

ASSESSMENT OF AGRICULTURAL EXTENSION SERVICES AND ITS INFLUENCE ON POST-HARVEST LOSSES AMONG YAM FARMERS IN TARKA LGA OF BENUE STATE, NIGERIA.

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Abstract

Agricultural extension services are essential for improving yam production and reducing post-harvest losses in Tarka Local Government Area (LGA), Benue State. This study evaluated the nature of extension services provided to yam farmers and examined their effects on reducing post-harvest losses. Using a cross-sectional survey design, data were collected from 400 yam farmers through structured questionnaire and key informant interviews. Quantitative data were analysed using descriptive statistics, while qualitative data were subjected to content analysis. Findings revealed that extension services in Tarka LGA include technical training on planting, weeding, and post-harvest handling, provision of farm inputs, market information, and support for cooperative formation. These services improved harvesting practices, packaging, transportation, storage, and overall yam quality, contributing to reduced post-harvest losses. The study concludes that extension services positively influence yam production and post-harvest management, though coverage and consistency remain limited. Recommendations include regular farmer training, increased extension outreach, strengthened cooperative support, and improved access to inputs and market information to further enhance post-harvest loss reduction.

Keywords: Agricultural extension services, yam production, post-harvest losses, Tarka LGA, Benue State, Nigeria.

Introduction

Post-harvest losses of agricultural produce remain a major challenge affecting food security, farmers' livelihoods, and agricultural development across the world. A substantial proportion of food produced globally is lost after harvest due to poor handling, inadequate storage, pest infestation, and inefficient transportation systems. According to the Food and Agriculture Organization, nearly one-third of the food produced for human consumption annually approximately 1.3 billion tonnes is lost along the post-harvest chain (Food and Agricultural Organization (FAO), 2019). These losses significantly reduce food availability and contribute to global food insecurity, particularly in developing countries where post-harvest management practices are often inadequate (Ansah & Tetteh, 2016). Studies have shown that about 30–40% of agricultural produce intended for human consumption is never consumed due to losses occurring during harvesting, handling, storage, processing, and marketing (FAO, 2018; Ojiya, Andohol, & Doki, 2021). Consequently, reducing post-harvest losses has been identified as one of the most practical strategies for improving food availability and strengthening food security globally (Bourne, 2014; Tanye, 2016).

Yam (*Dioscorea* spp.) is one of the most important staple crops in tropical regions, serving as a major source of carbohydrates, vitamins, and income for millions of rural

households (Tanye, 2016). Despite its nutritional and economic importance, yam production is significantly affected by post-harvest deterioration. Research has indicated that approximately one-third of yam produced globally is lost due to spoilage, pest infestation, microbial infection, and poor storage practices (Zinash, 2014; FAO, 2017). In many tropical countries, between 30% and 40% of harvested yam tubers are never consumed due to damage and decay occurring during storage and distribution (Bourne, 2014). For instance, in Latin America, post-harvest yam losses have been estimated at about 31%, particularly in major producing countries such as Colombia and Brazil (FAO, 2017). Similarly, studies in Asia have reported storage losses ranging from 20% to 39.5% due to microbial spoilage and poor storage conditions (Fatty, Ode, & Ajir, 2021). In Sub-Saharan Africa, post-harvest losses of yam continue to pose a serious challenge to food availability and farmer income (Ali, Xia, Ouattara, Mahmood, & Faisal, 2021).

In Nigeria, which is widely recognised as the largest producer of yam in the world, post-harvest losses remain a significant agricultural and economic problem. It has been estimated that more than 10 million tonnes of yam are lost annually in the country due to poor storage, pest infestation, and inadequate post-harvest management practices (FAO, 2017). Empirical studies conducted in various parts of Nigeria have also indicated that substantial quantities of yam deteriorate during storage due to poor preservation techniques and lack of improved storage facilities (Adejo, 2017; Olayemi, Adegbola, Bamishaiye, & Awagu, 2012). These losses reduce farmers' income, weaken food security, and undermine the economic benefits derived from yam production.

