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HARNESSING INDIGENOUS FARMING KNOWLEDGE TO ENHANCE FOOD SECURITY AND LAND CONSERVATION IN MUBI NORTH LGA, ADAMAWA STATE, NIGERIA

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ABSTRACT

The study investigates the role of indigenous farming knowledge in conservation practices and sustainable food security in Mubi North LGA, Adamawa State. The research seeks to achieve through the following objectives, to assessed the extent to which indigenous farming practices contribute to conservation farming and examining their impact on food security. and **t**o investigate the contributions of indigenous farming knowledge toward achieving sustainable food security in Mubi North LGA, Adamawa State. Utilizing a mixed-methods approach, both primary and secondary data sourced were used, data were collected through structured questionnaires and interviews of randomly selected 349 farmers and 15 agricultural officials in Mubi North LGA of Adamawa State sample size were determined using Cochran's formula, Liker scale was employed for measuring respondents' perception and Descriptive statistics were used to summarize data, while hypothesis was tested using t-test analysis. Findings reveal a high awareness of indigenous techniques, particularly in soil preservation and crop diversity. A mean score of 4.47 highlights the effectiveness of traditional methods in restoring soil fertility, while a grand mean of 3.32 indicates farmers recognize the benefits of these practices for food safety and affordability. Notably, a t-test analysis indicates significant differences in perceptions between adopters and non-adopters of indigenous practices, emphasizing the positive effects on land conservation among those who adopt. The study concludes that indigenous farming knowledge plays a crucial role in enhancing agricultural sustainability and food security in the region. Recommendations include enhancing education and training for farmers, innovating traditional storage methods, and strengthening support networks to foster collaboration among stakeholders. This approach aims to leverage indigenous knowledge for sustainable agricultural practices that address both environmental challenges and community needs.

Keywords: Indigenous Farming Knowledge, Conservation Practices, Sustainable Food Security, Environmental Challenges

INTRODUCTION

Indigenous farming knowledge refers to the traditional agricultural practices, techniques, and wisdom that have been passed down through generations within local communities. In regions like Mubi North Local Government Area (LGA) in Adamawa State, Nigeria, this knowledge serves as a crucial foundation for sustainable agricultural practices. With the increasing challenges posed by climate change, food insecurity, and economic pressures, there is a growing recognition of the potential role that indigenous farming knowledge can play in promoting conservation farming practices and achieving sustainable food security. According to Osei et al. (2020), indigenous farming practices not only enhance resilience to environmental changes but also contribute significantly to local food systems, supporting the livelihoods of rural communities.

The importance of indigenous knowledge in agriculture is further underscored by its ability to foster sustainable practices that align with local environmental conditions. Indigenous methods such as crop rotation, intercropping, and organic fertilization enhance soil health and biodiversity, ultimately leading to improved agricultural productivity (Mwangi & Karanja, 2021). These traditional practices are particularly relevant in Mubi North LGA, where the local climate and soil conditions demand an adaptive approach to farming that prioritizes long-term sustainability over short-term yields. The region's reliance on subsistence farming makes it imperative to explore how these indigenous techniques can address pressing agricultural challenges and contribute to food security.

Furthermore, indigenous farming knowledge plays a vital role in preserving biodiversity and traditional ecosystems. Practices such as mixed cropping and agroforestry not only improve yields but also foster ecological balance, which is crucial for sustaining agricultural productivity (Adebayo et al., 2022). In Mubi North LGA, these practices can help combat the negative impacts of climate change, including soil degradation and reduced crop yields, thus ensuring food availability for the local population. The integration of indigenous knowledge into modern farming systems can create a synergistic approach that enhances resilience to environmental shocks while promoting sustainable food production.

