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ATTITUDES OF FARMERS TO PESTICIDES USE AND MANAGEMENT PRACTICES IN SELECTED PERI-URBAN SETTLEMENTS OF SURULERE LOCAL GOVERNMENT AREA, OYO STATE, NIGERIA.

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ABSTRACT

The significance of the use of pesticides in improving crop production cannot be overemphasized. Their application in food production has also contributed significantly to increasing farmers' income. However, the growing concerns regarding the use of pesticide and its impact on the environment necessitate urgent actions to mitigate their hazardous effects. The study investigated the knowledge of farmers, their handling practices, and attitudes toward use and management of pesticides. A multi-stage sampling technique was employed to select respondents for the study, in which 50% (n = 52) of the registered farmers in the study area were randomly chosen. To capture the perspectives of the unregistered farmers, an additional 52 respondents were recruited through open invitation, with Microsoft Excel used to generate random numbers for selection, giving a total sample size of 104 respondents. A well-structured questionnaire was used to collect data on the set objective of the study and data were analyzed. Farming was observed to be male-dominated (51.9%), with most respondents being Yoruba ethnicity (82.7%) and an average age above 50 years. Education was generally low, with elementary schooling being the highest for many respondents. Use of personal protective equipment (PPE) was poor, with 90% wearing incomplete PPE, and some farmers engaging in risky behaviors such as eating, drinking, or smoking during spraying. Although many considered pesticide labels useful (82.7%), most (70.2%) lacked formal training in pesticide handling, leading to unsafe application, storage, and disposal practices. Fumigants and insecticides were used in crop storage, primarily for preservation and reducing post-harvest losses. These findings highlight critical gaps in pesticide safety practices with implications for farmers' health and environmental sustainability. Intensified farmer training on safe pesticide use, promotion of biological crop protection, and government support through provision of subsidized or free personal protective equipment were recommendations made to proffer solutions to the impending menace of indiscriminate use of pesticides in the environment.

Keywords: Farmers behaviour; Pesticides; Management; City life,

INTRODUCTION

Pesticides are chemical compounds that are used to kill pests. They are used in public health to control the population of diseases vectors such as mosquito (WHO, 2025). Pests of agricultural importance may include insects, rodents, fungi, nematodes and weeds. Pesticides are considered as one of the most important agricultural inputs widely used globally. In the year 2022, about 3.7 million tonnes of pesticides were used around the world (FAOSTAT, 2022), with the developing countries having significant share of this usage (FAOSTAT, 2022). In Nigeria alone, about 252,000 tonnes of pesticides of different classes were imported in the year 2020. This established the fact that pesticides play significant roles in agricultural development, with the intention of increasing productivity, ensuring affordable yield and increased food supply (Tudi *et al*., 2022).

Regardless, the use of these pesticides is under close observation of those concerned about the aftermath of their activities in the environment. The potentials of pesticides to mitigate pest activities could also be injurious to the environment when not applied appropriately. Bernardes *et al*., (2015) reported that only 1% of about three billion pesticides used globally yearly correctly attack the target insect pests while the rest are traced to pollutions and this is detrimental to healthy living of many organisms within the ecosystem, including human beings. Occupational exposure to pesticides is one of the ways by which farm workers are poisoned on daily bases. Several studies have established this as the major avenue by which farmers are unintentionally poisoned in the course of discharging their duties (Pradhan *et al*., 2023; Raimi *et al*., 2021.; Ismail *et al*., 2021).

The knowledge of farmers about pesticides usage and handling is crucial in managing their residual effects on the environment. Pesticides are commonly inappropriately handled and misused by farmers, a negative effect that potentially harms the environment including the farmers (Madaki *et al*., 2024; Struelens *et al*., 2022; Teklu *et al*., 2021). It is worthy to note that use of Personal Protective Equipment (PPE) in some developing countries is not fully implemented (Lari *et al*., 2023) especially among peasant farmers, despite government efforts towards human and environmental safety (Ejovwokeoghene *et al*., 2024). The knowledge of Good Agricultural Practices (GAP) in rural communities, which could have been impactful in reducing exposure to hazardous pesticides and safe pesticide usage does not necessarily correlate with its application on the farmers' fields (Istriningsih *et al*., 2022).

