.87	8th	Disagree
lower productivity for marginalized farmers groups or pastoralist groups	205	1.71	10th	Disagree
discourages smallholder farmers from seeking assistance	132	1.1	11th	Disagree

Source: Field data survey, 2024

Consequently, the overall progress and development of the agricultural sector may be stunted, as the full potential of innovations is not realized across all farming communities. Also, the perception of tribal biases in service delivery hindered social cohesion in farming communities. When extension services are perceived as favouring specific groups, it can exacerbate existing tensions and divisions within farming communities. This bias can lead to fragmentation, where farmers are less willing to collaborate, share resources or engage in community-driven initiatives.

Perceived Effects of Extension Service Delivery Bias among Pastoralists

Table 8 showed that the increase economic disparities among pastoralists ($\overline{X}$=2.85) and lower productivity ($\overline{X}$=2.85) were ranked first among the perceived effects of extension service delivery bias

among pastoralist. The perception that extension service delivery bias increases economic disparities among pastoralists ($\bar{X}$ = 2.85) showed the significant effects that unequal access to resources and services can have on livelihoods. When certain pastoralists receive preferential treatment, such as better access to extension services, training, and market opportunities, they are positioned to thrive economically. In contrast, marginalized groups face heightened challenges in accessing vital information and support, leading to a widening economic gap. Similarly, the perception that extension service delivery bias leads to lower productivity for marginalized pastoralist groups ($\bar{X}$ = 2.85) highlights a critical consequence of inequitable service provision. When extension agents prioritize certain pastoralists, those who are overlooked may lack access to essential information, innovative practices, and resources that can enhance productivity.

The perception that tribal biases in service delivery hinder social cohesion among pastoralists ($\bar{X}$ = 2.60) indicated that favoritism can have detrimental social implications. When extension services are perceived as biased toward specific tribes, it can foster divisions and mistrust within the community. This fragmentation undermines collaborative efforts and collective resource management, essential for sustainable pastoralist. As tribal biases intensify, pastoralists may become reluctant to share knowledge, resources, or support, creating an environment of competition rather than cooperation.

Table 8: Perceived Effects of Extension Service Delivery Bias by Pastoralists

Perceived effects	Weighted Sum	Weighted Mean	Rank	Remark
Increase economic disparities among pastoralists	114	2.85	1st	Agreed
Lower productivity	114	2.85	1st	Agreed
Hinder social cohesion among pastoralists	104	2.60	3rd	Agreed
Monopolization of agricultural benefits	90	2.25	4th	Agreed
unequal access to information and resources	89	2.23	5th	Agreed
discourages pastoralists from seeking assistance	57	1.43	8th	Disagree
reduces trust	54	1.35	9th	Disagree

Source: Field survey, 2024

CONCLUSION AND RECOMMENDATIONS

The study concluded that both the crop farmers and the pastoralist were young and energetic with moderate household size. Some of the major extension services required by both the crop and the pastoralists were not received. The extension services delivery bias exist in both crop farmers and pastoralists with more emphasizes on crop farmers. The factors responsible for extension services delivery bias in both crop farmers and pastoralists were accessibility to extension, location, language barriers and political interference. Reduce trust in extension services provider, tribal biases and economic disparity were the perceived effects of extension services delivery bias among crop farmers and pastoralists.

Based on the findings of this study, the following recommendations were made:

1. Government should establish extension stations in rural areas to improve access to services and information to reduce service delivery bias.
2. Both the crop farmers and the pastoralists should be encouraged to form cooperative societies for easy access to information, assistance and accusation of loans and agricultural grants from Government.

3. Extension agents should be trained in local language for easy understanding and adoption of improved practices.
4. Extension agents should be trust worthy in their interactions with farmers and pastoralists.

REFERENCES

Abubakar, M., Suleiman, H., & Lawal, K. (2019). Perceived effects of extension service delivery bias on farmers and pastoralists in Nigeria. *Journal of Agricultural Development and Policy Studies*, *14*(3), 25–38.

