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AWARENESS AND USAGE OF PESTICIDES AMONG RURAL DWELLERS IN SELECTED LOCAL GOVERNMENT AREAS OF OYO STATE

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ABSTRACT

Pesticides application is a widespread agricultural practice with significant implications for human health, biodiversity and environmental sustainability. This study assessed pesticide awareness and usage among crop farmers, hunters and bushmeat sellers in Oyo State, Nigeria. A multistage sampling technique was employed to select five Local Government Areas (LGAs), from which 208 respondents were surveyed: crop farmers (128), hunters (48) and bushmeat sellers (32). Descriptive statistics and Likert scale analysis were used for data interpretation. The results revealed a high awareness level of pesticide use among respondents, with 100% awareness among crop farmers, 87.50% among hunters and 48.40% among bushmeat sellers. Pesticides were primarily used for weed control (35.90% among hunters), pest control (71.40% among bushmeat sellers) and a combination of purposes (28.60% among bushmeat sellers). Socioeconomic analysis showed that most pesticide users were married men aged 31–50 years, with tertiary education being a determinant of higher pesticide use (63.30% of crop farmers and 54.30% of hunters). Income levels also influenced pesticide application, with the highest usage recorded among farmers earning ₦20,000 - ₦40,000 monthly. Findings suggest the urgent need for improved pesticide regulation, safer alternatives and increased awareness campaigns to mitigate environmental and human health risks associated with pesticide exposure.

Keywords: Pesticide awareness, crop farmers, bushmeat sellers, pesticide toxicity

Introduction

The field of ecotoxicology emerged in the late 19th century, initially driven by concerns over acute poisoning events. However, widespread awareness regarding the environmental hazards of chemical pollutants only gained momentum in the early 1960s. Despite growing recognition of these impacts, the conventional approach of incident registration remains inadequate in capturing the full extent of the problem. Jeyaratnam (1990) reported that in developing nations, approximately 25% of workers may experience pesticide toxicity. This high incidence is largely attributed to the preference for more hazardous but cost-effective pesticides over safer, environmentally friendly alternatives (McConnell and Hruska, 1993). Moreover, it has been estimated that over 98% of applied insecticides and 95% of herbicides fail to reach their intended targets, instead contaminating non-target flora and fauna, as well as air, water and soil (Erhunmwunse *et al.,* 2012). Such widespread contamination poses significant risks to environmental health and biodiversity (Gupta, 2010).

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Pesticides are widely used in modern agricultural practices to enhance crop yields and productivity. However, their indiscriminate application has raised concerns among scientists, policymakers and the general public due to their harmful effects on non-target organisms and ecosystems (Nwani *et al*., 2010; Pocart *et al.,* 2003). Pesticide residues often persist in the environment at quantifiable levels, potentially leading to adverse ecological and health consequences (Omonona *et al.,* 2015). The extent of pesticide toxicity is influenced by several factors, including the physicochemical properties of the soil, vegetation types and climatic conditions (Eleftherohorinos, 2008). Additionally, the toxicity potential is determined by the chemical's intrinsic toxicity, application rates, persistence and resistance to degradation. Nwani *et al*. (2010) further emphasized that the bioaccumulation of xenobiotics in organisms depends on the chemical's properties, its availability in the ecosystem and the balance between absorption and degradation rates.

Despite the known risks, banned, restricted, or expired pesticides continue to infiltrate developing countries due to weak regulatory frameworks and their relatively low costs (Wesseling *et al*., 1997; Wilson, 2000; Wilson and Tisdell, 2001). Consequently, farmers in these regions face heightened exposure risks due to improper application methods, inadequate or poorly maintained spraying equipment, substandard storage practices and the unsafe reuse of pesticide containers for food and water storage (Ajogwa and Dongo, 2003). Given these concerns, this study aims to assess the level of awareness among respondents regarding pesticide use and their specific applications in agricultural practices.

Materials and Methods

Study Area

Oyo state with its capital Ibadan is located in western region of Nigeria. It is located between 7°51'09″ N 6°55´ latitudes and 3°55'52'' E longitudes. It is confined by the State of Kwara (north), Osun (east), Ogun (south) and part of Republic of Benin with that of Ogun (west). The state of Oyo having 33 local government areas covers an area of about 28,454 square kilometers and ranks fourteenth by size. After Lagos and Kano, Ibadan is Nigeria's third largest metropolis (by population). Its land area is 629 square kilometers and a projected population of 12,578,372 inhabitants in 2024 using the standard of NPC (2006). Oyo's five large division groups are: Ibadans, Ibarapas, Oyos, Oke-Oguns and Ogbomoshos. The inhabitants belong mainly to the Yoruba society, most of which are Oyos, Ibarapas, Ibadan and Oke-Oguns. The people of Oyo State mainly engage in agriculture. Oyo State has a dual environment and climatic conditions that is comparable to the entirety of the Southwest.