International organizations have established some regulatory framework, to help reduce the negative impact of pesticide use on the environment. The introduction of Maximum Residual Limits (MRLs) on food products by the Food and Agriculture Organization as well as World Health Organization is one of the notable steps taken to endure that food consumed by man is relatively safe (WHO, 2022). The European Union Maximum Residual Levels (EU MRLs) on food is also one of the giant strides taken by the European Union (EU) towards a safer food intake as this is a vital route of exposure to pesticides (European Union Maximum Residual Levels, 2024). However, regulations governing pesticide usage are not visible in many developing countries due to lack of effective pesticide residue monitoring system to limit pesticide circulation in their environment (Ejovwokeoghene et al., 2024).

Considering the health implications of exposure to pesticides, several scholarly publications have reported the presence of many pesticide residues in human blood and some organs (Sosan *et al*., 2008; Rashidi *et al*., 2022; Bunsri *et al*., 2023) and these projected dangers have been linked with pesticides usage and human exposure. Deteriorations in biomarkers of kidney and liver functions in association with pesticides poisoning through occupational exposure is worrisome. increase in some of these biomarkers due to exposure to herbicides such as pendimethalin, atrazine or dicamba which are recommended for agricultural and residential uses in the United States of America (US EPA 2017), have been reported to have elevated risk of end-stage renal diseases (Shearer *et al*., 2021).

Howbeit, farmers are more vulnerable to pesticides exposure in agricultural settings (Abdul *et al*., 2021; Shearer *et al*., 2021). Despite several measures proposed to drastically reduce the negative effects of pesticide within the environment to improve healthy living (NAFDAC, 2023; Finger, 2024), cases of acute and chronic pesticide effects are still evident. Therefore, this study was carried out to investigate the knowledge, handling and attitudes of farmers towards use of pesticides, with the aim of suggesting measures to ameliorate unintentional poisoning menace resulting from pesticides exposure.

METHODOLOGY

Study area

The study was carried out in Surulere Local Government Area (LGA) of Oyo State between August and November, 2024. Surulere LGA was purposively selected because of its agrarian nature. It is a peri-urban local government area and the headquarters is situated at Iresa Adu. It is located at longitude 4° 20'52.17" E and latitude 8°04'30.44" N. To the north of the local government is Oriire Local Government Area, to the east and south is Osun State, and to the west are Ogo Oluwa, Ogbomoso North and South Local Government Areas. By land mass, the local government covers an area of 23 km² and has a population of 140,339, covering over 300 communities (National Population Census, 2006).

Sample Size and Design

The sample size comprised of farmers and people living in the communities. Multistage sampling technique was used for the selection of the respondents. During the first stage, 1% of 300 villages was selected which included Okin-Apa, Oko and Kueke, all along Oko axis of the local government. The second stage involved random selection of 50% of the farmers from the registered list of farmers in the Local Government Area, which amounted to a total of fifty-two (52) farmers, which formed the sample size of the study (Table 1).

Table 1: Selection of the respondents for the study

S/N	Name of Village	No of registered farmers	No of respondents (50%)
1.	Okin-Apa	52	21
2.	Oko	61	24
3.	Kueke	14	7
Total	3 Villages	127	52

Source: OYSADEP

To account for farmers who were not included in the list of registered farmers, an open invitation was extended to individuals residing in the farming communities. Random numbers were generated using Microsoft Excel to guide the recruitment process. This procedure yielded an additional 52 respondents, who were incorporated into the study. Altogether, the total sample size comprised 104 respondents drawn from the selected farming communities.

Data Collection

Primary data were collected using well-structured questionnaire, which was designed to capture relevant background information from the respondents, training on pesticide use, use of spraying equipment, use of personal protective equipment (PPE), types of pesticide used for the control of crop pests and risks to human health and the environment. The questionnaire was originally developed in English, but subsequently translated into Yoruba, for gathering information and re-translated into English by professional linguists to ensure accuracy, cultural relevance, and clarity. This process facilitated the correct and smooth administration of the questions by the investigators.

Data Analysis

Data collected were analyzed using descriptive statistics (frequency counts, simple percentage, mean and standard deviation) computed with Microsoft Excel 16 and Stata (Version 15).

RESULTS AND DISCUSSION

Socio-economic characteristics of the farmers

About half (51.9%) of the respondents were males and a little less (48.1%) were females (Table 2). The respondents were predominantly Yoruba (82.7%) with an average age of 51.30 ± 17.64 years. About one third of the population (28.9%) was not literate; the highest level of education common to the respondents was elementary school education (26.9%). Most of the respondents (63.5%) were farmers solely but 26.9% combined farming with trading and 9.6% combined with white collar job. Marriage is very important and was rated highly in rural communities, as 76 % of the respondents were married. Most farmlands (63.5%) of the respondents were subsistent; majority of the respondents are cultivated between 1and 6 acres of land with an average farm size being 6.09 ± 8.08 (Table 2).