One of the most effective approaches to reducing post-harvest losses in agriculture is the provision of effective agricultural extension services. Agricultural extension services facilitate the transfer of improved technologies, knowledge, and farming practices from research institutions to farmers, thereby improving productivity and post-harvest management (Swanson, 2018). Extension agents often educate farmers on improved harvesting techniques, pest control methods, storage technologies, and handling practices that can significantly reduce losses and enhance crop quality (Sheahan & Barrett, 2017). In many countries, extension programmes have introduced various post-harvest technologies such as improved storage structures, chemical treatments, and preservation techniques to prolong the shelf life of agricultural produce (Tyler, Kader, & Rolle, 2018). Through training, demonstrations, and advisory services, agricultural extension services therefore play a critical role in improving farmers' capacity to adopt better post-harvest management practices.

Benue State, popularly referred to as the "Food Basket of the Nation," is one of the leading producers of yam in Nigeria. However, despite the high level of yam production in the state, a substantial proportion of the harvested tubers is lost after harvest due to pest infestation, rodents, poor storage structures, and inadequate handling practices (Adisa et al., 2015; Veter & Bečvařova, 2014). Reports by the International Institute of Tropical Agriculture and the National Bureau of Statistics indicate that only about 43% of yam-harvesting households are able to sell a significant portion of their produce due to post-harvest deterioration (IITA, 2016; NBS, 2018). Several factors have been identified as contributing to these losses, including poor infrastructure, inadequate storage facilities, pest infestation, limited access to finance, and weak agricultural extension support (Mahmud & Idris, 2017; Shambe, 2017; Agbo, Ekele, & Amonjenu, 2016).

Tarka Local Government Area of Benue State is one of the major yam-producing areas where farmers depend heavily on yam cultivation for both subsistence and income generation. However, farmers in the area continue to experience considerable post-harvest losses which reduce their productivity and profitability. Although agricultural extension services are expected to provide farmers with the knowledge and technologies needed to minimise such losses, there is limited empirical evidence regarding the nature of extension services provided

to yam farmers and the extent to which these services influence post-harvest loss reduction in the area. This gap in knowledge makes it necessary to examine the role of agricultural extension services in improving post-harvest management among yam farmers.

Therefore, this study assesses agricultural extension services and their influence on post-harvest losses among yam farmers in Tarka Local Government Area of Benue State, Nigeria. Specifically, the study evaluates the nature of agricultural extension services provided to yam farmers and examines the effects of these services in reducing post-harvest losses of yam in the study area.

Research Questions

The following research questions were used

1. What is the nature of agricultural extension services provided to yam farmers in Tarka Local Government Area of Benue State?
2. What effects do agricultural extension services have on reducing post-harvest losses of yam among farmers in Tarka Local Government Area?

Research Objectives

The specific objectives of the study include to:

1. Evaluate the nature of agricultural extension services provided to yam farmers in Tarka Local Government Area of Benue State.
2. Examine the effects of agricultural extension services in reducing post-harvest losses of yam among farmers in Tarka Local Government Area.

Conceptual Clarification

Agricultural Extension Services

Agricultural extension services are structured systems through which farmers receive technical information, training, and support aimed at improving agricultural productivity, sustainability, and income (FAO, 2018). These services include demonstrations, field visits, workshops, advisory services, and dissemination of innovations in crop cultivation, pest management, soil fertility, and post-harvest handling (Rivera & Qamar, 2019). Scholars conceptualise agricultural extension as both a knowledge transfer mechanism and a link between research institutions and farmers, ensuring that modern agricultural practices are adapted to local contexts (Anderson & Feder, 2007). In Nigeria, extension services are delivered primarily through government agencies, non-governmental organisations, and private operators, although coverage is often constrained by limited personnel and financial resources (Ogunleye et al., 2020). In this study, agricultural extension services refer to the formal and structured provision of information, guidance, and support to yam farmers in Tarka Local Government Area aimed at improving post-harvest management practices and reducing losses.

Post-Harvest Losses

Post-harvest losses refer to the quantitative and qualitative reduction in the amount and quality of agricultural produce that occurs between harvest and final consumption (FAO, 2017). These losses may occur during harvesting, handling, transportation, storage, processing, and marketing due to factors such as pest infestation, microbial spoilage, poor storage facilities, and improper handling practices (Bourne, 2014; Tanye, 2016). Post-harvest losses not only reduce food availability but also diminish farmers' income and contribute to food insecurity, particularly in developing countries where storage infrastructure and post-harvest technologies are limited (FAO, 2018). In the context of this study, post-harvest losses refer to the deterioration, spoilage, or reduction in the quantity and quality of yam tubers after harvesting among farmers in Tarka Local Government Area.

