ORIGINAL RESEARCH REPORT NIGER. J. PLT. PROT. 40(2):82-88 (2026)

VEGETABLE FARMERS' PERCEPTION OF SAFETY PRACTICES IN PESTICIDES USE IN GIWA LOCAL GOVERNMENT AREA OF KADUNA STATE, NIGERIA

Musa Bako Muhammad, Usman, Kabiru, Muhammad, Ali and Divine Chidinma Ekeledo
Department of Agricultural Extension and Rural Development, Institute for Agricultural Research, Ahmadu Bello University, Zaria, Nigeria
Corresponding Author: mbmohammad@abu.edu.ng

SUMMARY

Pesticide use in vegetable farming enhances productivity but poses significant health and environmental risks, particularly when farmers' perceptions do not align with safe practices. This study evaluated vegetable farmers' perception of pesticide use in Giwa Local Government Area, Kaduna State, Nigeria. Primary data were collected from 400 smallholder vegetable farmers selected through stratified random sampling using a structured questionnaire. Descriptive statistics, perception indices, and multiple linear regression were used for analysis. Results showed that vegetable farming was male-dominated (67.3%), with a mean age of 50 years and average farm size of 1 hectare. Farmers demonstrated a high perception of health risks associated with pesticides (mean index = 4.10/5.0) but a lower perception of environmental risks (mean = 3.80). Despite this awareness, safety practices were poor: only 20.9% consistently used personal protective equipment (PPE), and 58.3% rarely or never followed recommended dosages. Education level ($\beta = 0.45$, $p = 0.016$), health risk perception ($\beta = 0.60$, $p = 0.008$), and access to extension services ($\beta = 0.35$, $p = 0.023$) were significant predictors of safer practices. Major constraints included high costs of PPE and pesticides (45.3%), limited access to extension services (30.1%), and difficulty understanding labels due to illiteracy (13.7%). The study concludes that a significant gap exists between risk perception and actual safety behavior. It recommends strengthening practical extension training, subsidizing PPE, and improving pesticide labeling with pictograms and local languages to bridge the gap.

Keywords: Vegetable farmers, pesticide use, perception, PPE

INTRODUCTION

Vegetable farming is a critical subsector of Nigerian agriculture, contributing significantly to food and nutritional security, income generation, and employment (FAO, 2021). However, vegetables are highly susceptible to pests and diseases, leading farmers to rely heavily on chemical pesticides (Ogunlela & Mukhtar, 2019). While pesticides can reduce crop losses and enhance productivity, their misuse—driven by limited knowledge, poor risk perception, and inadequate safety training—poses serious threats to human health and the environment (WHO, 2020; Yusuf et al., 2019).

In Nigeria, studies have documented unsafe practices such as applying pesticides without protective equipment, exceeding recommended dosages, and disregarding pre-harvest intervals (Adeogun et al., 2016). These practices increase risks of acute and chronic health issues for farmers

and consumers, environmental pollution, and pest resistance (Oladele & Adekoya, 2018). A critical barrier to improving this situation is the gap between farmers' perception of pesticide risks and their actual behavior. Perception—comprising knowledge, attitudes, and beliefs—plays a central role in decision-making. A farmer who perceives pesticides as effective but harmless may engage in risky practices, while an informed farmer may adopt safer methods (Ngowi et al., 2017).

In Giwa Local Government Area (LGA) of Kaduna State, vegetable farming is a common livelihood, yet limited research exists on how local farmers perceive pesticide risks or how these perceptions influence their practices. Most available studies are generalized to broader regions or focus on other crops (Yusuf et al., 2019). This knowledge gap hinders the development of targeted interventions. Therefore, this study aimed to evaluate vegetable farmers' perception of pesticide use in Giwa LGA, with specific objectives toexamine perception and level of awareness of health and environmental risks., evaluate their safety practices. Other objectives are to analyze the relationship between perception and insecticide use and identify constraints to effective pesticide utilization.