Use of personal protective equipment (PPE), habits during spraying, and cloth management.

Use of Personal Protective Equipment (PPE) was rated very low among the respondents (Table 3). 95.2% wore incomplete PPE; 54.8% do not change their clothes immediately after spraying, while 56.7% washed their clothes after spraying (Table 3). Half of the respondents (50%) reported washing spraying clothes with soap; 43% washed the cloths separately. Most respondents (63.5%) used the village stream for washing. During spraying, few engaged in risky behaviors, including smoking (1.9%), eating (11.5%), drinking water (14.4%), and alcohol consumption (1.0%) - Table 3.

Pesticides use and management

Majority (55.8%) of the respondents grew arable crops where pesticides are greatly used; 39.4% of the respondents were not able to the use pesticides but about 27.9% reported using pesticides on their farms for more than a decade (Table 4). Half (51%) of the respondents used pesticides at home and 92.3% applied pesticides up to five times in a

month (Table 4). More herbicides (43.3%) were used than insecticides (23.1%), but 33.7% applied both herbicides and insecticides. Pesticides were majorly sourced from agro-service centers (44.3%) and hawkers (40.8%) during market days (Table 4). Majority (54.8%) of the respondents claimed that the pesticides were readily available. However, 70.2% of the respondents had no training in pesticide application and management; 65.4% do not read the instruction label on the pesticides container and 41.4% considered the label as being very useful (Table 4).

Pesticide storage and disposal.

Pesticides were stored mainly at home (38.5%), on the farm (31.7%), in the store (18.3%), and in the kitchen (11.5%) -Table 5. Most respondents (77.9%) disposed empty pesticide containers by throwing them away, while 16.3% reported washing and reusing them for storing food, drinking water, or palm wine (Table 5). 42.3% washed the pump only when changing to a different pesticide, and 33.7% washed it with detergent. Disposal of leftover spray mixtures varied as 44.2% discarded them on the farm, 44.2% buried them, 9.6% disposed of them in streams, and 2.0% near wells or drinking water sources (Table 5).

Use of pesticides for storage of farm produce

Half of the respondents (50%) were reported not storing farm produce, while 47.1% stored food crops and 2.9% stored cash crops with fumigants (33.7%) and insecticides (16.4%) being the commonly used pesticide classes (Table 6). Preservation was the primary reason for pesticide use in storage (44.2%), particularly during the off-season. About one-third (31.7%) stored produce with pesticides for three months or longer, whereas 18.3% stored for no more than two months (Table 6). However, 30.8% of the respondents adhered to manufacturers' recommendations on pesticide quantities, while 19.2% applied them based on personal discretion (Table 6).

Tables 2: Socio-economic characteristics of the farmers (N=104)

Variables	Frequency	Percentage (%)
Sex		
Male	54	51.92
Female	50	48.08
Age		
< 30	12	18.26
30 – 40	19	11.54
41- 50	17	16.35
51- 60	22	21.15
> 60	34	32.70
Mean Age and Standard deviation	51.30 ± 17.64	-
Highest level of education completed		
No formal education	30	28.85
Less than primary school	7	6.73
Primary school completed	28	26.92
Secondary school uncompleted	11	10.58

Secondary school completed	16	15.38
NCE, OND, HND completed	7	6.73
University completed	5	4.81
Ethnicity		
Yoruba	85	82.69
Hausa	18	17.31
Igbo	1	0.96
Occupation		
Farming	66	63.46
Farming and trading	28	26.92
Farmer and White Collar	10	9.62
Marital status		
Never married	7	6.73
Currently married	79	75.96
Separated	2	1.92
Divorced	4	3.85
Widowed	11	10.58
Co-habiting	1	0.96
Farm size (Acre)		
1 – 5	66	63.47
6 – 10	23	22.12
11 – 15	3	2.88
16 – 20	10	9.61
> 20	2	1.92
Mean Farm size and Standard deviation	6.09 ± 8.08	-
Total	**104**	**100**

Table 3: Habits during spraying, use of personal protective equipment (PPE) and cloth management (N=104)

