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Influence of Agricultural Extension Services on Food Production among Rural Farmers in Cross River State

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Abstract

This study focused on influence of agricultural extension services on food production among rural households in Cross River State (CRS), Nigeria. Specifically, it determined ways: training and supervision services influence food production among rural farmers, in Cross River State. Two null hypotheses were tested at 0.05 level of significance. Survey design was employed. Population comprised 550 respondents (500 farmers and 50 extension agents). Data were gathered using questionnaire. Mean, standard deviation, and t-test were used for the data analysis. Results reveal 15 ways agricultural extension training services improved food production among rural farmers in CRS, ($\overline{X} \geq 2.50$). These include, among others, increased livestock production ($\overline{X}_g = 3.03$) and adoption of early-maturing varieties ($\overline{X}_g = 3.13$). Other results are 12 ways extension supervision improved food production, including; timely adoption of recommended practices ($\overline{X}_g = 3.29$), improved harvesting practices ($\overline{X}_g = 3.07$) and others. There were no significant differences between the mean scores of the farmers and the extension agents at 0.05 level of significances for all the items. Consequently, the two null HOs were accepted at this level. Five recommendations were made based on the findings.

Keywords: Agricultural extension, Food production, Rural farmers, Training, Supervision.

Introduction

Agriculture continues to be a central pillar of Nigeria's economy, sustaining the livelihoods of a vast rural population while contributing significantly to national food supply and poverty alleviation (Ujah & Ibe, 2025). However, despite its importance, the sector struggles with low productivity, widespread food insecurity, and increasing vulnerability to climate-driven shocks (Food and Agriculture Organization [FAO], 2024). A vital mechanism for enhancing agricultural outcomes is the provision of robust agricultural extension services, which

deliver technical guidance, innovation transfer, and capacity-building to farmers, enabling the adoption of improved practices, enhanced inputs, and sustainable farming methods (National Agricultural Extension Research Liaison Services [NAERLS], 2023; Rivera & Sulaiman, 2009).

Extension operates as a system that links farmers, research and development institutions, and markets, enabling farmers to access knowledge, improved crop varieties, climate-smart practices, pest management strategies, post-harvest technologies, and market information (Swanson & Rajalahti, 2010; Anderson & Feder, 2007). In principle, extension should facilitate the translation of agricultural research into practical, scalable improvements at the farm level, thereby contributing to improved food production, rural incomes, and food security (Yohannes & Berhanu, 2022).

In Nigeria, however, the delivery of extension services remains severely constrained. While FAO recommends an extension agent-to-farmer ratio of approximately 1:400 to 1:1,000 for effective coverage, recent reports indicate that many states operate at ratios of 1: 5,000 to 1: 10,000 (Guardian Nigeria, 2024; AgroCentric, 2025). Inadequate funding, shortage of skilled personnel, weak supervision mechanisms, poor infrastructure, and limited outreach capacity have undermined the reach and effectiveness of extension services (NAERLS, 2023; Olawuyi & Ogunlade, 2022). As a result, millions of smallholder farmers remain unreached, unable to benefit from modern agricultural technologies and practices, contributing to persistently low agricultural productivity and food insecurity across rural Nigeria (*BusinessDay*, 2024).

The situation in Cross River State exemplifies the challenges of inadequate training and supervision of farmers, and this affects their productivity (CRS-ADP, 2024). Despite interventions by the Cross River State Agricultural Development Programme (CRS-ADP), in collaboration with the Ministry of Agriculture and development partners, many rural households remain dependent on traditional, rain-fed agriculture, with limited access to improved seeds, mechanisation, credit, storage facilities, or extension support (Federal Ministry of Agriculture and Rural Development & TASAI, 2020; FAO, 2024). Programmes targeting cassava transformation, rice and maize value-chains, soil fertility management, and mechanisation have been implemented, but adoption remains uneven, especially among remote and marginalised communities (CRS-ADP, 2024).