Despite the potential benefits of indigenous farming knowledge, there are challenges to its continued practice, particularly the influence of modernization and globalization on agricultural practices. As noted by Moyo et al. (2019), the encroachment of industrial farming techniques threatens the relevance of traditional methods, leading to a decline in their use among younger generations. This generational shift poses a risk to food security and agricultural sustainability, as modern practices often overlook the ecological and cultural significance of indigenous techniques. Therefore, understanding the dynamics of this transition is essential for developing strategies that can effectively integrate indigenous practices into contemporary agricultural frameworks.

This study aims to explore the contributions of indigenous farming knowledge to conservation farming practices and sustainable food security in Mubi North LGA. By examining the extent to which these traditional practices are recognized and utilized, this research seeks to highlight their value in fostering resilience and sustainability in agriculture. In light of the pressing challenges faced by rural communities, it is essential to advocate for the preservation and enhancement of indigenous knowledge as a vital resource for achieving sustainable agricultural outcomes in the region.

Despite the recognized importance of indigenous farming knowledge in promoting sustainable agricultural practices, rural farmers in Mubi North Local Government Area (LGA), Adamawa State, face significant challenges in effectively utilizing these traditional techniques. The growing influence of modern agricultural practices, driven by industrialization and globalization, has led to a decline in the adoption and integration of indigenous knowledge systems. As a result, many farmers are increasingly relying on modern inputs and practices that may not be well-suited to the local environmental conditions, potentially compromising long-term agricultural sustainability and food security.

Furthermore, there is a lack of comprehensive understanding regarding the extent to which indigenous farming knowledge contributes to conservation farming practices. While some studies have highlighted the effectiveness of traditional methods in enhancing soil health, preserving biodiversity, and improving resilience to climate change, there is limited empirical data on how these practices are specifically applied in Mubi North LGA. This gap in knowledge restricts the ability to formulate effective policies and interventions that leverage indigenous techniques to address contemporary agricultural challenges.

Additionally, the awareness and understanding of indigenous farming knowledge among younger generations of farmers are diminishing, leading to a potential loss of valuable agricultural heritage. The neglect of traditional practices not only threatens food security but also diminishes the cultural identity and resilience of farming communities. Therefore, it is crucial to investigate the contributions of indigenous farming knowledge towards achieving conservation farming practices and sustainable food security in Mubi North LGA. By addressing these issues, this study aims to provide insights that can help integrate indigenous knowledge into modern agricultural systems and enhance the overall resilience and sustainability of farming practices in the region. The study seeks to achieved through the following Objectives, to determine the extent to which the use of indigenous farming knowledge contributes to the achievement of conservation farming practices in Mubi North LGA, Adamawa State and to investigate the contributions of indigenous farming knowledge toward achieving sustainable food security in Mubi North LGA, Adamawa State. To achieve these objectives the following research questions were set, what extent does the use of indigenous knowledge of farming lead to achievement of conservation farming in Mubi North LGA, of Adamawa state? And What are the contributions of indigenous knowledge of farming toward achieving sustainable food security in Mubi North LGA, of Adamawa state? the following Hypothesis was set; There is no significant difference in the mean ratings of farmers' perceptions regarding the contribution of indigenous farming knowledge to conservation farming practices between high adopters and low adopters in Mubi North LGA, Adamawa State.

MATERIALS AND METHODS

The study was carried out in Mubi North Local Government Area, Adamawa State, North-eastern Nigeria. The local government has over 45 villages (Adebayo, 2004), with numerous farms. It has a population of about 175,165 people (National Population Census, 2006) spread over 11 political wards. It lies on the west bank of the river Yedzeram (a stream that flow north into Lake Chad) and on the western flank at the foot of the Mandara mountain.

Mubi North Local Government Area covers a land mass of about 752.85km^2 (Adebayo, 2004). It is one of the twenty-one Local Government Area of Adamawa State and lies between latitude $9^0$26”1’ and latitude $10^0$10”1’ N and between longitude $13^0$11”00’ and $13^0$44”01’ E (ministry of land and survey Yola, Adamawa state). The entire town and its environs bordered with Maiha Local Government area on the south, Hong Local Government on the west, Michika Local Government on the north and Cameroon republic to the east (Adebayo, 1997).

