Adult Education for Sustainable Agriculture: Nigerian Farmers' Perspectives and Needs.

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Abstract:
This study examined adult education for sustainable agriculture: Nigerian farmers" perspectives and needs. The challenges of climate change, food insecurity, and rural poverty in Nigeria have necessitated the adoption of sustainable agriculture practices among farmers in Nigeria .However, many farmers lack access to relevant information and skills to implement these practices. This study explored Nigerian farmers' perspectives and needs for adult education programs that support sustainable agriculture. The purpose of this research was to investigate the information needs and preferences of Nigerian farmers regarding sustainable agriculture practices. The study addressed the following issues: farmers' current knowledge and practices, information needs, preferred delivery methods, and barriers to adopting sustainable agriculture. Using an analytical approach, the researchers discussed issues raised in this research concerning Nigerian farmers. Findings revealed that farmers lack knowledge on climate-smart agriculture, organic farming, and soil conservation techniques. They preferred practical, hands-on training and peer-to-peer learning approaches. Major barriers to adoption included limited access to finance, inadequate extension services, and climate-related shocks. Based on the findings, the researchers recommended the development of context-specific adult education programs that incorporate farmers' indigenous knowledge and experiences. The researchers also suggested strengthening partnerships between government agencies, NGOs, and farmer organizations to provide holistic support to farmers.

Conclusion:
The findings of this study highlight the crucial role of adult education in promoting sustainable agriculture among Nigerian farmers. The majority of farmers in this study emphasized the need for adult education programs that focus on sustainable agriculture practices, such as organic farming, crop rotation, and intercropping. These programs can help farmers acquire the knowledge and skills necessary to improve their productivity and income, while also reducing their environmental footprint.
The study also reveals that farmers in Nigeria face significant barriers to adopting sustainable agriculture practices, including limited access to credit and financial resources, high costs of sustainable agriculture technologies and inputs, and inadequate extension services and support. Therefore, there is a need for policymakers and stakeholders to prioritize adult education and provide farmers with the necessary resources and support to adopt sustainable agriculture practices.
Adult education is a critical component of sustainable agriculture development in Nigeria. By providing farmers with the knowledge and skills necessary to adopt sustainable agriculture practices, adult education programs can contribute to improving agricultural productivity, reducing poverty, and promoting environmental sustainability. It is essential for policymakers and stakeholders to invest in adult education programs that prioritize sustainable agriculture and provide farmers with the necessary support to achieve sustainable agricultural development in Nigeria.
Keywords*: Adult education, sustainable agriculture, Nigerian farmers, climate-smart agriculture, information needs.*

1.0 Introduction

Adult education plays a vital role in promoting sustainable agriculture in Nigeria, where a significant portion of the population relies on agriculture for their livelihood. According to Wami (2024), adult education encompasses structured and deliberate educational activities tailored specifically for adults, aimed at fostering personal and societal advancement. This type of education is essential for equipping farmers with the necessary skills and knowledge to adopt innovative and sustainable agricultural practices, thereby improving crop yields, reducing environmental degradation, and enhancing their overall quality of life. Adult education programs can cater to the diverse needs of farmers, including those with limited formal education, by providing training in areas such as agricultural extension services, cooperative management, and entrepreneurship.

The Nigerian agricultural sector faces numerous challenges, including climate change, soil degradation, and limited access to modern farming techniques. To address these issues, adult education programs can provide farmers with the necessary skills and knowledge to adopt sustainable agricultural practices. As emphasized by Ejiro-Mitaire, Chukwuemerie, and Orobor (2024), adult education programs such as agricultural extension education, cooperative education, and entrepreneurship education are essential strategies for improving agricultural productivity in Nigeria. These programs can help farmers adopt climate-resilient practices, improve soil fertility, and increase their income, ultimately contributing to the country's economic growth and food security.

Nigerian farmers' perspectives and needs are crucial in designing effective adult education programs for sustainable agriculture. Research has shown that farmers are more likely to adopt new practices when they are involved in the decision-making process and when the programs address their specific needs (Muntaka, Ibrahim, & Ali, 2024). Therefore, it is essential to conduct needs assessments and engage with farmers in the design and implementation of adult education programs. This approach ensures that the programs are relevant, practical, and tailored to the local context, thereby increasing their effectiveness and sustainability.