MATERIALS AND METHODS

Study Area

The study was carried out in Giwa Local Government Area located in Kaduna State, Nigeria, (latitudes 10°49' N and 11°24' N and longitudes 7°05' E and 7°37' E). It has a projected population of approximately 481,367 by 2024 and lies on the Galma plain at 712 m above sea level and is characterized by a savanna climate, with mixed ethnic groups including Hausa, Fulani, Yoruba, and Igbo. The Local Government Area is made up of 11 districts: Giwa, Kankangi, Gangara, Shika, Danmahawayi, Yakawada, Idasu, Kidandan, Galadimawa, Kadage, and Panhauya. The study was conducted in the 2024 farming session.

Research Design Sampling and Data Collection Methods

A descriptive survey research design was employed. This research design provides explanation between the independent variables and the dependent variable. It further helps to provide a focus on current conditions of the problem being investigated. The population comprised vegetable farmers in Giwa LGA. Using the Yamane formula with a 5% margin of error, a sample size of 400 respondents was calculated. A stratified random sampling technique was used to select respondents proportionally across farming communities.

Primary data were collected using a structured questionnaire. The instrument included sections on socioeconomic characteristics, awareness of risks, perception (measured on a 5-point Likert scale: 5=Strongly Agree to 1=Strongly Disagree), safety practices, and constraints. Questionnaires were administered in person, and all 400 distributed were returned and valid (100% response rate).

Data were analyzed using descriptive statistics (frequencies, percentages, means, standard deviations) and inferential statistics (multiple linear regression). The first section contains farmer's demographic information such as; gender, age, farm size, farming experience, among others, while the second section contains structured survey questions with rating scale from 1-5 (5= strongly agree, 4= agree, 3= undecided,

2= disagree, 1= strongly disagree). The result obtained from the survey was used to evaluate vegetable farmers' perception of pesticide use in Giwa Local Government Area, Kaduna State.

Perception indices were computed as mean scores across items for health risk (10 items), environmental risk (10 items), and risk-benefit (5 items). The safety practice index (dependent variable) was regressed against education, health risk perception, farming experience, access to extension, and age. Hypotheses were tested at $p \leq 0.05$.

RESULTS

Socioeconomic characteristics of vegetable farmers in Giwa Local Government Area of Kaduna State, Nigeria revealed that majority of vegetable farmers were male (67.3%), married (64.2%), and within the economically active age range of 31–50 years (67.2%). Most had at least secondary education (35.8%), and 44.0% owned less than 1 hectare of farmland, indicating smallholder status. Monthly household income for 44.0% was between ₦20,000 and ₦40,000 (Table 1).

Table 1: Socio-economic characteristics of respondents (n = 400)

Variable	Category	Frequency	%
Gender	Male	218	67.3
	Female	182	32.7
Age (Years)	31–40	83	26.4
	41–50	145	40.8
Education	Secondary	143	35.8
	No formal education	52	9.0
Farm size (ha)	< 1 ha	203	44.0
	1–3 ha	158	36.0

Results on awareness and perception of risks associated with pesticide use showed that most farmers were aware that pesticides cause health problems (72.0%) and can harm the environment (68.0%) (Table 2). The perception indices (Table 3) showed high perception of health risks (mean = 4.10), moderately high perception of environmental risks (mean = 3.80), and a moderate tendency to accept benefits over risks (mean = 3.20).

Table 2: Awareness of health and environmental risks (n = 400)

Statement	Yes (%)	No (%)	Not Sure (%)
Aware pesticides can cause health problems	72.0	16.0	12.0
Aware pesticides can harm the environment	68.0	20.0	12.0
Aware pesticides can contaminate water sources	64.0	24.0	12.0

Table 3: Perception indices (n = 400)

Perception index	Mean score (1–5)	SD	Interpretation
Health risk perception	4.10	0.60	High
Environmental risk perception	3.80	0.70	Moderately high
Risk–benefit perception	3.20	0.90	Moderate

Table 4 on safety practices used by the respondents reveals poor safety practices. Only 20.9% of respondents used any personal protective equipment (PPE). Reading pesticide labels "always" was reported by only 10.0%, and following recommended dosages "always" by only 12.9%. Over half (58.3%) rarely or never followed dosage recommendations.