Adegoroye, A. A., & Fasae, O. (2020). Extension service delivery bias in Nigeria: The role of informal networks. *African Journal of Agricultural Extension*, *9*(4), 56–72.

Ajiboye, M. O., Olaoye, J. A., & Lawal, A. O. (2022). The focus on commercial crop varieties in Nigeria's extension services and the marginalization of traditional crops. *Journal of Sustainable Agriculture*, *13*(1), 58–67.

Alabi, M. O., Olatunji, A. O., & Adeoye, O. A. (2021). The influence of cultural norms on women's access to agricultural extension services in rural Nigeria. *Journal of Gender and Agricultural Development*, *11*(3), 82–93.

Ayinde,O.E.,Ojehomon, V.E.T., Daramola, F.S. and Falaki, A.A. (2013). Evaluation of the Effects of Climate Change on Rice Production in Niger State. *Ethiopian Journal of Environmental Studues and Management*, vol.6. pp 765.

Haile, M., Kebede, D., & Asfaw, T. (2022). Assessing the adequacy of extension visits to pastoral communities in Kenya: Implications for livestock productivity. *East African Journal of Agriculture and Development*, *12*(3), 38–49.

Ibrahim, Y., & Habila, M. (2020). Extension service delivery bias and its impact on crop-pastoral conflict in Nigeria. *Journal of Rural and Agricultural Studies*, *15*(2), 39–53.

Mohammed U, Olaleye RS, Umar IS, Ndanitsa MA, Jibrin S (2015). An assessment of Factors influencing Adaptation of special Rice Project Technology Package by Farmers under the Rice Value Chain in Niger State, Nigeria. Retrieved on November 10, 2016 from www.sciencedomain.org

Musa, A. O. (2019). Extension services and their biases in supporting rural farmers: A critical analysis. *Journal of Agricultural Research and Extension*, *19*(1), 45–62.

National Population Commission (NPC) (2006).Population data in Nigeria http//www.population.gov.ng/population-data-in-Nigeria. Retrieved on February

Nigeria Forum. (2014). Challenges facing agriculture in Nigeria. Retrieved from https://www.nigeriaforum.org

Niger State Government website: https://nigerstate.gov.ng retrieved January,2024.

Nnaemeka, I. (2016). Agricultural advisory services: A rethinking of the concept of extension. *Journal of Modern Agriculture and Extension*, *11*(2), 78–89.

Ogunbameru, B. O. (2022). The effectiveness of public sector extension programs: A Nigerian perspective. *Journal of Rural Development and Extension*, *5*(2), 78-91.

Olatunji, A. O., Alabi, K., & Yusuf, R. A. (2021). Bridging the gap: Extension services for crop farmers and pastoralists in Nigeria. *International Journal of Agricultural Innovations*, *6*(4), 112-121.

Oni, A., Adeyemi, O., & Adebayo, T. (2017). Extension service delivery in Nigeria: A case study of Ondo State. *Journal of Agricultural Policy and Research*, *7*(2), 12–28.

Rivera, W. M., & Cary, J. W. (2016). Agricultural extension services: Perspectives and prospects. *Journal of Extension Systems*, *32*(1), 45–62.

Salihu, S., Mustapha, U., & Usman, A. (2019). Extension delivery bias in Nigeria: A review of causes and implications for agricultural extension. *International Journal of Agricultural Extension*, *11*(1), 18–32.

Saliu, M. A. (2019). Extension services in agricultural development: A critical analysis. *International Journal of Agriculture and Rural Development*, *16*(3), 34–50.

Yusuf, K., & Adeola, R. (2023). Panel data analysis of long-term effects of extension services on agricultural productivity in Nigeria. *African Journal of Agricultural Economics and Policy*, *19*(2), 110–123.

Yusuf, M., Umar, H., & Aliyu, K. (2023). Challenges in understanding and applying extension service information among pastoralists in northern Nigeria. *Journal of Agricultural Extension and Livestock Studies*, *8*(2), 19–28.