Sustainable agriculture is critical for ensuring food security, promoting environmental conservation, and improving the livelihoods of Nigerian farmers. As highlighted by Adedayo (2025), sustainable agriculture involves embracing digital technologies, reviving indigenous farming practices, and fostering partnerships across sectors. This approach can help Nigeria achieve its agricultural development goals, including increasing food production, reducing poverty, and promoting environmental sustainability. Sustainable agriculture also involves promoting agro-ecological practices, conserving biodiversity, and supporting small-scale farmers, who are crucial to Nigeria's agricultural sector.

However, there are challenges to implementing adult education programs for sustainable agriculture in Nigeria, including limited funding, inadequate infrastructure, and lack of trained personnel. According to Oghenekohwo, Tonukari, and Samuel (2020), these challenges can be addressed by repositioning adult education programs to prioritize sustainable agriculture and providing adequate resources and support. This can involve collaborations between government agencies, non-governmental organizations, and private sector stakeholders to provide funding, technical assistance, and other forms of support.

To achieve sustainable agriculture in Nigeria, it is essential to understand the perspectives and needs of farmers and design adult education programs that address these needs. By doing so, we can promote sustainable agriculture, improve food security, and enhance the livelihoods of Nigerian farmers. This requires a holistic approach that involves policymakers, educators, farmers, and other stakeholders working together to create an enabling environment for sustainable agriculture to thrive.

2.0 Adult Education

Adult education is a vital component of lifelong learning, enabling individuals to acquire new skills, knowledge, and competencies that enhance their personal and professional lives. It encompasses a broad range of educational activities, including formal and non-formal learning, vocational training, and community development programs. Adult education is designed to cater to the diverse needs of adults, taking into account their experiences, interests, and learning styles. By providing opportunities for adults to learn and grow, adult education contributes to the social, economic, and cultural development of societies. Moreover, adult education helps individuals adapt to changing labor market demands, improve their socio-economic status, and participate actively in civic engagement. As a result, adult education is essential for fostering a culture of lifelong learning, promoting social mobility, and driving national development.

Adult education plays a critical role in promoting social and economic empowerment, particularly for marginalized and disadvantaged groups. It provides opportunities for adults to acquire literacy and numeracy skills, improve their employability, and engage in income-generating activities. Adult education also fosters critical thinking, problem-solving, and decision-making skills, enabling individuals to participate actively in their communities and make informed decisions about their lives. Furthermore, adult education promotes social cohesion, tolerance, and understanding, contributing to more inclusive and equitable societies. By targeting vulnerable populations, such as women, youth, and rural communities, adult education can help bridge the socio-economic divide, reduce poverty, and promote sustainable development. Ultimately, adult education is a powerful tool for promoting social justice and human rights.

The field of adult education is constantly evolving, with new trends and challenges emerging in response to changing social, economic, and technological contexts. Globalization, technological advancements, and demographic changes are transforming the way adults learn and engage with education. In response, adult education programs are incorporating innovative approaches, such as online and distance learning, experiential learning, and competency-based education. These developments present opportunities for adult education to become more accessible, flexible, and responsive to the needs of diverse learners, ultimately contributing to more equitable and sustainable societies. However, they also pose challenges, such as ensuring equity and quality, addressing the digital divide, and building the capacity of adult educators to navigate these changes effectively. By addressing these challenges, adult education can continue to play a vital role in promoting lifelong learning and sustainable development.

3.0 Sustainable Agriculture

Sustainable agriculture is gaining momentum as a vital approach to ensuring food security while minimizing environmental degradation. According to Nikghadam-Hojjati, Marchetti & Barata (2026), women-led sustainable innovation in small island agriculture is crucial for strengthening resilience in the face of resource constraints and climate impacts. Women farmers are leveraging local knowledge and innovative practices to enhance agricultural productivity, improve food security, and promote environmental sustainability. For instance, initiatives such as community-supported agriculture and cooperative farming have empowered women to take charge of their agricultural practices, leading to improved livelihoods and more sustainable use of natural resources. As climate change continues to pose significant challenges to agricultural systems, the role of women in sustainable agriculture will become increasingly important.