Yam Farmers

Yam farmers are individuals or households engaged in the cultivation of yams (*Dioscorea* spp.) for subsistence or commercial purposes (Onwueme & Charles, 1994). Yam is a major staple crop in Nigeria and serves as an important source of food security, income, and employment for rural households (IITA, 2019). The productivity and profitability of yam farming are closely associated with the adoption of improved cultivation and post-harvest management practices, which are often promoted through agricultural extension services (Asiedu & Sartie, 2010). In this study, yam farmers refer specifically to smallholder farmers in Tarka Local Government Area of Benue State who depend on yam cultivation as a primary source of livelihood.

Nature of Agricultural Extension Services Provided to Yam Farmers

Extension is multidisciplinary. It combines educational methodologies, communication and group techniques in promoting agricultural and rural development. It includes technology transfer, facilitation, and advisory services as well as information services and adult education (Rivera, Qamar & Crowder, 2011). It is dependent for success on other agricultural development processes such as marketing and credit services, not to mention economic policy and physical infrastructure. In short, in this study, it is a function that is dependent for success on other factors which include other services and institutions. In many cases, its success depends on the ability to shift programme direction and development to stakeholders and programme users. No matter what the name of the system, approach or programme (cooperative extension, advisory services, special Programme for Food Security, technical assistance or technology transfer), the function remains that of extension: the transfer and exchange of practical information. At the same time, Mvuna (2017) states that extension is a political and organizational instrument utilized to facilitate development. Internationally, extension's institutional systems tend to differ from country to country, nonetheless, is very vital in farming operations.

Extension typologies/approaches generally, there are many models messages and types of extension activities, and several scholars have given messages of extension for illustrative review. This study views extension as generally (but not always) falling into 3 broad categories: diffusion or government-driven; participatory or demand-driven; and private or supply-driven, with the different systems or models falling under these three. According to Gêmo, Eicher and Teclerian (2015), many extension systems in Sub Saharan Africa (SSA) today are mixtures of these broad categories: Public, Commodity, Training and visit (T&V), Non-Governmental Organisation (NGO), Private sector and Farmer field schools (FFS). According to Oluwole and Onwubuya (2017), several approaches have been tested and adopted by countries in Africa to improve the technology dissemination agricultural messages to farmers on both production reductions in post harvest losses. Many extensions approach currently in use in The Nigeria and other SSA are combinations of these broad categorizations.

In The Gambia, Nigeria and so on approaches of agricultural extension range from the top-down commodity-based approaches of the pre-and post-independence to more participatory approaches (Lamin, *et al.*, 2021a). Specifically, the approaches that are still being used include the World Bank's Training and Visit (T&V), commodity, and participatory approaches and most recently farmer field schools (FFSs) in addition to innovative ICT based approaches which provide advice to farmers on-line and other approaches such as the promotion of mobile phones and community radio stations (Gêmo, *et al.*, 2015). However, like the case in Gambia, many farmers are not literate to adopt the innovative based approach but could come up with increased number of farmers' children being educated. These approaches are discussed below.

Agricultural extension services play a crucial role in improving farming practices, enhancing productivity, and reducing post-harvest losses. For yam farmers in Nigeria,

particularly in Benue State, the nature of these services determines their effectiveness in addressing key agricultural challenges (Mignouna *et al.*, 2014). Extension services provide farmers with technical knowledge, improved farming techniques, and market information, helping them maximize yield and reduce losses (FAO, 2019). However, the availability, accessibility, and efficiency of these services vary widely, influenced by factors such as funding, government policies, and infrastructural support. This literature review examines the nature of agricultural extension services available to yam farmers by exploring key sub-themes such as the structure of extension services, extension delivery methods, public and private sector involvement, credit facilities, marketing information and farm practices.