Mubi local government area is made of four districts namely: Mubi which is the administrative centre (seat) of the local government area, mayo-bani, Ba’a and mijilu. It is made up of eleven wards which include: Yelwa, Sabon Gari, Kolere, Lokuwa, Vimtim, Digil, Bahuli, Muchalla, Mujilu, Betso, and Mayo-Bani. Mubi north local government area has a number of ethnic groups such as Gude Nzanyi, Fali, Kilba, Marghi, Kamwe(higi), Fulani and Mundang (Godo-godo) (Adebayo, 2004).

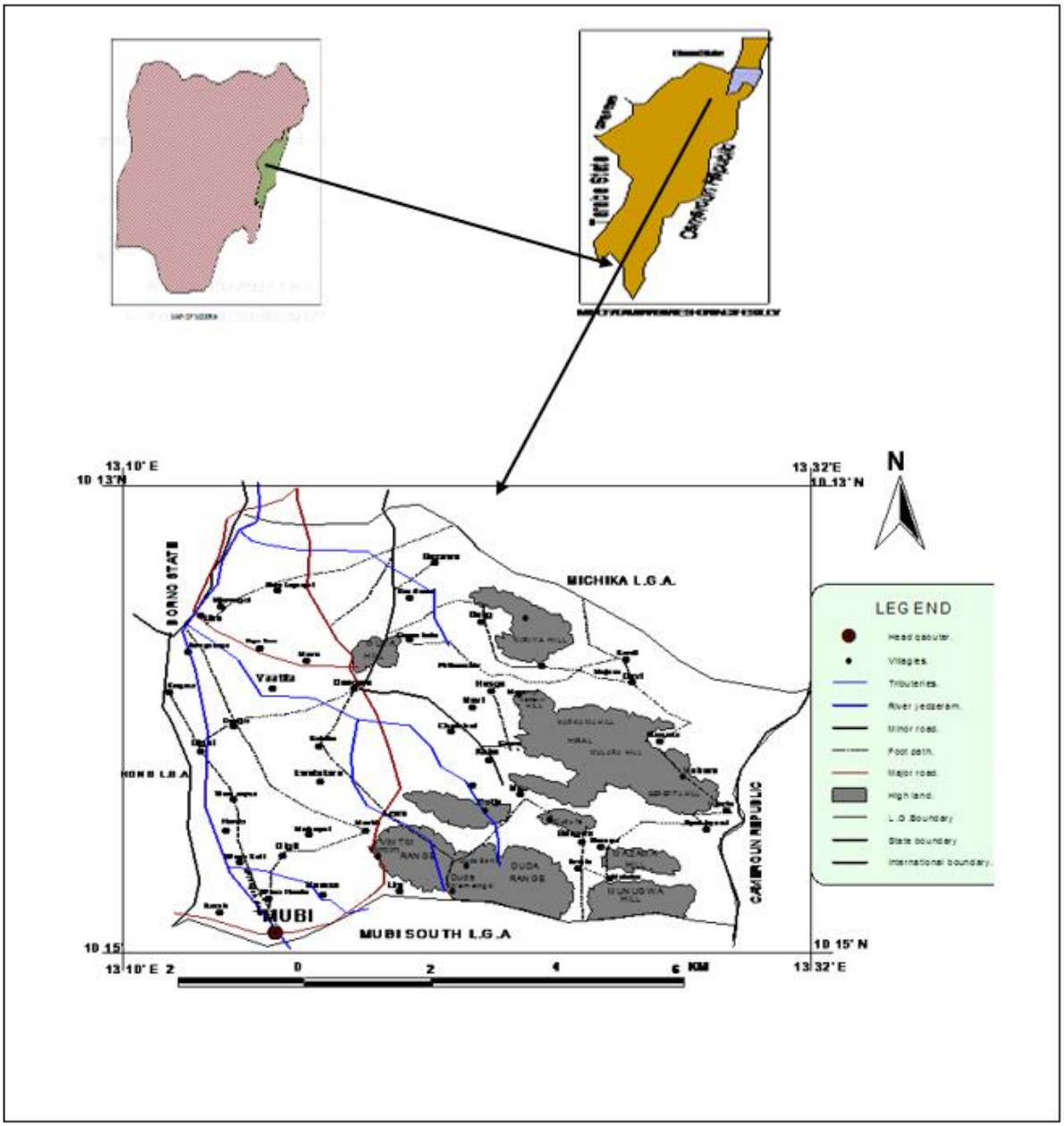

Figure 1: The Study Area
Source: Adebayo, 2004, modified by author

Both primary and secondary data were used for the study, primary data were gathered via questionnaires distributed to selected farmers, and interviews with staff from the State Ministry of Agriculture, AADP, and Fadama Group. Secondary data involves secondary information from existing sources, such as government publications and organizational records, were drawn from reports, books, and unpublished works from AADP, Fadama, and the Ministry of Agriculture. The study's population includes 3,459 farmers from Mubi North LGA, Adamawa State Sample Size and Sampling Techniques: A total sample of 364 individuals were selected, consisting of 346 farmers and 18 officials from agricultural extension services and ADP. The sample size for farmers were determined using Cochran's formula. Instrument for Data Collection: Data were collected using a structured questionnaire, divided into personal and research-related sections, as well as an interview guide. The Likert scale was employed for measuring respondents' perceptions. Data collection was managed by research assistants familiar within the region. The process involved administering questionnaires, conducting interviews, and observing farmland practices. Method of Data Analysis: Descriptive statistics were used to summarize data, and regression analysis were used to test hypotheses at a significance level of 0.05. Likert scale data were analysed based on weighted mean. Decision Rule: Hypotheses was rejected if the p-value is less than 0.05, and a weighted mean score above 2.5 will indicate agreement with survey items.

RESULTS AND DISCUSSION

Research Question 1

To what extent does the use of indigenous knowledge of farming lead to achievement of conservative farming in Mubi North LGA, of Adamawa state?