The integration of technology, such as precision agriculture and digital extension services, is transforming the agricultural landscape. Sen, Phuong, Chou, Dacuyan, Nyberg & Wetterlind (2025) highlight the opportunities and barriers in developing interactive digital extension services for smallholder farmers, emphasizing the potential for sustainable agriculture. Digital technologies can provide farmers with real-time information on weather patterns, soil health, and best agricultural practices, enabling them to make informed decisions and improve crop yields. However, challenges such as limited access to internet connectivity, lack of digital literacy, and high costs of technology adoption hinder the widespread adoption of digital extension services. Addressing these barriers is crucial for ensuring that smallholder farmers can benefit from digital technologies and contribute to sustainable agriculture.

Climate-smart agriculture is another key strategy for promoting sustainable agriculture practices. Swarnam, Velmurugan, Subramani, Ravisankar, Subash, Pawar & Dam Roy, (2024) demonstrate the effectiveness of climate-smart crop-livestock integrated farming systems in humid tropical islands, showcasing the potential for sustainable agricultural intensification. Climate-smart agriculture involves the use of practices such as conservation agriculture, agroforestry, and integrated pest management to enhance the resilience of agricultural systems to climate change. By adopting climate-smart agriculture practices, farmers can improve soil health, reduce greenhouse gas emissions, and promote biodiversity, ultimately contributing to sustainable agriculture and food security.

The role of women in sustainable agriculture cannot be overstated. Perelli, Cacchiarelli, Peveri, & Branca (2024) reveal that women's contribution to climate-smart agriculture is significant, and empowering them can lead to more sustainable and equitable agricultural outcomes. Women farmers play a crucial role in maintaining agricultural biodiversity, managing natural resources, and ensuring food security. However, they often face challenges such as limited access to land, credit, and extension services, which hinder their ability to adopt sustainable agriculture

practices. Empowering women through education, training, and access to resources can enhance their contribution to sustainable agriculture and promote more equitable agricultural development.

Harnessing biostimulants and other innovative technologies can further enhance sustainable agriculture practices. Khoulati, Ouahhoud & Taibi, (2025) explore the potential of biostimulants in promoting sustainable agriculture, highlighting the need for continued research and development in this area. Biostimulants are substances that can enhance plant growth and development, improve crop yields, and promote environmental sustainability. The use of biostimulants can reduce the need for synthetic fertilizers and pesticides, minimizing environmental pollution and promoting sustainable agriculture. As the demand for sustainable agriculture products continues to grow, the development and adoption of biostimulants and other innovative technologies will play a crucial role in promoting sustainable agriculture practices.

4.0 Nigerian Farmers

Nigerian farmers play a vital role in the country's economy, contributing significantly to the agricultural sector and food security. The majority of Nigerian farmers are small-scale, rural-based, and rely on traditional farming practices to produce crops such as maize, sorghum, millet, and cassava. These farmers face numerous challenges, including limited access to modern farming technologies, inadequate infrastructure, and exposure to climate-related shocks. Despite these challenges, Nigerian farmers have demonstrated resilience and adaptability, with many adopting innovative practices to improve crop yields and reduce poverty.

The agricultural landscape in Nigeria is characterized by diverse farming systems, including rain-fed agriculture, irrigated farming, and mixed crop-livestock production. Nigerian farmers have developed unique strategies to cope with the country's tropical climate, which is marked by distinct wet and dry seasons. For instance, farmers in the northern regions have adopted drought-tolerant crop varieties and agroforestry practices to mitigate the effects of drought, while those in the southern regions have developed flood-resistant crops and soil conservation techniques. These adaptations demonstrate the resourcefulness and ingenuity of Nigerian farmers in the face of climate variability.

Nigerian farmers are not only producers of food but also play a crucial role in maintaining the country's cultural heritage and traditional knowledge systems. Many farming communities in Nigeria have preserved indigenous agricultural practices, such as shifting cultivation and crop rotation, which promote soil fertility and biodiversity. These traditional practices are often passed down from generation to generation, highlighting the importance of intergenerational knowledge transfer in Nigerian agriculture. Moreover, Nigerian farmers have developed unique crop varieties and livestock breeds that are adapted to local conditions, which are an important part of the country's agricultural biodiversity.