Agricultural extension services help bridge this gap by linking farmers to financial institutions and guiding them on loan applications and credit management (Onyeka, 2014). Extension officers play a vital role in educating farmers on available government credit schemes, such as the Central Bank of Nigeria's Anchor Borrowers' Program and the Agricultural Credit Guarantee Scheme Fund (IITA, 2018).

Despite these efforts, many farmers remain hesitant to take loans due to fears of repayment difficulties and lack of collateral. Studies have shown that only a small percentage of yam farmers benefit from formal credit facilities, limiting their ability to invest in mechanization and modern storage systems (Mignouna *et al.*, 2014).

Additionally, agricultural extension services assist in forming cooperative societies, which help farmers pool resources and collectively access credit (Asiedu, 2017). Cooperatives reduce the risk of default by providing group-based guarantees, increasing the likelihood of loan approvals from financial institutions (FAO, 2019).

Challenges remain in credit disbursement, including bureaucratic delays and mismanagement of funds. Some government-backed credit schemes fail due to poor monitoring and corruption, leaving many intended beneficiaries without the necessary financial support (Aidoo *et al.*, 2011).

To improve credit access, policymakers must enhance transparency in credit allocation and design more farmer-friendly loan terms. Agricultural extension officers must also strengthen their role in financial literacy training, ensuring that farmers are equipped with the knowledge to manage loans effectively (Opara, 2013).

Subsidies and grants can serve as alternative financial support for yam farmers. Some international organizations provide funding for rural farmers, but awareness about these opportunities remains low, necessitating improved extension outreach (IITA, 2018).

Incorporating digital financial services into agricultural extension could also facilitate easier access to credit. Mobile banking and digital loan platforms can help farmers bypass traditional banking barriers, providing faster and more convenient loan disbursement (FAO, 2019).

Ultimately, improving credit access through agricultural extension services will enable yam farmers to enhance production, adopt better post-harvest management techniques, and reduce financial losses.

Marketing Information for Yam Farmers: Market information is a vital aspect of agricultural extension services, helping yam farmers make informed decisions about pricing, demand trends, and supply chain logistics. Access to timely and accurate market data can significantly reduce post-harvest losses by ensuring that farmers sell their produce at optimal prices and avoid overproduction (Mignouna *et al.*, 2014).

Agricultural extension services facilitate market linkages by providing farmers with price trends, buyer preferences, and export opportunities (FAO, 2019). Traditional methods of market information dissemination include extension officers conducting market surveys and providing periodic reports to farmers (Onyeka, 2014). However, the rapid growth of digital technologies has transformed market information access. Mobile apps, SMS-based updates,

and online agricultural platforms allow farmers to receive real-time price alerts and weather forecasts, helping them plan their sales more effectively (IITA, 2018).

Effects of Agricultural Extension Services to Yam Farmers in Reducing Post-harvest Losses

Yam farmers have been given little attention with regards to appropriate extension and research, and the situation is still similar today. Extension of inappropriate services often results in the lost chance of essential capacity building opportunities. Research therefore, emphasizes the important role of capacity building where farmers are taught good farming and handling practices (Gebrehiwot, 2015). In turn, the agricultural extension services units have been providing entrepreneurial training and advice to commercial farmers to enable them to move up the value chain while providing smallholder farmers technical, financial and marketing information, and assistance to help them make good decisions to mitigate post-harvest losses. This assistance came in different forms ranging from training on post-harvest losses reduction strategies such as food processing, market linkages, access to credit facilities and research linkages.

According to Wossen, Alene, Abdoulaye, Feleke and Manyong (2019), biases inherent in attributing the effect of extension services on agricultural production mean that measured effects might result from pre-existing differences rather than the programme under evaluation. The effectiveness of the extension approach in enhancing capacity building, technological adoption and ultimately improved agricultural output depends on key factors relating to the extension method used, the governance, capacity and management structures of the extension approach, as well as underlying contextual factors such as the policy environment, market access, characteristics of beneficiary communities and weather conditions.

Christoplos (2016) opine that to understand what effect of agricultural extension on the rural household food security concerns, it is useful to consider the general objectives and approaches of agricultural extension. Christoplos (2016) further reiterate that evaluating the agricultural extension approaches is very complex because a wide range of factors influence agriculture output—including agro-ecological climate, availability and prices of inputs, market access, farm-and farmer-specific variables, and so on.

