

Information Sources and Participation Levels of Cattle Rearers in Pattec Intervention Programmes in Jigawa and Nasarawa States, Nigeria

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Abstract: *The study examines information sources and participation levels of cattle rearers in Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) intervention programmes in Jigawa and Nasarawa states, Nigeria. The specific objectives are to: describe the socio-economic characteristics of farmers in the study area, investigate the impact of PATTEC on farmers' access to information on the control of tsetse and trypanosomiasis disease in the study area, evaluate the level of participation of cattle rearers in PATTEC project activities in the study area, and identify the constraints against cattle rearing activities in the study area. Multistage sampling techniques were used to sample 640 respondents for the study. The socio-economic characteristics results revealed that 66.5% of cattle rearers in Jigawa State had no formal education; in Nasarawa State, 52.0% did. The average farming experience of the farmers in both states was 28 years. The mean household size of farmers in Jigawa State was 8; in Nasarawa State, it was 12. The average annual income of cattle rearers in Jigawa and Nasarawa States was ₦3,028,393.1 and ₦2,282,368.75, respectively. The study revealed that, in Nasarawa State, 99.7% of social media users relied on radio, while 100% relied on telephone. Similarly, in Jigawa, 99.0% relied on radio, while 99.6% used telephone. Institutional sources of information in Jigawa State are veterinary doctors (100%), extension agents (100%), cooperative societies (100%), and village heads (100%). In Nasarawa State, extension agents (100%), cooperative societies (100%), and village heads (100%). Level of PATTEC project participation, which has the highest mean score, is participation in training on the use of clothing in a tsetse-infested environment with a mean score of 2.67, followed by training on the use of treated nets for protection with a mean score of 1.98 and the use of trypanotolerant breed of cattle with a mean score of 1.92. The study further revealed that the major constraints faced by cattle rearers in the study area were conversion of cattle routes to crop fields, Tsetse and Trypanosomiasis diseases, access to finance, etc. The study recommended that the government establish adult education programs in the States. The government should strengthen sensitization campaigns to improve the levels of participation in PATTEC. Social media and institutional sources of information should also be used in the dissemination of information on PATTEC activities to farmers.*

Keywords: Information sources, Participation levels, Cattle rearers, PATTEC, Agricultural extension, Trypanosomiasis control.

INTRODUCTION

Livestock production is essential for ensuring food security around the world, supporting rural communities, and bolstering agricultural economies. Cattle farming, in particular, plays a major role in providing meat and dairy products, and this sector is increasingly influenced by factors like disease control measures, climate change, and advancements in technology that enhance extension services. In numerous developing areas, having access to trustworthy livestock health information and being involved in veterinary intervention programs can greatly impact productivity and how effectively diseases are managed (FAO, 2023). In Africa, the landscape of cattle production is largely shaped by pastoral and agropastoral systems, especially in the Sahel and sub-Saharan regions. Unfortunately, livestock productivity faces significant challenges from parasitic diseases like trypanosomiasis, which is spread by the tsetse fly and impacts millions of cattle each year throughout tropical Africa. The African Union has made it a priority to tackle this issue through the Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC), focusing on coordinated vector control, raising community awareness, and treating livestock as essential strategies. However, the success of these initiatives can vary from one country to another, influenced by factors such as the effectiveness of extension services, access to information, and the level of farmer engagement (World Health Organization [WHO], 2022; PATTEC Coordination Office, 2021).

In Sub-Saharan Africa, research indicates that livestock keepers tend to lean more on informal communication channels—like chatting with fellow herders, local agro-veterinary drug sellers, and community leaders—rather than relying on formal extension services for animal health information. This reliance can hinder the reach and effectiveness of intervention programs, including those related to PATTEC, and makes it harder for recommended practices to gain traction (OIE, 2022). As a result, participation in livestock disease control programs varies widely across different regions, ultimately impacting the overall effectiveness of these initiatives.