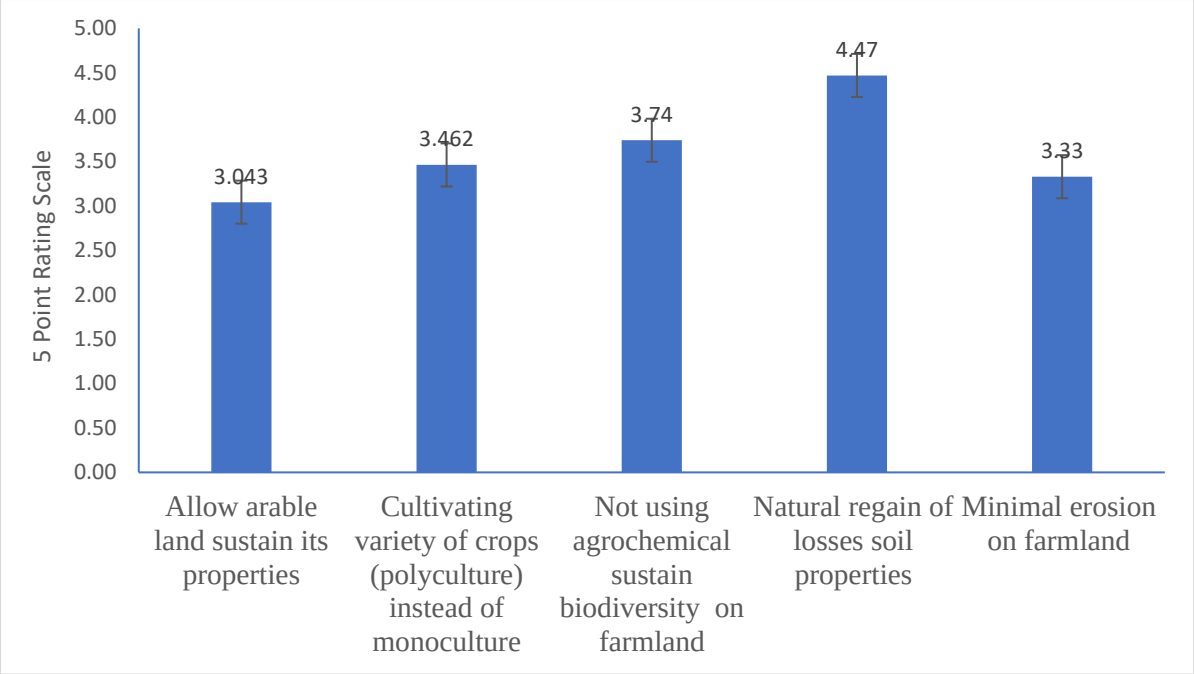

Figure 2: Farmers Perception on Contribution of Indigenous Farming Knowledge towards Conservation Farming Practices in Mubi North LGA, Adamawa State

The contributions of indigenous farming practices to conservation farming in Mubi North LGA, Adamawa State, are illustrated in Figure 2. The findings highlight several key benefits of these practices. First, indigenous farming methods have been shown to contribute significantly to the preservation of soil properties on farmlands, with a mean score of 3.04. This indicates that farmers recognize the role of traditional practices in maintaining soil health. Moreover, the cultivation of diverse crops is another prominent outcome of indigenous farming, as reflected by a mean score of 3.46. This diversity in crop production is vital for food security and resilience against pests and diseases, further underscoring the importance of indigenous knowledge in sustainable agriculture.

A particularly noteworthy finding is that the avoidance of agrochemicals through indigenous practices has a positive impact on biodiversity, with a mean score of 3.74. This suggests that farmers are aware of the ecological benefits of maintaining a diverse range of plant and animal life on their farms, which is crucial for the long-term health of the ecosystem. Additionally, indigenous farming techniques facilitate the natural recovery of depleted soil properties, achieving the highest mean score of 4.47. This strong endorsement reflects the effectiveness of traditional methods in restoring soil fertility without relying on external inputs. Finally, these practices also contribute to reducing soil erosion, as indicated by a mean score of 3.33. This suggests that farmers perceive indigenous methods as effective in minimizing erosion, thereby protecting the land from degradation. Overall, all the items in the figure received mean scores above 3.0, which is the neutral midpoint on the 5-point Likert scale. This indicates a positive perception among respondents regarding the contributions of indigenous farming practices to conservative farming in the study area.

