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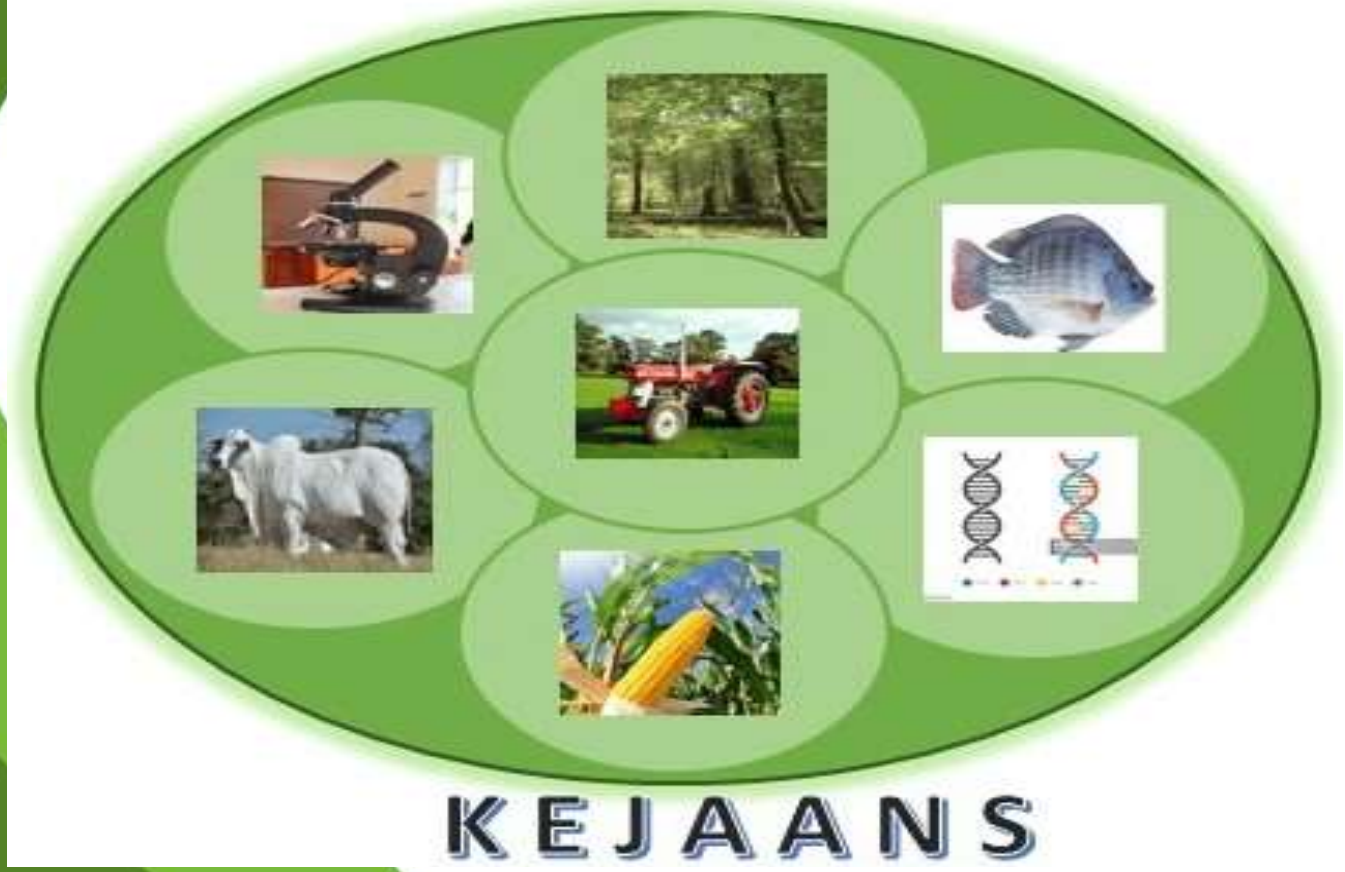

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FACTORS INFLUENCING THE WILLINGNESS TO ADOPT ORGANIC FARMING PRACTICES AMONG RURAL VEGETABLE FARMERS IN NORTHWESTERN NIGERIA. A SYSTEMATIC REVIEW