In Nigeria, cattle production plays a vital role in the agricultural landscape, particularly in the northern regions where pastoralism thrives. The country is home to one of the largest cattle populations in West Africa, but it grapples with significant challenges like trypanosomiasis, limited veterinary services, and disputes over grazing land. To tackle these issues, the Federal Government, alongside international partners, has rolled out PATTEC initiatives in select states aimed at curbing tsetse fly numbers and boosting livestock productivity. States like Jigawa and Nasarawa have been key focus areas due to their dense livestock populations and their importance in cattle migration routes (Federal Ministry of Agriculture and Rural Development [FMARD], 2022).

Even with these efforts in place, there are still noticeable gaps when it comes to sharing information and getting cattle rearers involved in program activities. A lot of pastoralists struggle

with limited access to formal extension systems, which leads to different levels of awareness and participation in PATTEC initiatives. This situation raises some red flags about how effective the communication channels and stakeholder engagement strategies are in livestock disease control programs in Nigeria.

That's why it's crucial to take a closer look at the information sources and participation rates of cattle rearers in PATTEC intervention programs in Jigawa and Nasarawa States. Doing so will help us improve program design, strengthen extension systems, and ultimately boost livestock health outcomes in the region.

Objective of the study

The broad objective of this study is to examine information sources and participation levels of cattle rearers in Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) intervention programmes in Jigawa and Nasarawa states, Nigeria.

The specific objectives are to:

- i. describe the socio-economic characteristics of the respondents in the study area;
- ii. investigate the impact of PATTEC project on farmers' access to information on the control of tsetse and trypanosomiasis in the study area;
- iii. evaluate the level of participation of cattle rearers in PATTEC project activities in the study area, and
- iv. identify the constraints militating against cattle rearing activities in the study area.

MATERIALS AND METHOD

Study Area

According to Jigawa State Government bulletin (2023), the state lies between latitudes 11°N and 13°N and longitudes 8°E and 10°35'E with a tropical climate. The daily minimum and maximum temperatures are 15 degrees and 35 degrees Celsius. Jigawa State has a savannah climate suitable for livestock farming. It has extensive grasslands, seasonal rivers, and grazing reserves that support cattle rearing. Jigawa State is one of the regions where animal trypanosomiasis is a significant concern. The disease mainly affects cattle and other live stock, leading to weight loss, reduced milk and meat production, abortions in pregnant animals, and death in severe cases. This causes major economic losses for farmers.

According to the Nasarawa State bulletin (2023), Nasarawa State lies within a region bounded by Latitudes 7° 50' and 9° 50' N and Longitudes 6° 54' and 9° 54' E. It is located in the middle belt zone of the country. Cattle rearing is a major agricultural activity in Nasarawa State. It significantly contributes to income generation, employment, and food supply, particularly meat and dairy.

Nasarawa's vegetation, rivers, and humid zones provide a suitable habitat for tsetse flies. The disease is more prevalent in animals, especially cattle, causing serious economic losses to farmers.

Population of the Study

Due to the absence of a comprehensive sampling frame indicating the total number of cattle rearers in Jigawa and Nasarawa States, the sample size was determined through a multistage sampling procedure. Sixteen PATTEC operational blocks were selected from each state, given a total of 32 blocks. Subsequently, 20 cattle rearers were randomly selected from each block, resulting in total sample size of 640 respondents. In a situation where a complete sampling frame is unavailable, multistage sampling is considered an appropriate technique to select respondents through successive stages while ensuring adequate representation of the study population (Sekaran and Bougie, 2016).

The selected States, zones and blocks were purposively chosen because cattle rearing is a major livelihood activity in the areas and the prevalence of tsetse fly infestation and trypanosomiasis has historically affected cattle production and the livelihood of cattle rearers; consequently, the areas were considered appropriate for assessing the impact of PATTEC.

In the final stage, 20 cattle rearers were randomly selected from each sample block to ensure equal representation of cattle rearers across the study area to generate sufficient observations for robust statistical analysis.