Table 4: Safety pesticide practices among vegetable farmers (n = 400)

Practice	Category	%
Use of any PPE	Yes	20.9
	No	79.1
Read pesticide labels	Always	10.0
	Rarely/Never	67.3
Follow recommended dosage	Always	12.9
	Rarely/Never	58.3

On the relationship between perception and insecticide use behavior, majority (80.7%) frequently applied insecticides. Interestingly, 89.2% preferred organic insecticides over synthetic ones, suggesting a latent demand for safer alternatives. However, this preference did not translate into consistent safe behavior, as precautions were rarely taken by 87.3%.

With respect to constraints to effective pesticide utilization has shown that the most cited constraints (Table 5) were economic constraints and inadequate advisory services (84.0%), high cost of PPE (71.2%), limited access to extension services and training (70.7%), difficulty in understanding labels due to illiteracy (87.9%), and availability of counterfeit products (80.7%).

Table 5: Constraints to effective pesticide utilization (n = 400)

Constraint	%
Economic constraints & inadequate advisory services	84.0
Difficulty understanding labels & illiteracy	87.9
High cost of protective equipment	71.2
Limited access to extension services/training	70.7
Availability of counterfeit/unlabeled products	80.7

Multiple regression analysis in Table 6 showed the determinants or predictors of use of safety practices by use of regression analysis. The results show that education level, health risk perception, and access to extension services were significant positive predictors of safer pesticide practices ($p < 0.05$). Years of farming experience and age were not significant. The model explained 42% of the variance in safety practice scores ($R^2 = 0.42, F = 6.36, p \leq 0.001$).

Table 6: Multiple Regression on Determinants of Use of Safety Practice

Predictor	Coefficient (β)	Std. Error	t-value	p-value
Education	0.45	0.18	2.50	0.016*
Health Risk Perception	0.60	0.22	2.73	0.008*
Access to Extension	0.35	0.15	2.33	0.023*
Years farming	0.01	0.01	1.00	0.320
Age	-0.02	0.01	-1.33	0.187

*Significant at $p \leq 0.05$. $R^2 = 0.42$.

86

DISCUSSION

The finding that vegetable farming in Giwa LGA is male-dominated aligns with previous studies in Nigeria (Adekunle et al., 2017; Bulu et al., 2017), reflecting broader gender roles in African agriculture. The high level of awareness regarding health risks (72.0%) is consistent with Issa (2021) in Kaduna who reported high level of awareness of risk on health, but contrary to findings of poor awareness in other regions (Akpa et al., 2016). However, the high perception of health risks (mean 4.10) did not translate into safe practices—a classic "perception-behavior gap."

The poor uptake of PPE (only 20.9%) mirrors reports from Oyo and Lagos States (Taofeek-Ayo-bello & Olufunso, 2017; Adesuyi et al., 2018), where cost and discomfort were major barriers. The very low adherence to label reading and recommended dosages is particularly alarming and consistent with findings by Ugwu et al. (2015) and Cheke & Oluwole (2019). This suggests that awareness alone is insufficient; farmers need practical, accessible training and affordable safety equipment.

The significant positive effect of education on safety practices corroborates Akeem and Sofoluwe (2021) and Adesuyi et al. (2018), who found that educated farmers are better able to read instructions and access information. Similarly, the role of extension access as a predictor reinforces the need for strengthened agricultural advisory services, as noted by Oladele & Adekoya (2018). The major constraints identified—cost, limited extension, illiteracy, and counterfeit products—are systemic issues that require policy interventions.

CONCLUSION AND RECOMMENDATIONS

Vegetable farmers in Giwa LGA demonstrate good awareness and high perception of health risks from pesticides. However, this awareness is not matched by safe handling practices, including PPE use, label reading, and dosage compliance. A significant gap exists between risk perception and behavior. Education, health risk perception, and access to extension services are key drivers of safer practices. Economic constraints, poor extension coverage, illiteracy, and counterfeit products are major barriers.