It is necessary to investigate issues relating to agricultural extension training and services and rural farmers in the area including ways these services influence food production. Training refers to structured programmes aimed at equipping farmers with skills in crop management, climate-smart agriculture, pest control, value addition, and market access delivered through field demonstrations, farmer field schools, workshops, and advisory services (FAO,

2024; Rivera & Sulaiman, 2009). Supervision involves continuous follow-up and technical support by extension agents, ensuring correct application of training content, monitoring progress, providing feedback, and offering farm-specific technical solutions (Yohannes & Berhanu, 2022). Food production represents the output of agricultural activities, including yields, livestock output, crop diversification, and post-harvest handling, which ultimately influences household nutrition, income, and food security (Chikaire, et al 2015, World Bank, 2025). A study on the influence of extension training and supervision on food production among rural households, is expected to provide evidence-based insights to inform improved extension delivery, policy reforms, and agricultural development strategies.

Purpose of the study

This study focused on agricultural extension services and food production among rural households in Cross River State, Nigeria. Specifically, it determined ways food production is influenced by the following agricultural extension services among rural households in Cross River State:

1. training services
2. supervision services

Hypotheses

The following HOs were tested at 0.05 level of significance:

There are no significant differences between the mean responses of farmers and agricultural extension agents on ways food production is influenced by the following agricultural extension services among rural households in Cross River State:

HO_1: training services

HO_2: supervision services

Methodology

***Research Design*:** The study adopts a survey research design.

***Area of Study*:** This study was conducted in the Southern Senatorial District of Cross River State, Nigeria. This is an agriculturally vibrant region comprising seven local government areas. The zone lies within the tropical rainforest belt, with favourable climatic conditions, abundant rainfall, fertile soils, and dense vegetation, supporting year-round farming. Agriculture is the primary livelihood in the area, with most residents engaged in smallholder farming.

***Population of Study*:** The population of this study consisted of 550 individuals, made up of two distinct groups: 500 registered rural farmers and 50 agricultural extension service agents across the seven Local Government Areas (LGAs) of Southern Senatorial District of Cross River State (Cross River State Agricultural Development Programme {CRS-ADP}, farmer cooperatives, and local agricultural registers as of 2023 {CRS-ADP Records, 2023}). The farmers also varied in terms of age, educational background, and farm sizes, reflecting the demographic and socioeconomic diversity of rural agricultural households in the state. The agents were distributed across

the seven LGAs according to their operational zones. They were responsible for delivering training, advisory, and supervisory services to farming communities.

***Sample of the Study*:** The sample of the study was 150 respondents, consisting of 135 rural farmers and 15 agricultural extension agents. The total sample size was determined using Yamane's formula (1967). Only those farmers who had benefited from extension training and supervision services within the past five years were purposively selected. A total of 15 agricultral extension agents were also purposively selected from 50 CRS-ADP staff across the LGAs. Only those agents who were directly involved in farmer training and supervision services and who had at least three years of field experience were selected.

***Instrument for Data Collection*:** The instrument for data collection was a structured questionnaire. It was developed based on study objectives review of relevant literature. It contained 28 items that covered the specific objectives of the study. The instrument had a five-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire was validated by three university experts in agricultural extension and rural development. Reliability of the instrument established based on data collected through pilot study 30 respondents from outside the area of the study and use of Cronbach's Alpha technique on coefficient of 0.87 obtained using showing high internal consistency of the instrument for the main study.

***Data Collection Technique*:** A total of 150 copies of questionnaires were distributed by hand to the two groups of respondents: rural farmers (135 copies) and agricultural extension agents (15 copies). Four trained research assistants were involved. The entire 150 copies of questionnaires were retrieved. This was a 100 percent return.

***Method of Data Analysis*:** Mean and standard deviation, were used for data analysis. Based on the five-point scale on the instrument, a benchmark mean score of 2.50 was set for decision-making. A mean score of ≥ 2.50 or above was interpreted as "Agreed," while a mean score below ≤ 2.50 was considered "Disagreed." Grand means were computed for each item to determine the overall perception across both groups. t-test was used to test the hypotheses at 0.05 level of significance.