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ABSTRACT

This review aims to highlight the factors influencing the willingness of rural vegetable farmers in the Northwestern part of Nigeria to adopt organic farming practices. Organic farming is characterized by an aversion to synthetic inputs such as chemical fertilizers and pesticides, focuses on maintaining ecological balance, and improving soil fertility through natural methods. This review aim to describe such factors like socio-economic characteristics,, level of awareness about organic farming practices, , types of organic farming practices used and the willingness to adopt to organic farming practices in the study area. A comprehensive literature search was conducted using academic databases such as Google Scholar and Scopus, relevant journals, and online libraries. The search terms include organic farming, willingness to adopt, vegetable farmers, and factors influencing adoption. Studies were included if they focused on vegetable farmers in Northwestern Nigeria, analyzed factors influencing the willingness to adopt organic farming practices, peer-reviewed articles or conference papers, and were published in english. Studies were excluded if they were review papers or theoretical studies and were not peer-reviewed. The search results were screened based on the inclusion and exclusion criteria. The selected studies were further evaluated for their relevance and quality. The major finding in this review is that economic factors, particularly the perceived cost-benefit analysis and market demand for organic produce, play a significant role in influencing the willingness to adopt organic farming practices among vegetable farmers in northwestern Nigeria. This review, therefore, concludes that awareness, knowledge, and training in organic farming practices, as well as the role of social and institutional factors, are of great significance. It is recommended that efforts should be made to develop markets for organic produce and promote consumer awareness of the benefits of organic foods.

Keywords: Factors, Influencing, Willingness, Organic Farming, Vegetable Farmers

Introduction

The organic farming practices have gained significant attention globally due to their impending benefits for sustainable agriculture, environmental conservation, and improved public health. Organic farming, characterized by the aversion to synthetic inputs such as chemical fertilizers and pesticides, focuses on maintaining ecological balance and improving soil fertility through natural methods (Aulakh et al., 2022). The International Federation of Organic Agriculture Movements (IFOAM, 2021) defines organic farming as "a production method that sustains the condition of soils, ecosystems, and people. It depends on ecological processes, biodiversity, and sequences adapted to local circumstances rather than using inorganic inputs with adverse effects". Organic farming combines' tradition, invention, and science to benefit the shared environment and encourage fair relationships and good quality of life for all involved (IFOAM, 2021). Organic agriculture is being endorsed and encouraged all over the world to address issues of environmental and health problems resulting from the use of chemical fertilizers, herbicides, and pesticides. According to the Food and Agriculture Organization (FAO, 2023), Organic farming offers numerous paybacks over conventional farming practices, such as biodiversity, environmental sustainability, health and safety, economic benefits, and climate change mitigation.

In Nigeria, the population is continuously on the increase, currently estimated at over 228 million people, making it the most populous country in Africa. The increasing population showed that there is a weight on the resource base. The resultant effects are the increase in food strains by urban consumers and rural farmers, the expansion of activation areas, reduced fallow interval, with a lack of inputs necessary to compensate, and reduced soil fertility. Where there is doubt in the capacity of accessible resources and technologies to satisfy the demands of this increasing population for food and other agricultural commodities, organic farming practices may become an alternative.

More than a few factors can influence farmers' willingness to adopt organic farming practices. It could be a result of the farmers' socio-demographic characteristics, inadequate information on organic techniques (knowledge), attitudes of the farmers, the risk involved in switching to another farming system, market availability, available extension services, psycho-behavioral and psycho-social factors, etc (IFOAM, 2022). Willingness in this background is the farmer's disposition or readiness to adopt organic farming practices. In light of the foregoing, it becomes imperative to assess the willingness to adopt organic farming practices among rural vegetable farmers.

Despite global awareness of environmental degradation as a major part of the challenges of inorganic farming, and the resultant acceptance of organic farming as a better and vital alternative to reducing these harmful effects on the farmers and the environment, farmers are still holding on to the inorganic system of farming (Willer and Lernoud, 2017). This unwillingness can be ascribed to various factors, including, but not limited to, limited awareness and perception of organic farming principles, perceived economic risks, lack of access to organic inputs and markets, inadequate extension services, and socio-cultural barriers. However, it is hard to generalize without any experiential evidence.

