Agricultural Education and Women Empowerment Through Vegetable and Poultry Production in Bayelsa State

Panebi Ugo
panebiugo@ndu.edu,ng
2348037897558
Department of Agricultural Science Education
Faculty of Education Niger Delta University
Wilberforce Island, Bayelsa State

https://doi.org/10.56201/ijaes.vol.12.no11.2026.pg50.62

Abstract
This study examined agricultural education and women's empowerment through vegetable and poultry production in Bayelsa State. Guided by four research questions, the study adopted a descriptive survey research design. The population comprised women engaged in vegetable and poultry production across the eight Local Government Areas of Bayelsa State. A multistage sampling procedure was used to select 200 women from 16 communities in four purposively selected Local Government Areas. Data were collected using the Agricultural Education and Women's Empowerment through Vegetable and Poultry Production Questionnaire (AEWEVPPQ), which was validated by experts and had a Cronbach's Alpha reliability coefficient of 0.76 and above. Demographic data were analysed using frequency counts and percentages, while the research questions were answered using mean and standard deviation, with a criterion mean of 2.50. The findings revealed that women's access to agricultural education was low. Their knowledge and practical skills in vegetable production were high, particularly in nursery preparation, transplanting, planting, spacing and seed selection. However, their poultry-production skills were low overall, especially in brooding management, disease identification and biosecurity. Women's participation in vegetable and poultry production was high, with substantial involvement in daily farm operations, labour management, cooperative activities and marketing, but limited access to credit and involvement in major financial decisions. The study concluded that although women were actively engaged in these agricultural enterprises, limited access to agricultural education, gaps in poultry-production skills and financial constraints restricted their empowerment. It recommended that relevant government agencies and agricultural cooperatives provide accessible, practical, gender-responsive training and improve women farmers' access to credit.

Keywords: *Agricultural education, women empowerment, vegetable production, poultry production*

Introduction

Agriculture remains a fundamental sector for economic development, poverty reduction, food security and livelihood improvement, particularly in developing economies where a considerable

proportion of the population depends on agricultural activities for survival and income generation. Beyond its contribution to food production, agriculture provides opportunities for entrepreneurship, employment creation, household income diversification and the utilisation of locally available resources. However, the capacity of individuals and households to benefit from agricultural opportunities depends substantially on their access to relevant knowledge, productive skills, appropriate technologies, financial resources and institutional support, thereby establishing the significance of agricultural education in promoting relevant knowledge, productive skills, Agricultural education constitutes an important instrument for developing the human capacity required to improve agricultural production, promote self-reliance and facilitate participation in agricultural enterprises. Amadi and Adejoh (2020) conceptualised agricultural education as an instructional process that integrate theoretical knowledge with practical agricultural experiences to enable learners develop competencies applicable to agricultural production and related occupations. Furthermore, agricultural education can be understood as a specialised vocational and entrepreneurial learning process that prepares individuals to identify agricultural opportunities, manage production resources, adopt improved farming practices and establish viable agricultural enterprise (Ibe et al.2025). Umar and Daniel (2023) also regard agricultural education as the application of appropriate instructional approaches, particularly discussion and demonstration, to develop agricultural knowledge and practical skills among learners. Agricultural education represents a structured educational process that develops the knowledge, practical abilities, attitudes and entrepreneurial competencies required to undertake agricultural activities. Consequently, its relevance to women's empowerment becomes more evident when agricultural knowledge is translated into productive capabilities and sustainable livelihood opportunities.

Agricultural education therefore empowers women with opportunities to acquire production-related competencies, understand agricultural business operations and develop the confidence required to establish and manage income-generating enterprises. Women empowerment remains an essential prerequisite for addressing systemic structural inequalities and unlocking hidden economic potential within developing rural economies. UN Women (2024) conceptualised women's empowerment as a transformative, collective process through which economic systems become equitable and female actors fully exercise their rights and individual agency. In a complementary manner, Ibrahim (2023) described this phenomenon as the absolute capacity of females to make strategic lifecycle choices and independent decisions that give them power to control their own income and family resources. Additionally, World Vision Australia (2021) defined the concept as a systematic advocacy movement that encourages females to recognise their inherent capacity to determine their own choices, acknowledge their sense of self-worth, and access equal socio-economic opportunities. Women empowerment involves more than participation in farm work; its practical meaning becomes clearer when considered through particular enterprises, including vegetable production. It also involves creating conditions that enable women to acquire productive assets, access financial services, develop occupational competencies, participate in markets and exercise control over the proceeds of their economic activities (Farnworth et al. 2020). Participation in agricultural enterprises can provide women with opportunities to generate income, improve their economic circumstances and strengthen their financial independence. Thus, women's empowerment is closely associated with their ability to transform agricultural participation into measurable economic, social and personal benefits, making vegetable and poultry production a suitable agricultural enterprise to embark on by women.