Research Question 2

What are the contributions of indigenous knowledge of farming toward achieving sustainable food security in Mubi North LGA, of Adamawa state?

Table 2: Contributions of Indigenous Farming Knowledge toward Sustainable Food Security in Mubi North LGA, Adamawa State

Items	Mean (n=339)	Standard Deviation	Remark
Using traditional method of crop production can guarantee safety of peoples in term of food consumption since less chemical are usually used	3.24	0.15	Agree
Farm produces through indigenous farming practices are usually less in cost and affordable to many household	4.51	0.26	Agree
There is assurance that using traditional farming system could sustain the quality of food due to natural growing method	3.65	0.19	Agree
The traditional storage system could make the food items dependable and safe for consumption long after harvesting	1.96	0.31	Disagree
The nature of pest and disease control on farmland through indigenous farming enable farm produce to be safe for human consumption, even at harvesting period	4.53	0.26	Agree
Traditional farming methods have the potential to produce sufficient yields that can sustain the community throughout the entire year	2.03	0.11	Disagree
Grand Mean	3.32		Agree

The results presented in Table 2 highlight farmers' responses regarding the contributions of indigenous farming knowledge toward sustainable food security in Mubi North LGA, Adamawa State. The data indicate that most farmers agreed with the assertion that traditional crop production methods can ensure food safety due to minimal chemical usage (mean = 3.24, standard deviation = 0.15). Additionally, respondents unanimously supported the view that produce from indigenous farming practices tends to be less expensive and more affordable for many households (mean = 4.51; standard deviation = 0.26). Farmers also affirmed that traditional farming systems help maintain the quality of food due to natural growing methods (mean = 3.65; standard deviation = 0.19).