Finally, all of these factors, together with market access and weather conditions will determine the degree of adoption of techniques and final outcomes such as yields (for example, production per unit of land), income and empowerment (impact of ext). The review will aim to synthesize quantitative estimates of effectiveness of extension interventions relating to intermediate outcomes such as knowledge acquisition, adoption and diffusion of technology, and final outcomes such as agricultural yields, post-harvest losses, household income and food security status. Because of the diversity of local agro-ecological conditions and farming systems across, and even within, developing countries, the specific post-harvest technology, crops and management techniques recommended by extension programmes will be different depending on the local context and needs of the farmers (Adio, Yusufu, Kunle & Shehu, 2016).

According to many studies, farmers have been losing between 30% and 40% of the value of their yam before they reach the final consumer (Mignouna, *et al.*, 2014; Okoedo-Okojie & Onemolease, 2017; Ojiya, *et al.*, 2021). These losses are observed at harvesting, during packing, transportation, in wholesale and retail markets, and during delays at different stages of handling.

Conversely, sources of agricultural extension services exerted negative influence on the producers' capabilities to manage post-harvest losses. The result showed that increase in the number of sources of information decreases significantly ($p \leq 0.1$) the management capability of the producers in minimising PHLs. This implies that the ability to manage PHLs successfully does not depend primarily on multiple information sources, but to a large extent, on the quality of the information that is received. This assertion is supported by the submission of Adio *et al.*,

(2016) who alluded that majority of the farmers rely on informal sources of information from neighbours, friends and colleagues rather than from the extension workers. Thus, information from such informal sources could be conflicting and also counterproductive.

Despite all these developments in the agricultural extension sector, post-harvest losses continue to be a great threat in most developing countries such as The Gambia, Nigeria, and Benin. This according to Swanson *et al.*, (2014) is because agricultural extension in most developing countries are mainly focused on providing technical information to farmers such as, which varieties of seeds to use and how to control pests and diseases or make better compost; while relegating to the background vital components like those required to reduce post-harvest losses in farm yields. The study further highlighted the messages that agricultural extension services needs to pass to farmers on Post harvest losses that will enable farmers to generate and promote innovations, improve the management of farmer organizations and agribusinesses, and build alliances and networks of different groups and individuals along the value chain.

Diffusion of Innovations Theory

Understanding how farmers adopt new agricultural practices requires a theoretical explanation of how innovations spread within communities. The Diffusion of Innovations Theory, proposed by Everett M. Rogers, provides such an explanation by describing the processes through which new ideas, technologies, or practices are transmitted and adopted among members of a social system over time (Rogers, 2003). Within the context of yam production in Tarka Local Government Area, improved post-harvest management practices and agricultural extension services represent the innovations, while yam farmers constitute the group expected to adopt these practices in order to minimise post-harvest losses.

Rogers explains that the spread of innovations within a community depends on four major components: the innovation itself, the channels through which information about the innovation is communicated, the time required for adoption to occur, and the social system in which the innovation is introduced. Farmers tend to adopt innovations when they perceive them to offer clear advantages over existing practices and when the innovations are compatible with their farming conditions. Communication also plays an important role in this process. Information about improved practices may reach farmers through interpersonal interactions such as extension worker–farmer contacts or farmer-to-farmer discussions, as well as through mass media platforms including radio or other agricultural awareness campaigns. The cultural norms, relationships, and institutional structures within the community further influence how quickly and widely these innovations are accepted (Rogers, 2003).

Another key aspect of the theory is the innovation-decision process, which explains the stages individuals pass through before adopting a new idea or technology. Rogers (2003) describes five stages in this process: knowledge, persuasion, decision, implementation, and confirmation. Farmers first become aware of an innovation and seek information about how it works during the knowledge stage. After gaining awareness, they develop favourable or unfavourable attitudes toward the innovation during the persuasion stage. This is followed by the decision stage, where they choose either to adopt or reject the innovation. If adoption occurs, the innovation is applied in practice during the implementation stage. Finally, the confirmation stage involves evaluating the effectiveness of the innovation and deciding whether to continue its use.