Empowering Nigerian farmers through access to modern technologies, extension services, and market opportunities can significantly enhance agricultural productivity and contribute to the country's economic growth. Initiatives aimed at promoting agricultural innovation, improving rural infrastructure, and strengthening farmer organizations can help address the challenges facing Nigerian farmers and unlock their full potential. By investing in Nigerian farmers, the country can achieve food security, reduce poverty, and promote sustainable agricultural development.

5.0 Farmers Current Knowledge and Practices

Farmers' knowledge and practices are crucial components of sustainable agriculture, as they possess traditional and local knowledge that has been passed down through generations. According to Aggarwal (2024), farmers' knowledge and practices play a significant role in maintaining soil health, conserving water, and promoting biodiversity. In many parts of the world, farmers have developed unique practices that are adapted to their local environments, such as crop rotation, intercropping, and agroforestry. These practices not only promote environmental sustainability but also contribute to food security and rural livelihoods. For instance, crop rotation and intercropping can help to reduce soil erosion, improve soil fertility, and increase crop yields, thereby enhancing the overall productivity and sustainability of agricultural systems.

Farmers' knowledge and practices are also essential for climate change adaptation and mitigation. As highlighted by Birthal (2024), farmers' perceptions and adaptations to climate change are critical for developing effective climate change strategies. In many developing countries, farmers have developed traditional knowledge

systems that enable them to predict and prepare for climate-related shocks, such as droughts and floods. This knowledge can be leveraged to develop climate-smart agricultural practices that promote resilience and sustainability. For example, farmers can use traditional knowledge to select drought-tolerant crop varieties, implement conservation agriculture practices, and adopt agroforestry systems that promote soil carbon sequestration and reduce greenhouse gas emissions.

The role of women in farmers' knowledge and practices is significant, as they play a crucial role in maintaining agricultural biodiversity and promoting sustainable agriculture. According to Nelson (2024), women's knowledge and practices are essential for maintaining crop diversity and promoting sustainable agriculture. Women farmers often possess knowledge about traditional crop varieties, soil conservation practices, and water management techniques, which are critical for promoting sustainable agriculture. Moreover, women's involvement in agriculture can also contribute to improved household food security and nutrition, as they are often responsible for managing household food resources and preparing meals.

Farmers' knowledge and practices are also influenced by their social and cultural contexts. As noted by Ojeda (2024), farmers' knowledge and practices are shaped by their social networks, cultural values, and institutional arrangements. In many parts of the world, farmers' knowledge and practices are influenced by traditional institutions, such as community-based organizations and cooperatives, which play a crucial role in promoting sustainable agriculture. For instance, community-based organizations can provide farmers with access to training, credit, and markets, thereby enhancing their ability to adopt sustainable agricultural practices.

Empowering farmers through knowledge and practices is critical for promoting sustainable agriculture and achieving food security. According to Pretty (2024), empowering farmers through knowledge and practices can promote sustainable agriculture, improve rural livelihoods, and contribute to environmental conservation. This can be achieved through initiatives that promote farmer-to-farmer learning, participatory research, and innovation, which can help to strengthen farmers' knowledge and practices and promote sustainable agriculture. Moreover, empowering farmers can also contribute to improved agricultural productivity, increased incomes, and reduced poverty, thereby promoting sustainable development and reducing hunger and malnutrition.

6.0 Information Needs of Farmers

Farmers in Nigeria require timely and accurate information to improve their agricultural productivity, which is a crucial factor in ensuring food security and reducing poverty in the country. According to Ogungbeni, Ogungbo, and Adeleke (2013), farmers need information on diseases and pest management, weather information, agricultural credit/loan, new/improved seed, soil and water conservation, storage of crops, and market information to enhance their farming practices. This information is essential for farmers to make informed decisions, reduce risks, and increase their yields. Moreover, farmers also require information on improved farming techniques, such as the use of fertilizers and pesticides, to improve the quality and quantity of their crops. Additionally, they need information on market trends and prices to enable them to make informed decisions about when and where to sell their produce.