Granting the fact that several studies have investigated the perception, awareness, and willingness of farmers to adopt organic farming practices in southern Nigeria (Ghosh et al., 2019; Ighoro et al., 2019; Okonta et al., 2023), there is a shortage of information on

factors influencing the willingness to adopt organic farming practices among rural vegetable farmers in northwestern Nigeria. It is against this backdrop that this study intends to assess the factors influencing the willingness to adopt organic farming practices among rural vegetable farmers in Northwestern Nigeria.

Materials and Methods

This review adopts a systematic approach to analyze existing literature on the factors influencing the willingness of farmers to adopt organic farming practices in Northwestern Nigeria. The review focused on peer-reviewed articles, grey literature, technical reports, policy documents, journals, and theses published between 2015 and 2024. The geographical focus of this review is Northwestern Nigeria, which comprises seven states: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara. The region is predominantly agrarian, with farming being a major source of livelihood. The choice of this area is due to its agricultural potential and growing interest in sustainable and environmentally friendly farming practices. A comprehensive literature search was conducted using the following electronic databases: Google Scholar and Scopus. Keywords and search phrases used included: organic farming adoption in Nigeria, factors influencing adoption of organic agriculture, sustainable agriculture in Northwestern Nigeria, willingness to adopt organic farming, and Socio-economic factors influencing organic farming in Nigeria. Studies written in English and directly related to Nigeria, particularly the northwestern region, were considered.

The inclusion and exclusion criteria for this review were developed by the authors in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), 2020 guidelines for reporting systematic reviews (Page et al., 2021) to ensure transparency and replicability. The inclusion criteria include: Studies focusing on the adoption of organic farming or sustainable agricultural practices, studies conducted in Nigeria, with emphasis on the northwestern states, Publications between 2015 and 2024, and Peer-reviewed journal articles, conference proceedings, and institutional reports. The exclusion criteria include: Studies not related to agriculture or organic farming, articles outside the geographical scope of Nigeria, non-English language papers, and publications without sufficient methodological detail or lacking relevance to adoption factors.

The extracted data were categorized into thematic areas: socio-economic factors, awareness and knowledge, market access, institutional support, and constraints. A qualitative synthesis was conducted to identify common trends, gaps, and policy implications across the reviewed literature.

Results and Discussion

Socio-Economic Characteristics of Rural Vegetable Farmers in Northwestern Nigeria

The socio-economic characteristics of rural vegetable farmers play an important role in defining their willingness and capacity to adopt organic farming practices. Studies conducted in Northwestern Nigeria have shown key demographic and economic factors that influence farmers' decisions regarding organic agriculture.

Age Distribution

Recent literature shows mixed effects of age on adoption. While some studies report that middle-aged farmers (35–55 years) are more active and open to new practices due to a combination of experience and remaining physical capacity (Usman et al., 2021; Okon &

Idiong, 2016), other research finds younger farmers more likely to experiment with innovations including organic methods because they are more connected to information sources and networks (Ume, 2023; Ikenga, 2024). The variation suggests that age per se is not a universal predictor; rather, age interacts with access to information, labor availability, and risk preferences. For Northwestern Nigeria this implies targeting both younger and middle-aged cohorts with different extension strategies: hands-on demonstrations for middle-aged farmers and ICT/radio-based messaging for younger farmers.

Educational Attainment

Multiple studies indicate that higher formal education is positively associated with awareness and uptake of organic and sustainable practices (Ahmed et al., 2019; Ikenga, 2024; Ume, 2023). Educated farmers tend to access, interpret, and apply technical information more readily and to experiment with alternative inputs. However, field studies in Nigeria also report instances where informal learning through farmer-to-farmer exchange and indigenous knowledge compensates for low formal education (El Bilali, 2021; Garba & Mohammed, 2022). Therefore, while education is an important enabler, extension programmes should combine formal training with participatory, experiential learning to reach less-literate farmers.

Education levels among vegetable farmers vary widely. Studies conducted by Ahmed et al. (2019 and Suleiman et al. (2020 reported that a significant portion has attained primary or secondary education, many still have no formal education. Farmers with higher educational qualifications showed a greater understanding of the ethics of organic farming and are more likely to adopt environmentally friendly practices. This could imply that education increases the capacity to access and interpret agricultural innovations, making awareness promotions and training programs more effective among educated farmers.