Vegetable production represents one of the agricultural enterprises through which women can improve their economic circumstances, contribute to household food security and participate in commercial agricultural activities. According to the Food and Agriculture Organization's AGROVOC classification, vegetables are plants cultivated as field or garden crops, either in open fields or under protected conditions, for their edible parts (FAO, 2024). In a related classification, the FAO (2024) describes vegetable crops as generally herbaceous plants cultivated for edible portions that are suitable for human consumption. Vegetable production can therefore be understood as the systematic cultivation and management of edible crops, including leafy vegetables, fruit vegetables, root vegetables and leguminous vegetables, for household consumption, commercial sales or both. This agricultural activity involves several operations, including land preparation, seed selection, nursery establishment, planting, transplanting, watering, fertilisation, weed management, pest and disease control, harvesting and post-harvest handling. Onyishi (2021) explained that vegetable farming provides livelihood opportunities for rural households through increased agricultural income, improved food security and the establishment of complementary economic activities. Hence, vegetable production is an important agricultural enterprise whose contribution extends beyond food cultivation to income generation and livelihood improvement, particularly among women in rural communities.

Vegetable production also encompasses the application of appropriate cultivation techniques, production inputs, environmental management practices and marketing strategies to ensure the continuous availability of quality vegetables. It includes the production of different vegetable varieties, such as fluted pumpkin, waterleaf, amaranth, okra, pepper, tomatoes, cucumber and other indigenous and exotic vegetables that are consumed within households or supplied to agricultural markets (Egwuonwu 2024). Tanimonure et al. (2020) established that indigenous vegetable production provides income-generating opportunities for Nigerian farmers, particularly women, although inadequate access to credit and agricultural extension services constrains their productive capacity. Consequently, attention must also be given to other agricultural enterprises, particularly poultry production, which offers complementary opportunities for income generation and livelihood diversification.

Poultry production constitutes another important agricultural enterprise with considerable potential for improving women's economic participation, household nutrition and livelihood security. The Food and Agriculture Organization (2024) defines poultry in terms of domesticated bird species raised for the production of meat, eggs, feathers and other commercial products. These birds include chickens, ducks, turkeys, guinea fowls, geese and quails, which are reared under different production systems depending on available resources, production objectives and market requirements. FAO's AGROVOC classification identifies poultry as domesticated birds utilised for meat, egg production, breeding and other commercial purposes (FAO, 2024). Poultry production is a systematic rearing, feeding, breeding and management of domesticated birds to obtain marketable products and generate economic returns. It involves activities such as selecting suitable breeds, constructing poultry housing, providing balanced feed and clean water, maintaining biosecurity, administering appropriate vaccinations, controlling diseases, managing reproduction and marketing poultry products (Ajala et al. 2021). Thus, poultry production is a commercially relevant agricultural enterprise that can provide women with opportunities to participate in livestock production and strengthen their economic independence.

Poultry production operations may be undertaken at household, community or commercial levels, depending on the production capacity, available capital, technical knowledge and intended market. The enterprise provides opportunities for women to participate in broiler production, which

focuses primarily on meat, and layer production, which concentrates on egg production, as well as the rearing of indigenous poultry varieties. Sulaiman et al. (2023) demonstrated that poultry production contributes to employment generation, household income and food security, while women's participation is influenced by socioeconomic circumstances and production-related constraints. It offers women opportunities to develop practical livestock management competencies, establish small-scale enterprises and generate regular income from the sale of eggs and birds.