The relevance of Diffusion of Innovations Theory to this study lies in its ability to explain how agricultural extension services facilitate the dissemination and adoption of improved post-harvest technologies among yam farmers. Extension agents serve as important channels through which farmers receive information and practical guidance on better harvesting, handling, and storage methods aimed at reducing yam losses. By analysing how farmers acquire knowledge, develop attitudes, and eventually adopt these practices, the study

provides insight into the role of extension services in improving post-harvest management and reducing losses among yam farmers in Tarka Local Government Area.

Methods

Research Design

This study adopted a cross-sectional survey design to collect data from yam farmers, extension agents, and cooperative leaders at a single point in time. This design allowed observation of adoption of agricultural extension services and post-harvest losses without influencing respondents.

Study Setting

The study was conducted in Tarka Local Government Area (LGA), Benue State, Nigeria, predominantly inhabited by Tiv people alongside Idoma, Igede, Hausa, Igbo, Yoruba, and Fulani settlers. Tarka covers 2,891 km² with ten council wards. Agriculture is the mainstay, with yam cultivation being a major occupation and cultural symbol. The prominence of yam farming and its contribution to household income justified selecting Tarka LGA as the study area.

Population

The population comprised yam farmers with at least three years of experience and exposure to post-harvest losses, along with extension agents and leaders of yam cooperative societies. The total yam farmer population was 2,023 (All Farmers Association, 2023).

Sample Size

Using Taro Yamane's (1967) formula with $N=2,023$ and $e=0.05$, the sample size was 400 respondents.

Sampling Technique

The study employed a multistage sampling technique. First, cluster sampling was used to group Tarka Local Government Area into three major clusters: Mbalahan, Mbachoughul, and Mbajir. Secondly, purposive sampling was applied to select four council wards—Tongov, Mbaayo, Mbanagber, and Shitile based on the intensity of yam farming activities. One village was further purposively selected from each ward (Asukunya, Agudo, Uchi, and Uvande). Finally, simple random sampling through balloting was used to select 100 yam farmers from each village, resulting in a total sample of 400 respondents. This procedure ensured adequate representation of yam farmers across the selected wards while reducing sampling bias.

Instruments of Data Collection

Data for the study were collected using structured interviews, focus group discussions (FGDs), and key informant interviews (KIIs). Structured interviews were administered to 400 yam farmers using both open- and closed-ended questions covering socio-demographic characteristics, causes of post-harvest losses, extent of adoption of agricultural extension services, effects of extension services, and challenges encountered in accessing them. In addition, eight FGDs were conducted, with 8–10 participants per group and separated by gender to encourage free participation. Furthermore, key informant interviews were carried out with four agricultural extension agents and eight leaders of yam cooperative societies to obtain in-depth and expert insights on extension service delivery and access constraints.

Validation

The study ensured face and content validity of the research instruments through expert review. Specialists in agricultural extension and social research examined the instruments for clarity, relevance, and alignment with the study objectives. Necessary corrections were made based on their recommendations. Test-retest reliability was conducted to determine consistency over time, and a reliability coefficient of 0.72 was obtained, indicating that the instruments were reliable.

Techniques of Data Analysis

Quantitative data were analysed using Statistical Package for Social Sciences (SPSS) version 23 and Microsoft Excel 16. Descriptive statistics such as frequencies and percentages were used to summarise the data, while inferential statistics were employed to test relationships. Linear regression analysis was used to assess the effect of agricultural extension services on post-harvest losses of yam, while chi-square analysis examined the challenges farmers encounter in accessing extension services. Qualitative data from FGDs and KIIs were analysed using content analysis, and findings from both quantitative and qualitative data were triangulated to strengthen the validity of the results.

Findings

Socio-demographic characteristics of respondents.

Analysis of socio-demographic characteristics of the respondents shows most of the respondents, 205 (58.2%), were within the age category of 41–50 years. The table also shows many of the respondents, 194 (55.1%), were male. The table again shows majority, 297 (84.4%), of the respondents were married. Most of the respondents, 309 (87.8%), were Christians. The table further shows that many of the respondents, 200 (56.8%), had 1–4 children. Lastly, the table shows most, 220 (62.5%), cultivated between 1–2 hectares and 205 (58.2%) had 10–20 years of yam farming experience.