However, the respondents disagreed with the claim that traditional storage systems could make food items dependable and safe for consumption long after harvesting (mean = 1.96; standard deviation = 0.31). The assertion that indigenous pest and disease control methods contribute to the safety of farm produce at the time of harvest was strongly supported by the majority of farmers (mean = 4.53; standard deviation = 0.26). On the other hand, respondents expressed disagreement with the notion that traditional farming methods have the potential to produce sufficient yields to sustain the community throughout the entire year (mean = 2.03, standard deviation = 0.11).

The grand mean value of 3.32 suggests that overall, farmers recognize the benefits of indigenous farming practices in terms of food safety, affordability, and quality, but they express concerns about the effectiveness of traditional storage methods and the quantity of food produced through these approaches. This study's findings reinforce the notion that indigenous farming practices contribute to food sustainability, while also highlighting areas where improvements are needed. The findings from this study have strongly reiterated that indigenous farming practices play a crucial role in ensuring the safety, affordability, and quality of food in Mubi North LGA, Adamawa State. Farmers overwhelmingly agree that traditional methods of crop production, which rely on minimal chemical inputs, contribute to safer food that is fit for consumption. This natural approach to farming not only reduces the risk of chemical residues in food but also aligns with the preferences of households that seek affordable and nutritious produce.

Hypothesis one

There is no significant difference in the mean ratings of farmers' perceptions regarding the contribution of indigenous farming knowledge to conservation farming practices between high adopters and low adopters in Mubi North LGA, Adamawa State.

Table 2: T-test Analysis of Mean Rating Difference of Farmers Perception on Contribution of Indigenous Farming Knowledge towards Conservation Farming Practices in Mubi North LGA, Adamawa State Based on Level of Adoption

Category of Farmers Based on IFK Adoption	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
IFK Adopters	63	3.253	1.1312	.1425	10.625	337	0.000
Non-IFK Adopters	276	2.060	.7104	.0428			

The study also aimed to explore potential differences in the perception of farmers regarding the contribution of indigenous farming knowledge to conservation farming practices in Mubi North LGA of Adamawa State, based on their level of adoption of these practices. The expectation was that farmers with higher adoption rates might perceive the conservation effects of indigenous farming differently than those with lower adoption rates. To test this, a t-test analysis was conducted on the data, comparing the perception ratings of adopters and non-adopters of indigenous farming knowledge. The results, as shown in Table 5, revealed a t-test value of 10.625 with a degree of freedom of 337 and a p-value of 0.0001. Since the calculated p-value of 0.000 is significantly less than the hypothetical p-value of 0.05, this indicates a statistically significant difference between the mean ratings of the two groups. Specifically, the mean rating for adopters was 3.253, while the mean rating for non-adopters was 2.060. This suggests that adopters rated the contribution of indigenous farming knowledge above average (mean > 3.0), while non-adopters rated it below average (mean < 3.0). These findings indicate that farmers who have adopted indigenous farming practices are more convinced of their positive effects on land conservation, whereas non-adopters may still harbour scepticism regarding the conservation benefits of these practices.

Discussion

The results indicate that indigenous farming practices significantly contribute to the preservation of soil properties, cultivation of diverse crops, and avoidance of agrochemicals, leading to enhanced biodiversity. A mean score of 3.04 for soil preservation suggests that farmers acknowledge traditional methods as vital for maintaining soil health. This is consistent with findings by Agboola et al. (2021), who found that indigenous agricultural practices in southwestern Nigeria helped maintain soil fertility and structure, thereby supporting sustainable farming. Similarly, Banjoko et al. (2022) highlighted that traditional knowledge systems play a crucial role in environmental conservation, particularly in areas facing ecological challenges.