Through agricultural education, women can acquire the technical knowledge required to select suitable vegetable varieties, prepare land, establish nurseries, manage soil fertility, control pests and diseases, and apply appropriate harvesting and marketing practices. They can equally develop the competencies required to select poultry breeds, formulate and administer appropriate feeds, manage poultry housing, maintain hygienic production environments and prevent common poultry diseases. Njura et al. (2021) states that practical agricultural learning enhances the development of production-related competencies, hence the importance of demonstration and discussion methods in developing agricultural skills for food security. Furthermore, the acquisition of relevant skills can improve their confidence in undertaking agricultural enterprises, making informed production decisions and responding to challenges associated with farming. The extent to which these competencies translate into economic benefits, however, depends on women's opportunities to participate in vegetable and poultry production. It is therefore important to examine how agricultural education can strengthen women's participation in vegetable and poultry production and the extent to which such participation contributes to their economic and social advancement.

Statement of the Problem

Women in Bayelsa State participate in agricultural activities, including vegetable cultivation and poultry production. However, their involvement does not necessarily mean that they have equal access to the resources, knowledge and decision-making power required to benefit from these activities. Some women may contribute substantial labour while having limited influence over production choices, ownership or use of productive assets, and decisions about the income generated. This creates a concern about whether participation in vegetable and poultry production is accompanied by meaningful economic and social empowerment. Vegetable production requires knowledge and skills in crop selection, planting, soil and water management, pest and disease control, harvesting and marketing. Women who lack access to relevant agricultural education or practical training may find it difficult to apply appropriate production methods, maintain consistent output or respond to changes in production conditions. Constraints involving land, finance, inputs, extension information, transport and market access may further limit their ability to sustain vegetable enterprises and obtain adequate returns from their labour.

Poultry production also involves several demanding activities, including housing, feeding, brooding, disease prevention, flock management and the sale of birds or eggs. Limited technical knowledge, high input costs, inadequate credit, disease risks and difficulties accessing veterinary and market services can undermine production and reduce its financial benefits. Women may therefore engage in poultry keeping without achieving stable production, sufficient income or greater control over enterprise decisions. Although agricultural education is relevant to developing knowledge and practical skills, the extent to which women in Bayelsa State can access and apply such education in vegetable and poultry production remains uncertain. It is also unclear whether participation in these enterprises enables women to control productive resources and earnings, contribute to household and farm decisions, or improve their economic independence. The central

problem is the limited understanding of how agricultural education and women's empowerment are connected through vegetable and poultry production in Bayelsa State.

Aims and Objectives

The main objective of this study is to examine agricultural education and women's empowerment through vegetable and poultry production in Bayelsa State. The specific objectives are to:

1. determine the extent to which women engaged in vegetable and poultry production have access to agricultural education in Bayelsa State
2. examine the agricultural education knowledge and practical skills women acquire for vegetable production in Bayelsa State
3. examine the agricultural education knowledge and practical skills women acquire for poultry production in Bayelsa State
4. assess the extent of women's participation in vegetable and poultry production in Bayelsa State

Research Questions

The following research questions guided the study

1. To what extent do women engaged in vegetable and poultry production have access to agricultural education in Bayelsa State?
2. What agricultural knowledge and practical skills do women acquire for vegetable production in Bayelsa State?
3. What agricultural knowledge and practical skills do women acquire for poultry production in Bayelsa State?
4. To what extent do women participate in vegetable and poultry production in Bayelsa State?

Methodology

The study adopted a descriptive survey research design. The design was considered appropriate because it enabled the collection of data from women engaged in vegetable and poultry production to determine their access to agricultural education, the knowledge and practical skills they acquired, and their level of participation in the two agricultural enterprises. Creswell and Creswell (2023) explained that research designs provide a systematic framework for selecting appropriate methods of data collection and analysis in addressing research questions. The descriptive survey design was therefore considered suitable because it enabled the researcher to obtain information from the respondents about existing conditions and practices without manipulating the variables.

The population comprised women involved in vegetable and poultry production across the eight Local Government Areas of Bayelsa State. A multistage sampling procedure was employed in selecting the respondents. First, four Local Government Areas were purposively selected based on the prevalence of vegetable and poultry production activities. Subsequently, four communities were selected from each of the four Local Government Areas, making a total of 16 communities. The respondents were then randomly selected from identifiable women farmers in the selected communities through agricultural extension records, farmers' associations and cooperative groups. A sample of 200 women engaged in vegetable and poultry production was selected for the study.