Sources of Data Collection

Primary data were collected through questionnaires while secondary information were collected from publications from Federal Ministry of Agriculture, Agricultural Development Programme (ADP), Local Government Department of Agriculture, books, journals, journal articles etc.

Design of Instrument for Data Collection

The Instrument for data collection was a structured questionnaire. Although two versions of the questionnaire were administered, both instruments were designed to measure the same core socioeconomic and livelihood variables. Therefore, instrument consistency and compatibility of the key study variables were maintained across both respondent groups.

Method of Data Collection

Primary data for this study were collected through the administration of structured questionnaires. The field survey for this study was conducted between January 2025 and December 2025. The questionnaires were administered through face-to-face interviews to obtain information on

respondents' socioeconomic characteristics and income generated from milk sales. To minimize interviewers' bias, enumerators were trained on the objectives of the study, questionnaire administration procedure, and ethical considerations before data collection.

Content Validity of Questionnaire

The questionnaires were validated by my supervisors and other lecturers in the Department of Agricultural Extension and Rural Sociology, Agricultural Economics amongst others to see that the questionnaire addressees the objectives of the study.

Reliability test of Questionnaires

The reliability or pilot test was carried out for this study. It allows researchers to identify and address potential issues before implementing the full-scale study. In conducting the reliability test, 10% of the questionnaires were administered in a location different from the study area. This was carried out in Abuja. The result of the Cronbach's alpha $\alpha = 0.715$ indicates acceptable internal consistency. It is most commonly used when you have multiple Likert questions in a survey/questionnaire that form a scale and you wish to determine if the scale is reliable (Frost, 2024).

Administration of Questionnaire

Trained ADP extension workers were used in the administration of instruments for data collection. To minimize interviewer's bias, the enumerators were trained prior to data collection on the objective of the study, administration of the questionnaire, ethical considerations, and techniques to maintaining neutrality during interviews. The training voiding leading respondents. In addition, field supervisors monitored the data collection process and regularly checked completed questionnaires for competencies and consistency.

Method of Data Analysis

Descriptive statistics were used to analyze data for the study. The data collected from the field were analyzed with IBM SPSS version 25. After analysis, the research findings were put into categories based on the research objectives and presented through the use of table, bar chart, and pie chart.

Objectives 1, 2, 3 and 4 were analyzed using descriptive statistics such as frequency, percentage and mean.

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Cattle Rearers in Jigawa and Nasarawa State

The results in Table 1 indicate that (82.2%) of cattle rearers in Jigawa State were male. This aligns with studies that highlight cattle rearing as a traditionally male-dominated activity due to its labor-intensive nature (Adebayo and Olaniyi, 2008). Cattle rearing is a male-dominated activity in Nasarawa State, with 93.1% male. This aligns with Akinwumi (2019) and Okoruwa (2020), which indicated that traditional livestock farming largely undertaken by men due to the labor-intensive nature.

The average age of cattle rearers in both States were 47 years suggests that cattle rearing is predominantly practiced by middle-aged farmers. Also, older farmers (51years and above) were farmers who are highly experienced.

The low percentage (1.6%) of youth indicates a declining interest among younger generations which could threaten the sustainability of the industry in the State (Adesiji *et al.*, 2013). The 37.0% of cattle rearers being above 40 years suggests an aging cattle-rearing population, which may have implications for the sustainability of the industry. A study by Alhassan (2021) noted that an aging farmer population can reduce the adoption of modern livestock management practices.

A significant majority (91.3%) of cattle rearers in Jigawa State were married. A similar study by Adebisi (2019) reported that married people are more responsible, which could be due to the struggle to meet the needs of the family and the provision of labour. Similarly, 96.2% of farmers in Nasarawa State were married. This trend aligns with previous research by Usman and Mohammed (2020), which found that livestock rearing is primarily managed by married men, who view it as a stable economic activity.