Variable	Frequency	Percentage (%)
Use of PPE		
Complete PPE	5	4.81
Incomplete PPE	99	95.19
Interval of cloth changing after spraying exercise		
Immediately	47	45.19
Later	57	54.81
Washing of cloth after spraying		
Immediately	59	56.73
Later	45	43.27

How clothes are washed after use		
Wash separately with soap	50	48.08
Mix with other clothes	10	9.62
Wash separately	43	41.35
Soak separately and mix with other clothes	1	0.96
Where clothes are washed		
At the village stream	66	63.46
Near village well/drinking	6	5.77
Outside area	32	30.77
Smoking during spraying interval		
Yes	2	1.92
No	102	98.08
Eating during spraying interval		
Yes	12	11.54
No	92	88.46
Drinking water during spraying interval		
Yes	15	14.42
No	89	85.58
Taking alcohol during spraying interval		
Yes	1	0.96
No	103	99.04
Total	**104**	**100**

Table 4: Pesticide use and management (N=104)

Variables	Frequency	Percentage (%)
Crops grown that attract pesticides application		
Arable crops	58	55.77
Cash crops	43	41.35
Both	3	2.88
History of pesticides usage (Years)		
Unknown	41	39.42
1-5	13	12.50
6-10	21	20.20
> 10	29	27.88
Use of pesticides at home		
Yes	53	50.96
No	51	49.04
Frequency of using pesticides per month		
0-5	96	92.31
6-10	7	6.73
> 10	1	0.96

Types of pesticides used		
Insecticides	24	23.08
Herbicides	45	43.27
Both	35	33.65
Sources of pesticides		
Agricultural shop	45	44.27
Extension agents	5	4.81
Chemical manufactural agents	3	2.88
Any available means	42	40.38
Others	9	8.65
Availability of pesticides		
Readily available	57	54.81
Not readily available	47	45.19
Training on pesticide application and management		
Yes	31	29.81
No	73	70.19
Determination of pesticide quantity to apply		
As recommended	27	25.96
On assumption	29	27.88
As advised by other farmers	48	46.15
Reading of instruction label on chemical before use		
Yes	36	34.62
No	68	65.38
Usefulness of label on chemicals		
Not considered useful	8	7.69
Not compulsory	10	9.62
Fairly useful	43	41.35
Very useful	43	41.35
Total	**104**	**100**

Table 5: Storage and disposal of pesticides (N=104)

Variables	Frequency	Percentage (%)
Where are pesticides stored before and after use		
At home	40	38.46
On the farm	33	31.73
In kitchen	12	11.54
In store	19	18.27
Handling of empty pesticide containers		
Burn	4	3.85
Destroy and bury	2	1.92
Throw away	81	77.89
Wash and use	17	16.34
Reuse of pesticide containers		
Yes	17	16.35
No	87	83.65

Purpose of pesticide containers reuse		
Not reused	87	83.65
Food packaging	13	12.5
Drinking of water/palm wine	2	1.92
Resell	2	1.92
Cleaning of spray pump after use		
Wash with detergent	35	33.65
Rinse with water only	21	20.19
Wash only when another type of pesticide is to be applied	44	42.31
Do not wash at all	4	3.85
Disposal of left over spray mixture		
On farm	46	44.23
In stream	10	9.62
Near well (drinking water)	2	1.92
Buried on the farm	46	44.23
Total	**104**	**100**

Table 6: Use of pesticides for storage of farm produce (N=104)

Variables	Frequency	Percentage (%)
Types of crop commonly stored		
None	52	50.00
Food crops	49	47.12
Cash crops	3	2.88
Type of pesticides use in produce storage		
None	52	50.00
Fumigants	35	33.65
Any type insecticides	17	16.35
Purpose of using the pesticides		
None	52	50.00
Preservation	46	44.23
Reasons other than preservation	6	5.77
Period when storage pesticides are much used		
No storage	52	50.00
Off season	46	44.23
On season	6	5.77
Interval of storage (Months)		
No storage	52	50.00
1-2	19	18.27
3 and above	33	31.73
Quantity of pesticides applied per sack/basket		
No storage	52	50.00
As recommended	32	30.77
As desired	20	19.23
Total	**104**	**100**

DISCUSSION

The outcome of this study revealed that male farmers are more involved than their female counterpart, which suggests that men are more represented in farming activities than women. This is consistent with the findings of Madaki *et al*., (2024) who similarly noted a higher male participation in farming. The average age of the respondents obtained from the finding suggests rural-urban migration among the youths of the communities since they are closer to urban centres. The fact that many of the respondents in this study were above the age of 50 years and were majorly males corroborate the findings of Yawson (2022) that reasonable proportion of rural dwellers are men and older in age. Due to the peri-urban nature of the study area, some of the respondents combined farming with white collar jobs. This is in agreement with the submission of Kumar *et al*., (2023) that some farmers in the peri-urban settlements have farming as their primary occupation but still engage in some other jobs to earn a living.