Table 1: Socio-demographic characteristics of yam farmers

Variables	Frequency (352)	Percentages (%)
Gender		
Male	194	55.1
Female	158	44.9
Marital Status		
Married	297	84.4
Divorced	10	2.8
Widow(er)	36	10.2
Single	7	2.0
Separated	2	0.6
Age		
Below 30yrs	12	3.4
31-40yrs	101	28.7
41-50yrs	205	58.2
51-60yrs	20	5.7
61yrs and above	14	4.0
Number of Children		
None	110	31.3
1-4	200	56.8
5-8	42	11.9
Level of Education		
FSLC	102	29.0
Ordinary Level	152	43.2
Advanced Level	50	14.2
Degree	44	12.5

None	4	1.1
Religion		
Christianity	309	87.8
Islam	11	3.1
Traditional	20	5.7
None	12	3.4
Farm Size		
Below 1 Hectre	72	20.5
1-2 Hectres	220	62.5
3 Hectres above	60	17.0
Years of Yam Cultivation		
Below 10yrs	17	4.8
10-20yrs	205	58.2
21-30yrs	130	36.9

Nature of Agricultural Extension Services Provided for the Yam Farmers in Tarka LGA

The findings indicate that agricultural extension services provided to yam farmers in Tarka Local Government Area of Benue State mainly include input provision, technical training, and limited financial or organisational support. Some farmers reported receiving farm inputs such as fertilizers and herbicides through extension programmes, although the availability of these inputs is often irregular and insufficient to meet farmers' production needs. A number of respondents also indicated that extension agents provide technical training on improved planting techniques, weed management practices, and storage and preservation methods aimed at reducing post-harvest losses. In addition, a few farmers reported receiving training on yam processing techniques, which helps to extend shelf life and create opportunities for value addition. However, the findings further reveal that extension services also involve organisational support, where farmers are encouraged to form cooperatives in order to facilitate access to training, collective marketing, and potential financial opportunities. Despite these services, some farmers reported that extension support remains limited due to irregular visits, inadequate input supply, and insufficient financial assistance. The findings revealed that although agricultural extension services are present in the study area, the level of support provided to yam farmers remains uneven and insufficient to fully address production and post-harvest challenges.

Table 4: Nature of Agricultural Extension Services Provided for the Yam Farmers.

Category of Service	Nature of Service	Frequency (N=352)	Percentage (%)
Input Provision	Fertilizers	82	23.3
	Herbicides	170	48.3
	None	100	28.4
Technical Training	Planting technique	60	17.1
	Weeding techniques	80	22.7
	Storage and preserving techniques	80	27.7
	Processing techniques	50	14.2
	Post-harvest practices to reduce losses	82	23.3
Financial/Organizational Support	Encouragement to form yam farmers' cooperatives	252	71.6
	Information on micro-finance banks	100	28.4

Source: Field work 2024

Effects of Agricultural Extension Services on Yam Farmers in Reducing Post-Harvest Losses in Tarka LGA

The findings reveal that agricultural extension services have contributed to reducing post-harvest losses of yam among farmers in Tarka Local Government Area of Benue State. A considerable number of respondents reported that extension services helped them minimise losses during packaging and transportation through improved handling practices such as careful stacking, use of protective materials, and proper arrangement of yam tubers during loading. Some farmers also indicated that they benefited from extension advice on improved storage and preservation techniques, including better barn spacing, curing of harvested yams, and the use of local materials such as ash or botanical repellents to protect stored tubers from pests and rot. In addition, a smaller proportion of farmers reported improvements in yam size after adopting agronomic practices introduced through extension training, such as proper spacing, timely fertilizer application, and improved crop management. Overall, the findings revealed that agricultural extension services have had a positive effect on yam farmers by improving handling, storage, and production practices, thereby contributing to the reduction of post-harvest losses in the study area.

Table 6: Effects of Agricultural Extension Services on Yam Farmers in Reducing Post-Harvest Losses of Yam.