Household Size

Household composition affects labor availability for labour-intensive organic practices. Several Nigerian and African studies report that larger households provide farm labor that facilitates practices such as composting and manual weeding, increasing the feasibility of organic methods (Bello et al., 2022; Muluneh et al., 2022). Conversely, large households may also create off-farm demands that reduce time for novel practices. The net effect thus depends on intra-household labour allocation and seasonal labor demands. Programmes promoting organic practices should therefore consider labour-saving techniques or cooperative models where on-farm labour is pooled.

Large household sizes (ranging from 6 to 10 members) are common in rural communities (Bello et al., 2022). A larger family unit often provides a steady source of labor for farming activities, which is advantageous for labor-intensive organic farming techniques such as composting and manual weeding. This suggests that household size can positively influence adoption if satisfactory labor is available, particularly when family members are involved in farm operations.

Farm Size

Farm sizes are typically small-scale (less than 2 hectares), often fragmented, and operated under informal or customary land tenure arrangements (Yakubu and Adebayo, 2021). This limits long-term investment in organic soil improvement methods and deters adoption where land ownership is uncertain. This implies that securing land tenure and access to larger farm plots may inspire farmers to invest in the long-term benefits of organic farming.

Farming Experience

Experience influences both openness to change and risk perception. Several papers show that experienced farmers may be conservative, sticking to proven inorganic inputs, while other studies find experience provides practical skills that help adopt organic practices successfully (Ojo et al., 2018; Okon & Idiong, 2016; Ume, 2023). The implication for Northwestern Nigeria is that extension messages must be evidence-based, demonstrating that organic techniques can maintain yields and profitability when properly managed, to persuade experienced practitioners.

Income Level

Lower income levels and limited access to credit facilities are recurring challenges among rural farmers (Muhammed et al., 2020; Abdullahi and Musa, 2022). Without financial support, the initial costs associated with transitioning to organic methods, such as purchasing organic inputs or obtaining certification, may be prohibitive. This implies that financial constraints are a major barrier; targeted microcredit schemes can serve as catalysts for adoption.

Level of Awareness of Organic Farming Practices

Awareness of organic farming practices is a vital factor in the decision-making process regarding adoption. In Northwestern Nigeria, studies have reported changing levels of awareness among rural vegetable farmers, often linked to factors such as education, access to extension services, media exposure, and institutional support.

Findings through the region have shown that awareness of organic farming remains relatively low among rural vegetable farmers. According to Ibrahim et al. (2021), only 27% of surveyed farmers in Sokoto and Zamfara states were aware of organic farming as a discrete agricultural practice. Similarly, Abubakar and Lawal (2020) reported that while farmers had heard of "natural" or "chemical-free" farming, only 15% could appropriately define organic farming or recognize its core principles. This low level of awareness suggests a substantial information gap, which must be addressed through targeted sensitization and extension campaigns.

Additionally, those who were aware of organic farming, their main source of information was found to be fellow farmers (informal networks), radio programs, and local extension agents (Garba and Mohammed, 2022). However, formal training or workshops specific to organic agriculture were rarely attended by rural farmers in the region. Yahaya et al. (2019) observed that less than 10% of respondents in a study conducted in Kano and Katsina states had ever participated in any training related to organic farming techniques. The study sees lack of structured information channels contributes to misconceptions and shallow understanding of organic farming practices.

There are widespread misconceptions among farmers who associate organic farming with merely avoiding chemical fertilizers, without understanding the broader practices such as crop rotation, biological pest control, or certification requirements (Iliyasu et al., 2020). Moreover, many farmers consider organic farming to be less productive, which affects their willingness to explore it further. This study suggests that mistaken beliefs must be adjusted through evidence-based demonstrations and farmer field schools, highlighting the economic and ecological paybacks of organic systems.

Studies by Suleiman et al. (2020) and Ahmed et al. (2019) highlight a positive correlation between educational level and awareness of organic farming. Farmers with secondary or post-secondary education were more likely to

have heard of organic practices. Additionally, access to frequent extension visits increases awareness and interest in sustainable farming (Usman et al., 2021). Strengthening agricultural extension systems and integrating organic farming content into farmer outreach programs will significantly enhance awareness levels.