Table 1: Socio-Economic Characteristics of Cattle Rearers in Study Area

Variables	Jigawa State		Nasarawa State	
	Frequency	Percentage	Frequency	Percentage
Sex				
Male	263	82.2	298	93.1
Female	57	17.8	22	6.9
Age				
≤ 20	5	1.6		
21 – 30	47	14.6	9	3.0
31 – 40	43	13.5	99	31.0
41 – 50	119	37.0	126	39.0
≥ 51	106	33.3	86	27.0
Mean	47		47	
Marital Status				
Single	13	4.1	6	1.9
Married	292	91.3	299	96.2
Divorced	4	1.3	6	1.9
Widowed	11	3.4		
Educational Level				
No formal education	210	66.5	167	52.0
Primary school	67	21.2	53	16.0
Secondary school	29	9.2	60	19.0
Tertiary school	10	3.1	40	13.0
Years of Farming				
1-10	28	8.8	53	16.6
11-20	84	26.0	181	56.5
21-30	97	30.4	47	14.7
> 30	111	34.8	39	12.2
Mean	28		28	
Household Size				
≤ 5	116	37.9	37	12.0
6 – 10	114	37.2	152	50.0
11 – 15	60	19.7	26	8.0
>15	16	5.2	92	30
Mean	8		12	
Income (Naira)				
< 1,000,000	4	1.2	20	6.0
1,000,001-2,000,000	60	19.1	131	41.0
2,000,001-3,000,000	122	38.7	144	45.0
3,000,001-4,000,000	69	21.7	25	8.0
4,000,001-5,000,000	44	13.7		
>5,000,000	21	6.6		
Mean	3028393.1		2282368.75	

Source: Field Survey, 2025

Sources of Information (Social Media) on the Activities of the PATTEC Project in Jigawa and Nasarawa states.

Table 2 presents the sources of information on the activities of the Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) in Jigawa and Nasarawa States. The findings reveal distinct patterns in the use of various information channels, emphasizing the dominance of traditional and community-based sources over digital media.

In both states, radio and telephone were the most widely used sources of information. In Nasarawa State 99.7% used radio, while 100% used telephone. Similarly, in Jigawa, 99.0% of respondents' relied on radio, while 99.6% used telephone for communication. This study agreed with Godson-Ibeji *et al.* (2022) which stated that information communication technology (ICT) tools available to the rural livestock farmers include mobile phones, radio, television, and the internet. Information and communication technology (ICT) tools play vital roles in livestock production. This also aligns with previous studies that highlight the effectiveness of radio as a tool for rural communication (Bishta, Sahb and Rautc, 2014). Radio is accessible, affordable, and widely available, making it a preferred medium for agricultural extension and development campaigns (FAO, 2014). The high percentage of phone usage suggests that mobile technology plays a significant role in information dissemination this agreed with Aker and Mbiti (2010) who stated that mobile phones improves access to agricultural and development-related information in Africa.

The use of the internet is notably low, with only 4.8% of respondents in Jigawa State and 0.6% in Nasarawa State reporting it as a source of information. Similarly, social media platforms like Facebook and WhatsApp were only mentioned in Jigawa State with low usage rates (3.9% and 5.9%, respectively). These findings indicate low or limited digital literacy in these areas. Research by GSM Association [GSMA] (2021) notes that internet usage in rural Africa remains constrained by poor network infrastructure, affordability issues, and digital skills gaps.

Table 2: Sources of Information (Social Media) on the Activities of the PATTEC Project in Jigawa and Nasarawa states

Sources of Information (Social M	Jigawa		Nasarawa	
	Frequency	Percentage	Frequency	Percentage
Television	35	9.9	0	0
Radio	316	99.0	319	99.7
Phone	319	99.6	320	100.0
Internet	17	4.8	2	.6
Facebook	14	3.9	0	0
Whatsapp	21	5.9	0	0

Source: Field Survey, 2025

Institutional Sources of Information on the Activities of the PATTEC Project in Jigawa and Nasarawa States

The results presented in Table 3 showed that Jigawa, respondents receiving information from veterinary doctors (100%), extension agents (100%), cooperative societies (100%), and village heads (100%). In Nasarawa State, key sources of information included extension agents (100%), cooperative societies (100%), and village heads (100%). The high level of responses in Jigawa states can be attributed to the PATTEC project being a fully funded initiative, supported by international development partners such as the World Bank (WB), African Development Bank (AfDB), Food and Agriculture Organization (FAO), World Health Organization (WHO), African Heads of Government (AHG), and the International Atomic Energy Agency (IAEA), among others. Jigawa, as the pilot state, received special attention and substantial resources, including incentives to encourage full participation; however, the high engagement in Nasarawa indicates that the project's institutional support and communication channels were equally effective there.