Based on the findings of this study, the recommendations made include strengthening practical extension training by regular, hands-on training using local languages and demonstrations on safe pesticide handling, and label interpretation. Also, use of Integrated Pest Management to reduce chemical dependence and subsidizing PPE as Government and NGOs should establish local supply points, bulk purchase cooperatives, and targeted subsidies to make PPE affordable.

REFERENCES

Adekunle, C. P., Akinbode, S. O., Akerele, D., et al. (2017). Effects of agricultural pesticides utilization on farmers health in Egbeda LGA, Nigeria. *Nigerian Journal of Agricultural Economics, 7*(1), 73-88.

Adeogun, O. A., Adebayo, A. A., & Ojo, S. O. (2016). Safety practices among vegetable farmers in southwestern Nigeria. *Journal of Agricultural Safety and Health, 22*(3), 189-202.

Adesuyi, A. A., Njoku, K. L., Akinola, M., & Oladele, V. C. (2018). Pesticides related knowledge, attitude and safety practices among small-scale vegetable farmers in Lagos Lagoon wetlands. *Journal of Agriculture and Environment for International Development, 112*(1), 81-99.

Akeem, T., & Sofoluwe, N. (2012). Assessment of farm level pesticides use among maize farmers in Oyo State, Nigeria. *Food Science and Quality Management, 3*, 1-8.

Akpa, O. M., Ugwu, J. A., & Asogwa, E. U. (2016). Farmers' knowledge and handling of pesticides in vegetable production. *Scientific Research Journal, 3*(4), 40-47.

Bulu, Y. I., Adewole, M. B., & Faluyi, J. O. (2017). An analysis of adherence of precautions in herbicide application in Southwest Nigeria. *Ethiopian Journal of Environmental Studies and Management, 10*(10), 1310-1322.

Cheke, R. A., & Oluwole, O. (2019). Health and environmental impacts of pesticides: A case study of farmers in Ekiti State, Nigeria. *International Journal of Agricultural Sustainability, 3*, 153-163.

FAO. (2021). *The state of food and agriculture*. Rome: Food and Agriculture Organization.

Issa, F. O. (2021). Use of agrochemicals in Kaduna and Ondo States, Nigeria. *Journal of Agripreneurship and Sustainable Development, 4*(1), 47-55.

Ngowi, A. V. F., Mbise, T. J., Ijani, A. S. M., et al. (2017). Smallholder vegetable farmers in Northern Tanzania: Pesticides use practices, perceptions, cost and health effects. *Crop Protection, 26*, 1617-1624.

Ogunlela, V. B., & Mukhtar, A. A. (2019). Pesticide use among vegetable farmers in northern Nigeria. *Journal of Agricultural Extension, 23*(2), 112-124.

Oladele, O. I., & Adekoya, A. A. (2018). Biological capital and productivity of insecticides in sub-Saharan Africa. *International Journal of Agricultural Sustainability, 3*(3), 154-166.

Taofeek-Ayo-bello, K. O., & Olufunso, A. (2017). Perceived health risk posed by agricultural pesticides among farmers in Ikenne LGA, Ogun State. *International Journal of Agriculture and Environmental Research, 3*, 3657-3666.

Ugwu, J. A., Omoleye, A. A., Asogwa, E. U., & Ogunlela, M. R. (2015). Pesticides-handling practices among smallholder vegetable farmers in Oyo State, Nigeria. *Scientific Research Journal, 3*(4), 40-47.

WHO. (2020). *Pesticide residues in food: Toxicological evaluations*. Geneva: World Health Organization.

Yusuf, O. J., Oladele, O. I., & Salau, E. S. (2019). Determinants of pesticide use and safety practices among crop farmers in Kaduna State. *Nigerian Journal of Rural Sociology, 19*(1), 45-53.