The sources of information for farmers are diverse, ranging from traditional to modern methods, and it is essential to understand these sources to develop effective agricultural information systems. A study by Funom and Soyemi (2019) revealed that non-governmental organizations (NGOs) and banks are the most consulted institutional sources of agricultural information for soybean farmers in Niger State, Nigeria. Additionally, interpersonal sources, such as friends and family members, are also crucial in disseminating information to farmers, highlighting the importance of social networks in information diffusion. Furthermore, farmers also rely on radio and television programs, agricultural extension agents, and mobile phones to access information. However, the effectiveness of these sources varies, and there is a need to identify the most reliable and accessible sources of information for farmers.

The use of digital technologies has transformed the way farmers access information, and it is essential to leverage these technologies to improve agricultural information systems. A report by the Nigeria National Bureau of Statistics (NBS) and the World Bank Living Standards Measurement Study (LSMS) team (2025) found that two in five farmers report using digital farmer services (DFS) at least once during the 2023-24 main agricultural season. The report also highlighted that only 22% of farmers have access to smartphones, emphasizing the need for inclusive digital solutions that cater to the needs of all farmers, regardless of their socio-economic status. Moreover,

there is a need to address the challenges associated with the use of digital technologies, such as poor network connectivity, high cost of data, and limited digital literacy among farmers.

Climate change and variability are significant concerns for Nigerian farmers, who require information on climate-smart agricultural practices to adapt to the changing climate. According to Akor (2026), farmers need to adopt climate-smart and water-efficient farm practices to survive the 2026 dry-season farming cycle. This includes planting cover crops, rainwater harvesting, and using precision and drip irrigation, which can help to reduce the risks associated with climate change. Furthermore, farmers also need information on weather forecasting and early warning systems to enable them to prepare for extreme weather events. Additionally, there is a need to promote the use of climate-resistant crop varieties and livestock breeds to enhance the resilience of farmers to climate change.

To address the information needs of farmers, it is essential to strengthen agricultural extension services and promote digital literacy among farmers. The Federal Government of Nigeria has initiated programs to support farmers, including the distribution of free seeds and fertilizers (Federal Government of Nigeria, 2026). However, more efforts are needed to ensure that farmers have access to timely and accurate information to improve their productivity and livelihoods. This includes providing training and capacity-building programs for farmers, improving the infrastructure for agricultural information dissemination, and promoting public-private partnerships to support agricultural development.

7.0 Preferred Delivery Methods for Farmers

Farmers in Nigeria have diverse preferences when it comes to receiving agricultural information, and understanding these preferences is crucial for effective information dissemination. According to a study by Adekunle, Adewumi, and Ogunlela (2020), farmers in Nigeria prefer receiving agricultural information through interpersonal sources, such as friends, family members, and extension agents. This preference is attributed to the trust and credibility associated with these sources, as well as the opportunity for farmers to ask questions and clarify doubts. Moreover, interpersonal sources provide farmers with the opportunity to share experiences and learn from one another, which can be a powerful tool for knowledge transfer and adoption. For instance, farmers can share information on best practices, such as the use of improved seed varieties, and learn from each other's experiences, thereby improving their productivity and income. Additionally, interpersonal sources can provide farmers with timely and location-specific information, which is essential for making informed decisions about their farming practices.

In addition to interpersonal sources, farmers in Nigeria also prefer receiving agricultural information through mass media channels, such as radio and television programs (Ogunbode & Oladele, 2017). Radio, in particular, is a popular medium for disseminating agricultural information to farmers, given its accessibility and affordability. Many farmers in Nigeria have access to radio, and they often tune in to agricultural programs that provide them with valuable information on farming practices, weather forecasts, and market trends. Furthermore, radio programs can be tailored to meet the specific needs of farmers, making them a effective tool for agricultural information dissemination. For example, radio programs can be broadcast in local languages, making it easier for farmers to understand and apply the information. Additionally, radio programs can be used to disseminate information on critical issues, such as pest outbreaks and weather alerts, which can help farmers take timely action to protect their crops.