Results

Table 1: Mean Responses, Standard Deviation and t-test Results on Ways Agricultural Extension Training Programmes Improved Food Production among Rural Farmers in CRS

S/N	Influence of Training	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_g$	t	P	D
1	Increased crop yields per hectare	2.66	1.18	2.83	1.25	2.75	-0.5024	0.6161	148
2	Increased livestock production	3.06	1.17	3.00	1.30	3.03	0.1712	0.8643	148
3	Expansion of cultivated farmland	2.87	1.12	3.00	1.08	2.94	–0.4406	0.6601	148
4	Enhanced access to inputs and technologies	2.98	1.01	2.96	1.12	2.97	0.0662	0.9473	148
5	Reduction in post-harvest losses	2.85	1.08	2.92	1.19	2.89	–0.2181	0.8277	148
6	Year-round farming through irrigation	3.01	1.14	3.10	1.07	3.06	–0.3070	0.7593	148
7	Diversification of food crops grown	3.10	1.12	3.21	1.16	3.16	–0.3496	0.7271	148
8	Higher seed germination and crop survival rates	2.85	1.13	2.88	1.10	2.87	–0.0999	0.9206	148
9	Increased use of organic & inorganic fertilisers	2.80	0.96	2.86	1.02	2.83	–0.2174	0.8282	148
10	Adoption of early-maturing varieties	3.15	0.95	3.10	1.04	3.13	0.1781	0.8589	148
11	Integration of agroforestry & crop-livestock systems	2.93	0.91	2.98	0.98	2.96	–0.1888	0.8505	148
12	Improved food storage & preservation methods	2.90	1.05	2.95	1.12	2.93	–0.1650	0.8692	148
13	Better market access & income generation	3.08	1.09	3.12	1.15	3.10	–0.1285	0.8979	148
14	Improved knowledge of climate-smart farming	2.96	1.07	3.01	1.14	2.99	–0.1621	0.8714	148
15	Strengthened farmer cooperative activities	2.91	1.02	2.97	1.08	2.94	–0.2052	0.8377	148

$\bar{X}_1$ = Mean of Farmers (150); SD_1 = Standard Deviation of Farmers; $\bar{X}_2$ = Mean of Agricultural Extension Agent (15); SD_2 = Standard Deviation of Agricultural Extension Agents; $\bar{X}_g$ = Grand Mean; t = t-test result; P = P-value results; Degree of Freedom (148)

Table 1 shows that all 15 items, both groups of respondent obtained mean scores greater than 2.50 ($\bar{X} \geq 2.50$), indicating 15 ways agricultural extension training services contribute positively to food production in the area of the study. The grand means ($\bar{X}_g$) for all items were also above the benchmark ($\bar{X} \leq 2.50$).

The Table also shows that there are no significant differences between the mean scores of the farmers and extension agents for each of the 15 ways at 0.05 level of significance. Consequently, the null hypothesis was uphelp for each cash item at the 0.05 level of significance.

Table 2: Mean Responses and Standard Deviation and t-test values ways Agricultural Extension Supervision Service Improve Food Production among Rural Farmers in Cross River State

S/N	Influence of Training	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_g$	t	P	D
1	Timely adoption of recommended practices	3.24	1.00	3.33	0.91	3.29	–0.254	0.800	148
2	Correct application of fertilisers and chemicals	2.69	1.18	2.80	1.03	2.75	–0.364	0.716	148
3	Higher germination and crop establishment rates	3.48	0.87	3.60	0.73	3.54	–0.748	0.455	148
4	Early detection and control of pests/diseases	3.20	0.94	3.28	0.85	3.24	–0.383	0.703	148
5	Improved harvesting practices	3.03	0.98	3.10	0.90	3.07	–0.281	0.779	148
6	Efficient use of farm inputs	2.91	1.12	3.00	1.05	2.96	–0.274	0.785	148
7	Consistent farm record-keeping	3.13	0.90	3.20	0.86	3.17	–0.354	0.724	148
8	Use of improved planting materials	2.92	1.19	3.00	1.11	2.96	–0.229	0.819	148
9	Introduction of better crop varieties based on farm conditions	3.10	1.05	3.20	1.01	3.15	–0.379	0.707	148
10	Improved soil and water management	2.87	1.12	2.95	1.02	2.91	–0.306	0.760	148
11	Identification and scaling of best practices	2.66	1.22	2.75	1.14	2.71	–0.312	0.755	148
12	Improved motivation and confidence of farmers	2.95	1.10	3.00	1.04	2.98	–0.148	0.882	148

$\bar{X}_1$ = Mean of Farmers (150); SD_1 = Standard Deviation of Farmers; $\bar{X}_2$ = Mean of Agricultural Extension Agent (15); SD_2 = Standard Deviation of Agricultural Extension Agents; $\bar{X}_g$ = Grand Mean; t = t-test result; P = P-value results; Degree of Freedom (148)