The instrument used for data collection was a structured questionnaire titled Agricultural Education and Women's Empowerment through Vegetable and Poultry Production Questionnaire (AEWEVPPQ). The questionnaire was divided into five sections, A and B. Section A elicited demographic information from the respondents. Section B comprises 24 questionnaire items on the research questions that guided the study. The response options were arranged on a 4 points

rating scale of Very High Extent (VHE) 4, High Extent (HE) 3, Low Extent (LE) 2 and Very Low Extent (VLE) 1, respectively. The instrument was subjected to face and content validation by the researcher's supervisor and two other experts in Agricultural Education and Measurement and Evaluation from Niger Delta University. Their observations and corrections were incorporated into the final version of the questionnaire. To establish the reliability of the instrument, a pilot test was conducted among 20 women engaged in vegetable and poultry production in a Local Government Area outside the selected study locations. The responses obtained from the pilot exercise were analysed using Cronbach's Alpha reliability method, which produced a coefficient of 0.76 and above, indicating that the instrument was sufficiently reliable for the study. The researcher, with the assistance of trained research assistants, administered the questionnaire directly to the selected respondents across the 16 communities. Data relating to the respondents' demographic characteristics were analysed using frequency counts and percentages, while the research questions were answered using mean and standard deviation. A criterion mean of 2.50 was adopted for decision-making. Mean scores of 2.50 and above were interpreted as high extent, while mean scores below 2.50 were interpreted as low extent.

Results

Demographic Characteristics of Respondents

Table 1: Distribution of Respondents by Demographic Variables (N = 200)

Demographic Variable	Category	Frequency	Percentage (%)
Age Distribution	18–30 years	42	21.0
	31–45 years	108	54.0
	46 years and above	50	25.0
Marital Status	Single	35	17.5
	Married	135	67.5
	Widowed/Divorced	30	15.0
Educational Qualification	No Formal Education	28	14.0
	Primary Education	54	27.0
	Secondary Education	82	41.0
	Tertiary Education	36	18.0
Farming Experience	1–5 years	64	32.0
	6–10 years	96	48.0
	11 years and above	40	20.0
Primary Enterprise	Vegetable Production	78	39.0
	Poultry Production	52	26.0
	Both Enterprises	70	35.0

Table 1 shows that 54.0% of the respondents fall within the active working age of 31–45 years. The data reveals that 67.5% are married, and 41.0% have secondary education as their highest academic qualification. In terms of experience, 48.0% have been farming for 6–10 years, while 35.0% simultaneously engage in both vegetable and poultry production.

Analysis of Research Questions

Research Question 1: To what extent do women engaged in vegetable and poultry production have access to agricultural education in Bayelsa State?

Table 2: Mean and standard deviation scores on the extent women engage in vegetable and poultry production have access to agricultural education

S/N	Item	$\bar{X}$	SD	Remarks
1	Agricultural extension agents who provide field training	2.14	0.82	Low Extent
2	Agricultural workshops, seminars, or community literacy programs?	1.98	0.75	Low Extent
3	Radio or television broadcasts focusing on modern farming education?	2.65	0.89	High Extent
4	Mobile phone networks, SMS alerts, or social media for farming advice?	2.38	0.81	Low Extent
5	Bulletin materials, pamphlets, or training manuals written in simple language?	1.85	0.68	Low Extent
6	Cooperative societies providing instructional demonstrations for members?	2.58	0.91	High Extent
	Cluster Mean / Average Standard Deviation	**2.26**	**0.81**	**Low Extent**

The data presented in Table 2 indicate that only two out of the six items recorded mean scores above the 2.50 criterion mean, while the remaining four items fell below it. The item mean scores ranged from a low of 1.85 to a high of 2.65, showing that the respondents consistently perceive a lack of institutional and digital support, while relying more heavily on mass media and cooperative structures. The cluster mean of 2.26, with an average standard deviation of 0.81, further indicates an overall low response regarding the availability of these resources. Therefore, the findings establish that women engaged in vegetable and poultry production have access to agricultural education to a low extent in Bayelsa State.

[

Research Question 2: What agricultural knowledge and practical skills do women acquire for vegetable production in Bayelsa State?