The cultivation of diverse crops, with a mean score of 3.46, is particularly critical for food security and resilience against pests and diseases. This aligns with the work of Altieri et al. (2020), who emphasized the importance of biodiversity in agriculture as a strategy for sustainable food production. The use of diverse cropping systems can enhance soil health and reduce the need for synthetic inputs, which is echoed by findings from Smith et al. (2023) that link crop diversity to improved ecosystem services and agricultural resilience.

However, contrasting perspectives exist regarding the effectiveness of indigenous practices in modern contexts. For example, a study in Brazil by Martinez et al. (2020) indicated that the adoption of industrialized farming methods has overshadowed traditional practices, leading to a decline in local biodiversity. This suggests that while indigenous knowledge remains crucial in regions like northern Nigeria, its relevance may diminish in contexts favouring modern, mechanized agriculture. The difference in findings may stem from varying agricultural policies and market pressures faced by farmers in different regions.

Moreover, the avoidance of agrochemicals as indicated by a mean score of 3.74 reflects farmers' awareness of ecological benefits. Similar findings were reported by Nkongolo et al. (2021), who noted that reducing chemical inputs through traditional practices can lead to enhanced biodiversity and ecosystem stability. However, in contrast, some agricultural

experts argue that a complete shift away from agrochemicals is impractical in high-demand agricultural systems, as modern agriculture often relies on chemical inputs for higher yields (Johnson et al., 2022).

In summary, the positive perception of indigenous farming practices in Mubi North LGA aligns with various studies that underscore their contributions to conservation farming. However, the juxtaposition of these findings with contrasting views from other regions highlights the complexities surrounding the adoption of traditional practices in the face of modern agricultural demands. The evidence suggests that while indigenous methods are beneficial, further research is necessary to understand their integration into contemporary farming systems.

The data reveals that farmers in Mubi North LGA strongly perceive indigenous farming knowledge as a key contributor to sustainable food security, especially regarding food safety and affordability. The mean score of 3.24 for food safety due to minimal chemical usage reflects a growing awareness among farmers about the health implications of their agricultural practices. This finding is in line with research by Obi and Oko (2021), which suggests that traditional farming methods enhance food quality by minimizing chemical residues, thus ensuring safer consumption.

Furthermore, the strong agreement on the affordability of produce from indigenous practices (mean = 4.51) resonates with studies indicating that traditional farming often yields lower production costs, making food more accessible (Adebayo et al., 2022). These findings emphasize the economic advantages of indigenous farming systems, particularly in rural settings where access to affordable food is critical for household sustainability.

However, the respondents expressed skepticism regarding traditional storage methods, with a mean score of 1.96, which raises concerns about the effectiveness of these practices in preserving food over time. This skepticism is echoed by a study conducted by Nwachukwu et al. (2023), which highlighted that inadequate traditional storage techniques could lead to significant post-harvest losses in rural communities. In contrast, modern storage methods have been shown to improve food preservation and reduce waste, suggesting that while indigenous practices are valuable, they may need to be complemented by modern techniques to enhance food security fully.

The strong support for indigenous pest and disease control methods (mean = 4.53) further underscores farmers' confidence in traditional knowledge for maintaining produce safety at harvest. This aligns with findings by Abdullahi et al. (2021), who noted that indigenous pest management practices are often more sustainable and environmentally friendly than chemical alternatives. Conversely, some researchers have pointed out that without proper training and resources, farmers may struggle to implement these methods effectively, which could hinder their potential benefits (Williams et al., 2022).

Overall, the findings suggest that while indigenous farming practices significantly contribute to food security in Mubi North LGA, there are notable limitations regarding certain practices, such as storage methods. These insights highlight the need for a holistic approach that combines the strengths of indigenous knowledge with modern agricultural innovations to improve food security outcomes.