Table 2 shows that all the 12 items recorded mean scores above the benchmark ($\bar{X} \geq 2.50$), indicating that both rural farmers and extension agents generally agree that these are 12 ways agricultural extension supervision service influence food production. The grand means ($\bar{X}_g$) for all the 12 items also exceeded 2.50. The Table also shows that there are no significant differences between the mean reponses of the farmers and the extension agents for each of the 12 ways agricultural extension supervision services improve food production at 0.05 level of significance. Consequently, the null hypothesis was upheld at 0.05 level of significance.

Discussion

The findings of this study demonstrate that agricultural extension services play a pivotal role in enhancing food production among rural farmers in Cross River State. Table 1, with a grand mean of 2.97,

indicates that agricultural training programmes exert a substantial positive influence on various aspects of farm productivity. Specifically, training programmes were perceived to improve crop yields, increase livestock production, promote the adoption of early-maturing crop varieties, reduce post-harvest losses, and enhance farmers' access to inputs and technologies. These findings align with previous studies indicating that structured training interventions improve farmers' knowledge, promote the adoption of modern agricultural technologies, and increase farm productivity when effectively implemented (Adewale & Aremu, 2020; Nnadi et al., 2021; Yusuf & Okon, 2023; World Bank, 2023; Okeke & Musa, 2024). The t-test analysis further revealed no significant differences between farmers' and extension agents' perceptions, suggesting a shared consensus on the effectiveness of training programmes and highlighting the importance of consistency in extension messaging and outreach.

Table 2, with a grand mean of 3.08, reinforces the critical role of supervision by extension agents in enhancing food production. Supervision was found to facilitate the timely adoption of recommended practices, correct application of fertilisers and other inputs, higher crop germination and establishment rates, and improved farm record-keeping. These results corroborate evidence that continuous follow-up, technical guidance, and monitoring strengthen the effectiveness of extension services, improve farmers' decision-making, and reduce the risk of poor farm management (Caroline et al., 2020; Olawuyi & Ogunlade, 2022; FAO, 2022; Okeke & Musa, 2024). The alignment of farmers' and agents' perceptions, as indicated by non-significant t-test results ($p > 0.05$), underscores that supervision is widely recognised as a critical component of extension service delivery.

The findings from Tables 1 and 2 collectively demonstrate that well-coordinated training programmes, effective supervision, and integration of modern advisory technologies are essential for improving food production, enhancing farmers' technical capacity, and promoting rural food security in Cross River State. These results highlight the need for policy interventions that expand extension coverage, strengthen supervision systems, and ensure continuous capacity-building for both extension agents and farmers, in line with the recommendations of FAO (2022) and World Bank (2023). Additionally, the study confirms that the combination of training and supervision contributes not only to higher productivity but also to increased confidence among farmers in adopting modern agricultural practices, thereby fostering sustainable rural development.

Conclusion

The study examined ways agricultural extension training and supervision services, influence food production among rural farmers in the Southern Senatorial District of Cross River State.

The findings reveal that training services play a critical role in enhancing farmers' technical knowledge, practical skills, and overall farming competence. Through structured trainings, farmers gained better understanding of modern production techniques, improved agronomic practices, and efficient resource management strategies, all of which contributed to higher yields and improved productivity. Supervisory services further strengthened these gains by providing follow-up guidance that ensured farmers correctly applied newly acquired skills in their fields. Regular supervision also encouraged timely adoption of innovations, adherence to recommended practices, and early correction of mistakes that could undermine production.

Recommendations

Based on the study findings, the following measures are suggested to improve agricultural extension services and strengthen food production in Cross River State:

1. Organise regular, practical sessions (e.g., Farmer Field Schools, demonstrations) on crop diversification, irrigation, and post-harvest handling.
2. Tailor content to farmers' specific challenges, such as soil management, pest control, and market access, while actively including women and youth.
3. Ensure regular farm visits using structured checklists, with continuous technical guidance for timely adoption of innovations.
4. Provide mobility tools, materials, and refresher training to enhance supervision efficiency and reach.
5. Develop monitoring and feedback systems that document farmers' challenges and link them to research institutions for responsive solutions.

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