These findings also emphasize the importance of effective stakeholder collaboration in information dissemination. Multi-stakeholder approaches in agricultural extension have been shown to improve access and adoption of innovations, as highlighted by Swanson and Rajalahti (2010). In line with this, Musharraf et al. (2016) observed that farmers prefer receiving information from multiple sources, including neighbours, television, experienced farmers, radio, input dealers, newspapers, local extension agents, and farm labourers. The high usage of institutional sources in both states reflects the successful integration of these multi-source information channels, reinforcing the significance of coordinated stakeholder involvement in the PATTEC project

Table 3: Source of Information (Institutional) on the Activities of PATTEC project in Jigawa and Nasarawa States

Sources of Information (Institutional)	Jigawa		Nasarawa	
	Frequency	Percentage	Frequency	Percentage
PATTEC	320	100	0	0
Veterinary Doctor	320	100	318	99.4
Extension	320	100.0	320	100.0
Corportative society	320	100.0	320	100.0
Village Head	320	100.0	320	100.0
Workshops	315	98.4	253	75.0
Traders	316	99.0	256	80.0
Research institution	316	99.0	253	79.0
NGOs	311	97.2	240	75.0

Source: Field Survery, 2025

Level of Participation of Cattle Rearers in PATTEC Project

Table 4 presents the result of the participation of cattle rearers in various activities. The highest participation level was observed in training on appropriate clothing for tsetse fly-infested areas, with 69.7% of respondents reporting high participation and mean score of 2.67 probably because those farmers understood that they need to protect themselves from tsetse and trypanosomiasis disease first before their herds.

This result also suggests that simple, low-cost interventions requiring minimal behavioral change is more readily adopted (Chadenga, 2018). The majority of respondents (57.3%) reported low participation in cattle screening for treatment and a mean score of 1.64. This low engagement could be attributed to factors such as limited access to veterinary services, or financial constraints. Study indicates that successful disease control programmes require active participation from livestock owners (Dione, Traoré, Kassambara, Sow, Touré, Sidibé and Fall, 2019).

The study further revealed that training and retraining with a mean score of 1.90. About 40.5% of the cattle rearers had high participation in training programmes, while 50.6% had low participation. This suggests that while some cattle rearers understood the importance of training, a significant portion remained disengaged. According to Akinwumi (2019), knowledge transfer through training is crucial for disease control and improving livestock management.

The farmers participated in breeding of trypanosomiasis-resistant cattle was moderate, with 42.3% reporting high involvement. The mean score was 1.92. The adoption of resistant breeds is a recommended strategy for mitigating the effects of trypanosomiasis, but barriers such as cost, knowledge and awareness, cultural and social factors, institutional and policy factors, environmental and ecological factors and availability of such breeds may hinder wider adoption (FAO, 2016). Only 39.7% of the respondents reported high participation in the construction of traps for tsetse fly with a mean score of 1.89. This aligns with findings from Rivera, Arrivillaga, Juárez, De Urioste-Stone, Berganza and Pennington (2023), which suggest that adoption of vector control measures requires sustained community engagement and support from extension services.

Training on the use of treated nets had a mean score of 1.98 while use of insecticides had a mean score of 1.87. However, the effectiveness of these measures depends on sustained awareness campaigns and accessibility (Torr, 2015). Surveillance activities had the lowest participation, with 67% of respondents indicating low involvement. Effective surveillance is critical for early disease detection, but low engagement could be due to a lack of awareness or logistical challenges (Meckawy, Stuckler, Mehta, Al-Ahdal and Doebbeling, 2022).