Extension Service Benefit	Frequency	Valid Percent
Reduce loss during packaging and transportation	162	46.0
Prolonging the shelf life of yam tubers	140	39.8
Improved/increased sizes of yams after the adoption of services	50	14.2
Total	352	100

Source: Field Work 2024

Discussion of Findings

Nature of Agricultural Extension Services Provided to Yam Farmers in Tarka LGA

The study revealed that agricultural extension services provided to yam farmers in Tarka Local Government Area include the provision of farm inputs, technical training, market information, and support for cooperative formation. Many respondents indicated that extension agents provide advice on improved farming practices such as proper planting methods, pest management, and post-harvest handling techniques. Some farmers also reported receiving information on storage and preservation practices as well as opportunities to access credit facilities and marketing channels through extension networks. However, the findings also show that these services are not evenly distributed among farmers, as some respondents indicated limited interaction with extension agents and irregular access to extension programmes.

These findings are consistent with earlier studies which highlight that agricultural extension services function primarily as channels for transferring agricultural knowledge and technologies to farmers. Mignouna et al. (2014) observed that extension services provide farmers with technical knowledge and improved farming practices that enhance productivity and reduce post-harvest losses. Similarly, FAO (2019) noted that extension activities such as demonstrations, field days, and farmer training programmes are effective approaches for disseminating improved agricultural practices to farmers. The findings therefore confirm that extension services play an important role in equipping farmers with the knowledge and practices necessary to improve production and reduce post-harvest losses.

Effects of Agricultural Extension Services on Yam Farmers in Reducing Post-Harvest Losses

The study further revealed that agricultural extension services have contributed positively to reducing post-harvest losses among yam farmers in Tarka Local Government Area. Farmers indicated that extension training helped them adopt improved packaging and transportation practices, which reduced physical damage to yam tubers during handling and movement to markets. Some respondents also reported adopting improved storage and preservation techniques such as better barn spacing, curing of harvested yam, and the use of local materials for pest control. Additionally, a smaller proportion of farmers linked extension training to improvements in yam size and quality through better agronomic practices such as appropriate spacing and fertilizer application. These improvements contribute indirectly to reducing post-harvest losses by increasing the durability and market value of yam tubers.

These findings support previous studies which emphasise the role of extension services in improving farmers' knowledge and adoption of technologies that reduce post-harvest losses. Ahungwa, Odiaka and Ahungwa (2021) found that access to agricultural extension services

significantly improves the capability of yam producers to minimise post-harvest losses. Similarly, Wossen et al. (2019) explained that agricultural extension services enhance farmers' productivity and management capacity through technological innovation and knowledge dissemination. In addition, Danso-Abbeam, Ehiakpor and Aidoo (2018) noted that extension services contribute to improved agricultural outcomes through technology transfer, human capital development, and improved access to markets. These findings therefore confirm that effective extension services play a crucial role in reducing post-harvest losses and improving the productivity and profitability of yam farmers.

Conclusion and Recommendations

The research revealed that agricultural extension services provided to yam farmers in Tarka Local Government Area include technical training, provision of farm inputs, market information, and advisory support on improved farming practices. The findings further indicate that extension services contribute to reducing post-harvest losses of yam through improved harvesting practices, better packaging and transportation methods, and the adoption of improved storage and preservation techniques. The study also revealed that extension services help farmers improve agronomic practices such as proper spacing and fertilizer application, which enhance the quality and durability of yam tubers. However, the findings also show that access to extension services among farmers is not uniform, as some farmers reported limited contact with extension agents and irregular extension activities. The study therefore concludes that although agricultural extension services play a significant role in improving farmers' knowledge and reducing post-harvest losses of yam, the coverage and consistency of these services remain limited in Tarka Local Government Area.

In the light of the findings and conclusions of this study, the following recommendations are made; farmers should be trained regularly on improved harvesting, handling, packaging, transportation, and storage techniques in order to further reduce post-harvest losses of yam. Government and agricultural agencies should strengthen extension service delivery by increasing the number of extension agents and ensuring regular visits to farming communities. Extension agents should also intensify field demonstrations and farmer training programmes to encourage the adoption of improved post-harvest management practices. Furthermore, extension services should strengthen farmers' access to market information, credit facilities, and cooperative organisations in order to enhance farmers' capacity to adopt improved production and post-harvest management technologies.

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