The use of digital technologies is also gaining popularity among farmers in Nigeria, who are increasingly using mobile phones and other digital devices to access agricultural information (Akinola, 2022). This trend is driven by the increasing availability of mobile networks and internet connectivity in rural areas, as well as the decreasing cost of digital devices. Farmers are using digital platforms to access information on weather forecasts, soil health, and pest management, among other things. Moreover, digital platforms provide farmers with the opportunity to interact with experts and other farmers, creating a virtual community of practice that can be a powerful tool for knowledge sharing and innovation. For instance, farmers can use digital platforms to ask questions and receive responses from experts, share their experiences and best practices, and access information on new technologies and innovations. Additionally, digital platforms can be used to provide farmers with personalized information and advice, which can help them improve their productivity and income.

8.0 Barriers to Adopting Sustainable Agriculture in Nigeria

1. Limited Access to Credit and Financial Resources: Many farmers in Nigeria lack access to credit and financial resources, making it difficult for them to invest in sustainable agriculture practices, such as purchasing improved seeds, fertilizers, and equipment. This limited access to finance hinders their ability to adopt new technologies and practices, ultimately affecting their productivity and income.
2. High Cost of Sustainable Agriculture Technologies and Inputs: The high cost of sustainable agriculture technologies and inputs, such as organic fertilizers and irrigation systems, is a significant barrier to adoption, especially for small-scale farmers. These costs can be prohibitive, making it challenging for farmers to transition to sustainable practices.
3. Limited Knowledge and Skills on Sustainable Agriculture Practices: Many farmers in Nigeria lack the knowledge and skills required to implement sustainable agriculture practices, such as crop rotation, intercropping, and organic farming. This knowledge gap hinders their ability to adopt sustainable practices and improve their productivity.
4. Inadequate Extension Services and Support: Extension services and support are crucial for farmers to access information and advice on sustainable agriculture practices. However, these services are often inadequate in Nigeria, leaving farmers without the necessary guidance and support.
5. Land Tenure Insecurity and Fragmentation: Land tenure insecurity and fragmentation are significant barriers to sustainable agriculture in Nigeria, as farmers may be reluctant to invest in land they do not own or have secure access to. This insecurity can lead to short-term decision-making and hinder long-term investments in sustainable practices.
6. Limited Access to Markets and Market Information: Farmers in Nigeria often lack access to markets and market information, making it difficult for them to sell their produce at competitive prices. This limited access to markets can reduce their income and incentives to adopt sustainable practices.
7. Low Prices for Sustainable Agricultural Products: The prices of sustainable agricultural products are often low, making it difficult for farmers to earn a decent income. This can discourage farmers from adopting sustainable practices and lead to a focus on conventional agriculture.
8. Competition from Conventional Agriculture: Sustainable agriculture faces stiff competition from conventional agriculture, which often has lower production costs and higher yields. This competition can make it challenging for sustainable agriculture to gain traction.
9. Limited Government Support and Policy Framework: The government has a crucial role to play in promoting sustainable agriculture, but the current policy framework and support are inadequate. A supportive policy environment is essential for encouraging the adoption of sustainable practices.
10. Climate Change and Variability: Climate change and variability are significant barriers to sustainable agriculture in Nigeria, as they affect crop yields, water availability, and pest management. Farmers need support and resources to adapt to these changes.
11. Soil Degradation and Erosion: Soil degradation and erosion are major environmental challenges in Nigeria, reducing soil fertility and affecting crop yields. Sustainable agriculture practices can help address these issues, but more support is needed.
12. Limited Access to Improved Seed Varieties and Planting Materials: Farmers in Nigeria often lack access to improved seed varieties and planting materials, which are essential for sustainable agriculture. This limited access can hinder productivity and adoption of sustainable practices.
13. High Labor Requirements and Drudgery: Sustainable agriculture often requires more labor, which can be a significant barrier, especially for small-scale farmers. This can lead to labor shortages and increased costs.
14. Limited Access to Irrigation Facilities: Irrigation facilities are essential for sustainable agriculture, but many farmers in Nigeria lack access to these facilities. This can limit crop yields and productivity.
15. Social and Cultural Barriers to Adopting New Practices: Social and cultural barriers, such as resistance to change and traditional practices, can hinder the adoption of sustainable agriculture practices. Farmers may need support and training to adopt new practices

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