Table 4: Level of Participation of Cattle Rearers in PATTEC Project

Variae	High (%)	Moderate (%)	Low (%)	Mean Score
Training on the types of clothes to use in tsetse fly areas	219(69.7)	84(26.3)	13(4.0)	2.67
Training on the use of treated net for human protection	120(37.5)	40(12.5)	160(50.0)	1.98
Rearing trypanosomiasis resistant breed	135(42.3)	25(7.7)	160(50.0)	1.92
Training and retraining activities	130(40.5)	29(8.9)	161(50.6)	1.90
Construction and use of traps for trapping tsetse flies	127(39.7)	31(9.7)	162(50.6)	1.89
Training on the use of insect repellent to repel tsetse flies	121(37.0)	37(11.7)	162(50.6)	1.88
Training on the use of insecticide to kill tsetse flies	120(36.7)	36(11.6)	164(50.6)	1.87
Clearing bushes around human and animal houses	91(28.5)	53(16.6)	176(54.9)	1.74
Cattle screening for treatment	69 (21.7)	67 (20.9)	184 (57.3)	1.64
Training on the surveillance activities	27(8.4)	79(24.6)	214(67.0)	1.41
Public campaign and sensitization	21(6.5)	55(17.4)	244(76.1)	1.30

Source: Field Survey, 2025.

Constraints Militating Against PATTEC Productivity by Rearers in Jigawa and Nasarawa States

The result in Table 5. Showed the constraints affecting cattle rearing. In Jigawa State conversion of cattle routes to crop fields (66.6%), tsetse and trypanosomiasis (65.9%), and limited access to finance (65.6%). In Nasarawa State high transportation costs (65%), cost and unavailability of vaccines (63%), bad leadership of cooperative groups (63%), and migration/movement issues (62%). Across both states included lack of quality feeds (50%), water scarcity in the dry season (50%), herder-farmer clashes 59.4% in Jigawa State 38% in Nasarawa State. cattle rustling 60.9% in Jigawa State 41% in Nasarawa State, and poor insurance coverage (44.1% in Jigawa State 43% in Nasarawa State. Less frequently reported challenges included poor market access 14.1% in Jigawa State 11% in Nasarawa State and lack of adequate government support 16.9% in Jigawa State 16% in Nasarawa State. The high proportion of respondents reporting *tsetse and trypanosomiasis* in Jigawa aligns with previous studies identifying African animal trypanosomiasis as a persistent challenge in Nigerian livestock systems, leading to reduced productivity and increased herd mortality (Shaw *et al.* 2015). This finding is consistent with the study, which showed that shrinking grazing lands in Nigeria and the Sahel region, intensified farmer–herder conflicts and undermined pastoral mobility (Blench, 2017; Turner, 2021). Limited grazing access exacerbates feed shortages and increases the risk of violent clashes with farming communities.

Security-related issues, such as cattle rustling and farmer–herder conflicts, were also reported as major concerns. The prevalence of cattle rustling 61% in Jigawa State and 41% in Nasarawa State

underscores the rising insecurity facing pastoral communities. These findings mirror reports highlighting how rustling and rural banditry disrupt cattle production, reduce herd sizes, and discourage investment in improved husbandry practices (Okoli and Okpaleke, 2014; Fasona et al., 2020). The findings show that the challenges facing livestock production in Nigeria is multifaceted.