Table 3: Mean and standard deviation scores on agricultural knowledge and practical skills women acquire for vegetable production

S/N	Item	$\bar{X}$	SD	Remarks
7	Nursery preparation and transplanting techniques for leafy vegetables.	3.12	0.65	High Extent
8	Proper spacing, depth of planting, and seed selection procedures.	2.94	0.71	High Extent
9	Calibration and application of inorganic fertilizers or organic manure.	2.41	0.84	Low Extent
10	Identification of vegetable pests and safe application of pesticides.	2.23	0.79	Low Extent
11	Post-harvest handling, preservation, and packaging to minimize loss.	2.18	0.73	Low Extent
12	Basic farm record-keeping and calculating profits from vegetable sales.	2.45	0.80	Low Extent
	Cluster Mean / Average Standard Deviation	**2.56**	**0.75**	**High Extent**

The data presented in Table 3 indicate that only two out of the six items recorded mean scores above the 2.50 criterion mean, while the remaining four items fell below it. The item mean scores ranged from a low of 2.18 to a high of 3.12, showing that the respondents consistently perceive that they possess foundational agronomic skills but lack advanced technical, protective, and managerial capabilities. The cluster mean of 2.56, with an average standard deviation of 0.75, further indicates an overall high response due to the strong weight of the initial cultivation practices. Therefore, the findings establish that women engaged in vegetable production in Bayelsa State have acquired relevant agricultural knowledge and practical skills to a high extent, particularly in the early stages of crop establishment.

Research Question 3: What agricultural knowledge and practical skills do women acquire for poultry production in Bayelsa State?

Table 4: Mean and standard deviation scores on agricultural knowledge and practical skills do women acquire for poultry production

S/N	Items	$\bar{X}$	SD	Remarks
13	Brooding management and adjusting temperatures for young chicks.	2.30	0.78	Low Extent
14	Formulating, mixing, or measuring daily feed portions for different stages.	2.62	0.82	High Extent
15	Constructing or selecting proper housing types with adequate ventilation.	2.48	0.74	Low Extent
16	Administering vaccines, medications, and executing bio-security measures.	1.95	0.69	Low Extent
17	Identifying common poultry symptoms (e.g., Newcastle, Gumboro disease).	2.04	0.71	Low Extent
18	Processing, processing hygienically, and marketing poultry products.	2.76	0.85	High Extent
	Cluster Mean / Average Standard Deviation	**2.36**	**0.77**	**Low Extent**

The data presented in Table 4 indicate that only two out of the six items recorded mean scores above the 2.50 criterion mean, while the remaining four items fell below it. The item mean scores ranged from a low of 1.95 to a high of 2.76, showing that the respondents consistently perceive that they possess skills in routine feeding and market processing but lack capacity in health management and environmental control. The cluster mean of 2.36, with an average standard deviation of 0.77, further indicates an overall low response regarding technical poultry mastery. Therefore, the findings establish that women engaged in poultry production in Bayelsa State have acquired relevant agricultural knowledge and practical skills to a low extent.

Research Question 4: To what extent do women participate in vegetable and poultry production in Bayelsa State?

Table 5: Mean and standard on the extent women participate in vegetable and poultry production in Bayelsa State?

S/N	Items	$\bar{X}$	SD	Remarks
19	Executing daily farm operations (clearing, watering, feeding birds).	3.45	0.54	High Extent
20	Managing farm labor and allocating duties to family or hired help.	2.82	0.70	High Extent
21	Making major financial decisions regarding purchases and expansion.	2.21	0.83	Low Extent
22	Attending agricultural market unions or cooperative group meetings.	2.74	0.76	High Extent
23	Securing loans or credit facilities specifically for farm enlargement.	1.62	0.61	Low Extent
24	Selling directly to wholesalers and controlling the generated income.	2.88	0.80	High Extent
	Cluster Mean / Average Standard Deviation	**2.62**	**0.71**	**High Extent**

The data presented in Table 5 indicate that four out of the six items recorded mean scores above the 2.50 criterion mean, while the remaining two items fell below it. The item mean scores ranged from a low of 1.62 to a high of 3.45, showing that the respondents consistently perceive that they are heavily involved in labor, operations, and marketing but are severely constrained in financial governance and capital sourcing. The cluster mean of 2.62, with an average standard deviation of 0.71, further indicates an overall high response regarding their physical and structural engagement. Therefore, the findings establish that women participate in vegetable and poultry production in Bayelsa State to a high extent.