The safety of the environment where pesticides spraying activities are carried out supersedes any other reasons for their use. Hence, farmers' poor attitudes toward the use of complete PPE is worrisome because they do not completely put on PPE while spraying pesticides. These results are similar to those of Bamiwuye *et al.* (2024), who reported that some smallholder farmers in Iwo (a town in Osun State) demonstrate poor attitudes toward the use of complete PPE. Also, over a half of the respondents washed their clothes immediately after pesticides application which is in line with the claims of Kumar *et al*., (2023) that larger percentage of farmers wash their clothes after spraying exercise. However, a related study by Thammachai *et al.* (2022) reported that female farmers were more likely than their male counterparts to engage in personal cleanliness immediately after spraying activities. Eating and drinking during pesticides application by the farmers can be an indirect route of exposure to hazardous compounds with far reaching health implications. Studies have reported possible cases of unintentional poisoning resulting from occupational exposure to pesticides among farmers around the world (Abdul *et al*., 2021; Bunsri *et al*., 2023). The major arable crops grown by the respondents include maize, yam, cassava, pepper, tomatoes among others. These crops are preserved and protected from pest infestation with the use of pesticides and is consistent with the reports of Ahmadu and Ewansiha (2023) that farmers rely heavily on pesticides to minimize post-harvest losses and ensure the availability of staple food crops. In terms of frequency of using pesticides, most of the respondents apply pesticides up to 5 times in a month. It suggests that farmers may be over using pesticides in the study area and this agrees with Kumar *et al*., (2023) who similarly documented excessive pesticide application among smallholder farmers. Most of the farmers are not trained on the correct use of pesticides, making their use to be based on assumption, guess-work and advice given by fellow farmers. This is highly unsafe and detrimental to plant, livestock, ecosystem and human health. Also, the instructional label may not be fully considered and understood because of the low literacy level of the farmers. According to Masumbuko *et al.* (2024), levels of farmers' education can greatly influence their attitudes towards the use and managements of pesticides.

Most farmers store their pesticides at home and dispose the empty containers indiscrimi-

nately in open places while some re-use the containers for food and drinks and it is consistent with the study of Madaki *et al.,* (2024) who also highlighted the widespread misuse and poor disposal of pesticide containers among farmers. This is very unsafe and injurious to living organisms and the ecosystem as a whole (Ndlovu and Basopo, 2022; Ferri, 2022). However, Masumbuko *et al.* (2024), reported that empty pesticide containers are burnt while others are kept.

Post-harvest storage of farm produce is an essential strategy for minimizing quantitative and qualitative losses. This study demonstrated that some farmers utilized pesticides, particularly fumigants, as a means of preserving stored crops. This aligns with the report of Lougraimzi *et al.*, (2022), who observed that fumigants are widely applied by farmers to mitigate post-harvest grain losses. In the present study, preservation was identified as the principal rationale for pesticide use in crop storage.

CONCLUSION AND RECOMMENDATIONS

This study revealed that farming in the study area is predominantly undertaken by older male farmers, with youth participation limited. Farmers demonstrated a high reliance on use of pesticides for crop production and post-harvest storage, often applying them excessively and without adequate training. Poor compliance with safety practices, including incomplete use of PPE, indiscriminate disposal or reuse of pesticide containers, and unsafe behaviors during spraying, poses significant risks to human health and the environment. While pesticides play a critical role in crop preservation and food security, unsafe handling practices observed underscores the urgent need for targeted farmer education, stricter enforcement of pesticide regulations, and promotion of safer, sustainable alternatives.

The study recommended that agricultural extension workers should intensify efforts towards the training of respondents in correct pesticides handling and management which will greatly reduce indiscriminate use of pesticides in the environment. Biological method of crop protection should also be encouraged to ensure minimal usage of pesticides on the farm. Government should also provide personal protective equipment to the farmers, free of charge or at subsidized rate.

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