Table 5: Constraints Militating Against Cattle Rearing Activities in Jigawa and Nasarawa States

Variable	Jigawa State		Nasarawa State	
	Frequency	Percentage	Frequency	Percentage
Tsetse and Trypanosomiasis diseases	211	65.9	108	34
Herder's farmers clash	200	62.5	120	38
Cattle rustling	190	59.4	130	41
Water scarcity in the dry season	160	50.0	160	50
Conversion of cattle routes to crop fields	213	66.6	100	31
Lack of quality feeds	160	50.0	160	50
Poor cattle management practices	180	56.3	118	37
Poor market	45	14.1	34	11
Lack of adequate veterinary services	150	46.9	170	53
Cost and lack of vaccine	116	36.3	200	63
Access to capital/credit/finance	210	65.6	109	34
Migration from one place to another	105	32.8	198	62
Poor extension services	79	24.7	50	16
Poor Insurance of cattle	180	56.3	140	44
Bad leadership of the cooperative group	101	31.6	201	63
Transportation cost of cattle for sales to far places	110	34.4	209	65
Lack of infrastructure, such as housing, electricity, etc.	200	62.5	115	36
Lack of adequate government support for cattle rears	51	15.9	50	16
Pest and diseases of cattle, e.g., foot and mouth, brucellosis, bovine tuberculosis, bluetongue, etc.	186	58.1	130	41
Seasonal feed shortages (natural grasses, crop residues)	175	54.7	140	44

Source: Field Survey, 2025

(Multiple responses recorded)

CONCLUSION

The study concludes that cattle rearers in Jigawa and Nasarawa States are predominantly male, with an average age of about 47 years, mostly married, and largely without formal education. They possess substantial experience in cattle rearing, averaging 28 years, with mean household sizes of 8 in Jigawa and 12 in Nasarawa. The average annual income of cattle rearers was ₦3,028,393.10 in Jigawa State and ₦2,282,368.75 in Nasarawa State.

The study revealed social media sources of information in both states radio and telephone were the most widely used sources of information. In Nasarawa State 99.7% used radio, while 100% used telephone. Similarly, in Jigawa, 99.0% of respondents' relied on radio, while 99.6% used

telephone for communication. Furthermore, the study revealed that in both Jigawa and Nasarawa States, institutional sources of information showed exceptionally high accessibility and utilization. In Jigawa, respondents reported receiving information from veterinary doctors (100%), extension agents (100%), cooperative societies (100%), and village heads (100%). In Nasarawa State, key sources of information included extension agents (100%), cooperative societies (100%), and village heads (100%). The result of the analysis also revealed that the highest level of PATTEC project participation that has the highest mean score is the participation in training on the use of clothing in tsetse infested environment with mean score of 2.67 followed by training on the use of treated net for protection with mean score of 1.98 and the use of trypanotolerant breed of cattle with mean score of 1.92.

The study further revealed that the major constraints faced by cattle rearers in the study area were conversion of cattle routes to crop fields, Tsetse and Trypanosomiasis diseases, Access to capital/credit/finance, Lack of infrastructure, such as housing, electricity, cost and lack of vaccine, transportation cost of cattle for sales to far places, farmers herders clashes, cattle rustling, water scarcity in the dry season, lack of adequate veterinary services, and poor cattle insurance etc. The study revealed that the major constraints faced by cattle rearers in the study area were conversion of cattle routes to crop fields, Tsetse and Trypanosomiasis diseases, Access to capital/credit/finance, Lack of infrastructure, such as housing, electricity, Cost and lack of vaccine, Transportation cost of cattle for sales to far places, farmers herders clashes, cattle rustling, water scarcity in the dry season, lack of adequate veterinary services, and poor cattle insurance etc.

Recommendations

1. Based on the socioeconomic characteristics of farmers in both states, the study revealed that farmers 'have lower levels of education therefore, study recommended that the government should establish adult education programs in the States or strengthen existing ones, as education is key to the adoption of technologies.
2. The study recommended that extension services, training programmes and sensitization campaigns should be strengthened by government and funding agencies of PATTEC to improve participation in different PATTEC project activities.
3. Financial and institutional support should be provided by government and PATTEC project sponsors to enhance active involvement in PATTEC activities.
4. Radio and television should be used in dissemination of information to farmers in PATTEC project activities.

5. Institutional sources of information such as veterinary doctors (100%), extension agents (100%), cooperative societies (100%), and village heads (100%) should also be used in the dissemination of information on PATTEC activities to farmers

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