4.3 Discussion of Findings

Access to Agricultural Education among Women Farmers

The findings in Table 2 indicate that women engaged in vegetable and poultry production have access to agricultural education to a low extent in Bayelsa State. This implies that the current system of delivering agricultural knowledge through extension field training, formal workshops, printed training manuals, and digital mobile network alerts is not effectively reaching or servicing female farmers. These gaps can restrict women's exposure to modernized agricultural techniques, reinforce old traditional practices, drop productivity levels, and limit their awareness of emerging innovations in the vegetable and poultry sectors. This finding agrees with the study of Annan et al. (2024), who examined the determinants of access to agricultural extension services among smallholder farmers. Their study revealed that institutional neglect, physical distance, and gender biases significantly limit female farmers' access to public training infrastructure, while informal networks and community-based groups often step in to mitigate these gaps.

Agricultural Knowledge and Practical Skills Acquired for Vegetable Production

The findings in Table 3 indicate that women engaged in vegetable production have acquired relevant agricultural knowledge and practical skills to a high extent in Bayelsa State. This implies that competencies in nursery preparation, transplanting techniques, crop spacing, depth of planting, and seed selection procedures are well established among female vegetable farmers. These

operational skills can maximize crop establishment, ensure uniform plant populations, boost farm output quality, and stabilize the baseline production of leafy vegetables under local conditions. This finding agrees with the study of Eze and Odo (2023), who assessed the skill acquisition needs of women farmers in arable crop production. Their study revealed that women farmers possess high practical competence in primary agronomic operations like planting and nursery management, although they require additional targeted training in complex post-harvest handling and chemical safety to prevent value chain losses.

Agricultural Knowledge and Practical Skills Acquired for Poultry Production

The findings in Table 4 indicate that women engaged in poultry production have acquired relevant agricultural knowledge and practical skills to a low extent in Bayelsa State. This implies that deficits in brooding management, temperature control, biosecurity execution, vaccine administration, and disease identification can leave female-managed poultry farms highly vulnerable to flock mortalities. These technical deficiencies can increase production risks, lower bird survival rates, cause sudden financial losses, and discourage women from expanding their livestock investments. This finding agrees with the empirical study of Nwakpu and Okoye (2025), who evaluated technical skill gaps among livestock and poultry farmers. Their study revealed that small-scale poultry producers frequently suffer severe economic shocks and high disease outbreaks due to inadequate training in biosecurity measures, poultry disease identification, and proper medication scheduling.

Extent of Participation in Vegetable and Poultry Production

The findings in Table 5 indicate that women participate in vegetable and poultry production to a high extent in Bayelsa State. This implies that heavy involvement in daily farm operations, labor allocation, market union attendance, and direct wholesale marketing can position women as vital drivers of the local agricultural value chain. These extensive roles can enhance household food security, generate direct personal income, support domestic livelihoods, and maintain the steady supply of poultry and vegetable products in regional markets. This finding is consistent with the study of Oladoja et al. (2022), who investigated the socio-economic contributions and participation of women in urban and peri-urban agriculture. Their study revealed that women maintain a highly active, hands-on presence in agricultural production and local marketing, even though they remain severely constrained by systemic barriers to formal credit access and land ownership.

Conclusion

Based on the findings of this study, it is concluded that women engaged in vegetable and poultry production in Bayelsa State are highly active participants who possess strong foundational skills in vegetable cultivation. However, their capacity to scale up their operations is severely hindered by an overall low extent of access to formal agricultural education. This educational deficit directly translates into critical technical skill gaps, particularly in poultry health, biosecurity management, advanced agronomic practices, and agribusiness management. Furthermore, while these women drive the physical labor and marketing sectors of local agriculture, they remain systematically excluded from making major financial decisions and accessing formal credit facilities.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are made:

1. The Bayelsa State Ministry of Agriculture and Natural Resources should deploy female extension agents specifically trained to deliver hands-on, gender-sensitive field training and community workshops directly to women in their farming clusters.
2. Agricultural cooperative societies, in partnership with veterinary agencies, should organize targeted step-down training sessions focused specifically on brooding management, vaccine administration, and early poultry disease identification.
3. The Bank of Agriculture (BOA) and local microfinance banks should lower collateral barriers and offer low-interest, tailored loans directly to registered female vegetable and poultry farmer groups to facilitate farm expansion.
4. Non-governmental organizations (NGOs) and agricultural tech firms should develop localized voice-message and SMS alert systems in native languages to bridge the digital information gap regarding pest control and weather forecasts.
5. Extension agencies should distribute simplified, illustrated training manuals that teach women farmers basic book-keeping, profit calculation, and hygienic packaging methods to minimize losses.