Radio remains the most accessible medium of communication in rural Northwestern Nigeria. Audu and Sani (2022) found that 46% of vegetable farmers relied on radio as their main source of agricultural information, while mobile phone-based agricultural platforms were used by only 12%, mostly by younger and more literate farmers. This review is leveraging radio programs in local languages and developing accessible ICT as tools that could increase the spread of accurate information on organic farming.

Types of Organic Farming Practices in the Study Area

Though full-scale adoption of certified organic farming remains limited in Northwestern Nigeria, evidence suggests that various organic-related practices are being applied by rural vegetable farmers either traditionally, due to lack of access to agrochemicals, or as deliberate sustainable choices (Audu et al., 2018). The following are the main types of organic farming practices observed in the study area:

Use of Organic Manure (Animal Dung and Compost)

The use of animal manure and compost is widespread but often rudimentary. Surveys in several Nigerian states report high incidence of manure use, yet composting techniques are poorly managed and application rates inconsistent (Ibrahim et al., 2021; Garba & Yusuf, 2020; Oladapo & Afolami, 2021). This review emphasize training on compost preparation and nutrient management to improve effectiveness. Strengthening local compost production and cooperative collection of agro-waste can raise both availability and quality of organic amendments.

Crop Rotation and Intercropping

Traditional crop rotation and intercropping systems are widely practiced, primarily for soil fertility management and pest control. According to Suleiman et al. (2020), many farmers rotate vegetables such as tomatoes and okra with cereals like maize or millet. Farmers also intercrop with legumes to enhance nitrogen fixation. However, these practices are often driven by traditional knowledge rather than deliberate organic principles. These traditional systems can form a foundation for certified organic practices if integrated with formal knowledge and management strategies.

Biological Pest and Disease Management

Biological pest control remains largely underutilized. A very low percentage (10–15%) of farmers use local herbs (e.g., neem extract) or ash for pest prevention, as noted by Iliyasu et al. (2020). The majority rely on chemical pesticides due to their effectiveness and ease of access, even when aware of their health and environmental risks. The low usage of bio-pesticides underscores a need for practical training and demonstration of locally available alternatives.

Use of Organic Seeds and Indigenous Varieties

Use of indigenous seed varieties, particularly those that have been saved over multiple planting seasons, is common in some communities. However, the deliberate use of certified organic seeds is almost non-existent, due to limited supply and awareness (Yahaya et al., 2019). Promoting indigenous seeds and improving access to certified organic seed

varieties can support the transition to formal organic farming systems.

Mulching and Minimum Tillage

Mulching using grass, crop residues, or leaves is practiced by a limited number of farmers, mostly to conserve moisture during dry spells (Usman et al., 2021). Minimum tillage, while beneficial for soil health, is rarely practiced due to the widespread use of manual hoes and preference for clean, tilled fields. These methods have potential but require education on their benefits and adaptation to local farming systems.

Organic Waste Recycling and Green Manuring

Recycling of agricultural waste into compost or green manure is not often practiced formally. According to Audu and Sani (2022), only 7% of farmers in selected villages of Kaduna and Zamfara were aware of the idea of green manuring, though some indirectly apply crop residues to their fields post-harvest. This study is of the view that, with better awareness, farmers could improve soil fertility and reduce waste through integrated nutrient recycling.

Conclusion

This review has studied the critical socio-economic factors, awareness levels, and types of organic farming practices. The findings showed that while awareness of organic farming practices remains generally low, many farmers show a positive disposition toward organic agriculture, motivated primarily by concerns over soil degradation, health risks of agrochemicals, and the increasing cost of synthetic inputs.

Traditional practices such as the use of animal manure, crop rotation, and intercropping are already rooted in local farming systems and could help as entry points for promoting formal organic farming. However, widespread adoption is hindered by several constraints, including limited technical knowledge, poor access to organic inputs, inadequate extension services, and the absence of supportive policies and market infrastructure.

Additionally, younger, more educated farmers show greater willingness to adopt organic practices, underlining the importance of targeting these groups in future interventions. The review also shows that farmers' willingness is often higher than their actual ability to implement organic practices, indicating an important adoption gap that can be addressed through strategic interventions

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