The t-test analysis revealed a significant difference in perceptions of indigenous farming knowledge based on adoption levels, with adopters rating its contribution to conservation farming practices more positively than non-adopters. The mean rating of 3.253 for adopters compared to 2.060 for non-adopters illustrates the contrasting views on the effectiveness of these practices. This finding aligns with research by Williams et al (2017), which indicated that higher adoption rates of indigenous methods lead to a greater appreciation for their benefits among farmers.

The significance of this difference suggests that familiarity with indigenous practices enhances farmers' confidence in their utility for land conservation. Studies by Akinyemi et al. (2023) have shown that farmers who actively engage with traditional techniques are more likely to recognize their role in promoting sustainable agricultural practices. Conversely, non-adopters may remain skeptical, potentially due to a lack of exposure or negative experiences with traditional methods, as highlighted by Ibeh et al. (2021), who found that unfamiliarity can breed mistrust and reluctance to adopt beneficial practices.

This divergence in perceptions underscores the need for targeted education and awareness campaigns to increase the adoption of indigenous practices among skeptical farmers. Research by Usman et al. (2023) has shown that training programs focused on the benefits of indigenous knowledge can effectively shift perceptions and enhance adoption rates. By increasing awareness and understanding, it may be possible to foster greater acceptance of these practices, thereby improving sustainable farming outcomes.

Additionally, the findings raise questions about the barriers that non-adopters face in integrating indigenous practices into their farming systems. A study conducted by Nkang et al. (2024) identified factors such as access to resources, market pressures, and peer influence as significant hurdles to adoption. Addressing these challenges may be crucial for improving perceptions and promoting the widespread use of indigenous farming knowledge.

In conclusion, the significant difference in perceptions between adopters and non-adopters of indigenous farming knowledge highlights the importance of increasing awareness and education about traditional practices. By bridging the gap between these groups, stakeholders can enhance the adoption of sustainable farming techniques, ultimately contributing to improved land conservation and agricultural productivity in Mubi North LGA.

CONCLUSION

The study on indigenous farming knowledge in Mubi North LGA, Adamawa State, reveals the significant role of traditional agricultural practices in enhancing conservation farming methods and supporting sustainable food security. The findings indicate that farmers possess a strong awareness of indigenous techniques that contribute to soil health, biodiversity, and reduced reliance on chemical inputs. This awareness is essential for building a resilient agricultural system capable of addressing climate change and contemporary challenges.

The analysis shows that adopters of indigenous practices have a more favourable perception of their effectiveness in promoting environmental sustainability and agricultural productivity compared to non-adopters. This difference underscores the need for targeted educational initiatives to broaden the adoption of these beneficial practices among farmers. Furthermore, while respondents acknowledge the benefits of indigenous methods for food safety and affordability, concerns regarding traditional storage systems and overall yield indicate areas that require innovation and improvement.

In conclusion, indigenous farming knowledge serves as a vital pathway to conservation farming and sustainable food security. By leveraging the strengths of these traditional

methods while addressing their limitations, stakeholders can foster a more resilient agricultural sector. Such a holistic approach will be crucial in promoting sustainable agricultural practices that not only benefit the environment but also enhance food security for local communities in Mubi North LGA and beyond

RECOMMENDATIONS

There is need for Adamawa state government to implement targeted educational programs and workshops to raise awareness among farmers about the benefits and techniques of indigenous farming practices, promoting greater adoption and understanding within the community.

There is need for Ministry of Agriculture in Adamawa State to invest in research and development to improve traditional storage systems, ensuring they are effective in preserving food quality and safety over extended periods, thereby increasing the overall yield and reliability of indigenous farming.

There is need for establishment of supportive networks among stakeholders (farmers, agricultural extension services, and local organizations) to facilitate knowledge exchange, resource sharing, and the implementation of sustainable agricultural practices in Mubi North LGA.

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