References

Adekola, O. A., Adesiji, G. B., Adetarami, O., Oose, M. O., & Komolafe, S. E. (2023). Effects of flood on livelihood activities of smallholder crop farmers in Saki West Local Government Area, Oyo State, Nigeria. *Ife Journal of Agriculture*, 35(3), 1–8.

Ajala, M. K., Oyedipe, E. O., & Rege, J. E. O. (2021). Operational and marketing strategies in smallholder poultry production systems. *Journal of Agricultural Extension and Rural Development*, 13(2), 114–125.

Amadi, N. S., & Adejoh, G. (2020). Strategies for re-orienting agricultural education towards hands on experience in Rivers State Universities. *GSC Advanced Research and Reviews*, 5(3), 64–73.

Annan, J., Mueller, V., & Martinez, A. (2024). Institutional frameworks and gender disparities in smallholder access to public agricultural extension infrastructure. *World Development*, 174, Article 106421.

Egwuonwu, C. A. (2024). Commercial production of indigenous leafy vegetables and economic adaptation strategies among smallholder farmers. *African Journal of Agricultural Economics*, 19(1), 45–58.

Eze, C. U., & Odo, F. N. (2023). Practical competency and training needs of female farmers in processing and agronomic management of arable crops. *Nigerian Journal of Rural Sociology*, 23(2), 89–98.

Farnworth, C. R., Cohen, M. J., Stephenson, K., & Thomas, A. (2020). Gender integration in livestock and crop value chains: Creating pathways for women's asset ownership and economic agency. *Gender, Technology and Development*, 24(3), 291–312.

Food and Agriculture Organization [FAO]. (2024). *AGROVOC Multidisciplinary Thesaurus: Vegetable and poultry production classifications*. Rome: Food and Agriculture Organization of the United Nations.

Ibe, V. S. O., et al. (2025). Sustainable agricultural science education, entrepreneurship and self-reliance among graduates in vocational studies. *NAU Journal of Technology and Vocational Education*, 10(1), 12–22.

Ibrahim, H. M. (2023). Financial agency and independent resource allocation as measures of rural women's empowerment. *Journal of Development Studies and Social Policy*, 14(2), 77–91.

Njura, H. J., Mugambi, M. M., & Chomba, J. M. (2021). Practical instructional strategies in agricultural learning: Developing vocational competencies for national food security. *Journal of Agricultural Education and Extension*, 27(4), 415–429.

Nwakpu, S. C., & Okoye, E. C. (2025). Assessing technical biosecurity knowledge gaps and production vulnerabilities among smallholder livestock operators. *Journal of Animal Production and Health*, 33(1), 102–115.

Oladoja, M. A., Adisa, B. O., & Adeokun, O. A. (2022). Socio-economic contribution and institutional constraints to women's participation in urban and peri-urban agricultural value chains. *Journal of Agricultural Extension*, 26(4), 54–66.

Onyishi, T. O. (2021). Horticultural interventions for household resilience: The economics of backyard vegetable production. *Journal of Agriculture and Environment*, 17(3), 201–214.

Sulaiman, A. B., Sani, M. H., & Yusuf, O. (2023). Economic assessment of women participation in poultry enterprise: Socioeconomic determinants and micro-level barriers. *Nigerian Journal of Agricultural Economics*, 13(2), 74–86.

Tanimonure, V. A., Omodara, O. D., Fayemi, O. G., & Osifo, J. A. (2020). Determinants of lack of credit access among indigenous vegetable producers in Nigeria: Implications for policy interventions. *Agricultura Tropica et Subtropica*, 53(3), 149–155.

UN Women. (2024). *Empowering women actors within agricultural and rural economies: A transformative framework for collective agency*. New York: United Nations Entity for Gender Equality and the Empowerment of Women.

Umar, A. M., & Daniel, J. K. (2023). Instructional strategies in vocational agriculture: Leveraging discussion and demonstration methodologies for skill acquisition. *International Journal of Educational Research*, 11(2), 142–153.

World Vision Australia. (2021). *Socio-economic advocacy and women's development: Building blocks for gender-equal resource distribution*. Melbourne: World Vision Policy Press.