The environment is equatorial, especially with comparatively elevated moisture during dry and wet periods. Altitudes ranging from 200 to 450m above sea level, annual rainfall of 1000 to 1500mm and wind velocity of 96 to 145km/h (Nigeria Standard Organisation, 1973; Menakaya and Floyd, 1976). Approximately the yearlong average daily temperatures range from 25℃ (77.0℉) to 35℃ (95.0℉). Fiditi, Moniya, Asejire, Omi Adio and Odo-ona Kekere were wildlife markets located in Afijio, Akinyele, Egbeda, Ido and Oluyole LGAs of Oyo State

respectively. Figure 1 shows the chosen study sites.

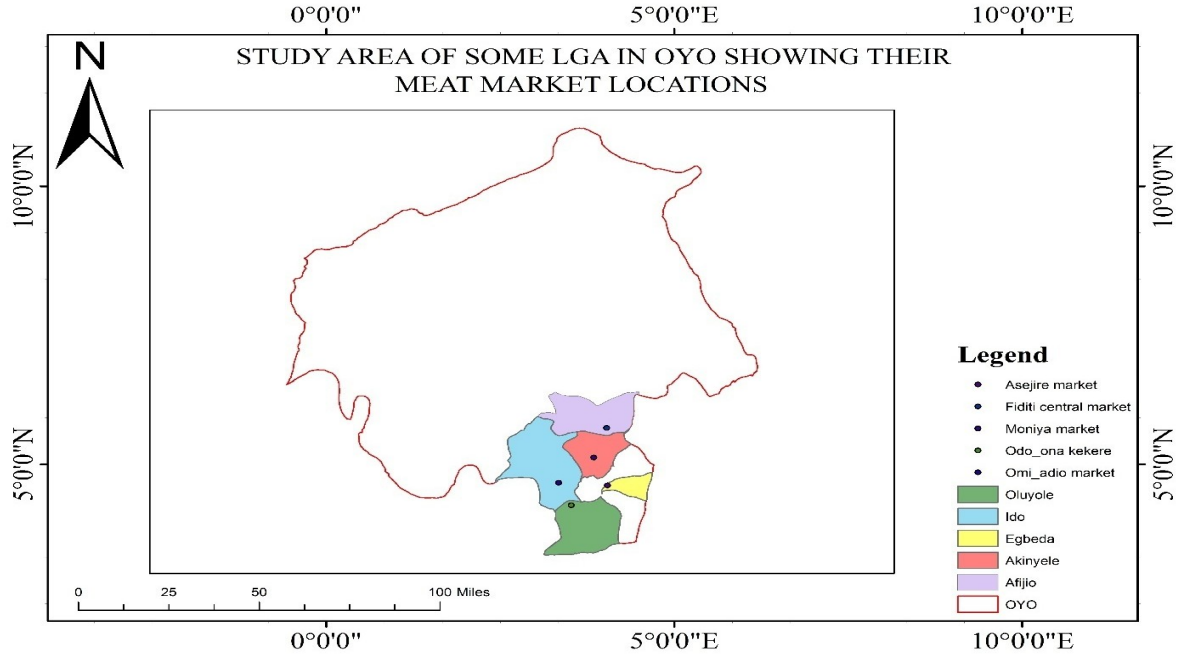


Figure 1: Nigeria map showing the selected Local Government Areas of Oyo State

Sampling Technique

Multistage sampling technique was adopted in this study. At first stage, five Local Government Areas were purposively selected in Oyo State. Five villages with their markets were later purposively selected from each of the five local government areas to elicit information from Crop farmers, Hunters and Bushmeat sellers.

Sample Size

Purposive sampling method was adopted based on the result of reconnaissance survey. The results showed that the population of stakeholders categories (Crop farmers, Hunters and Bushmeat sellers) in each selected study area varied between tens and one hundreds. Therefore, the method described by Diaw *et al.* (2002) was adopted. The method implies that wherever population was less than 100, 30% sampling intensity was used and when population was greater than 100, 10% sampling intensity was used. Thereafter, the questionnaires were administered among 208 respondents comprising; the crop famers (128), hunters (48) and bushmeat sellers (32).

Statistical Analysis

Descriptive statistics such as percentages and the frequency for demographic variables were used for the data collected with the SPSS IBM version 20.0. Overall totals were considered by calculating scores using Likert scale with simple percentage analysis. The test retest method was employed to obtain the

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reliability co-efficient of r = 0.75 and content validity was carried out.

Results and Discussion

Survey of Pesticide Awareness and Usage in Oyo State

In Figure 2, Oyo state recorded 100% awareness level for crop farmers, 87.50% for the hunter category and 48.40% for bushmeat sellers, respectively.

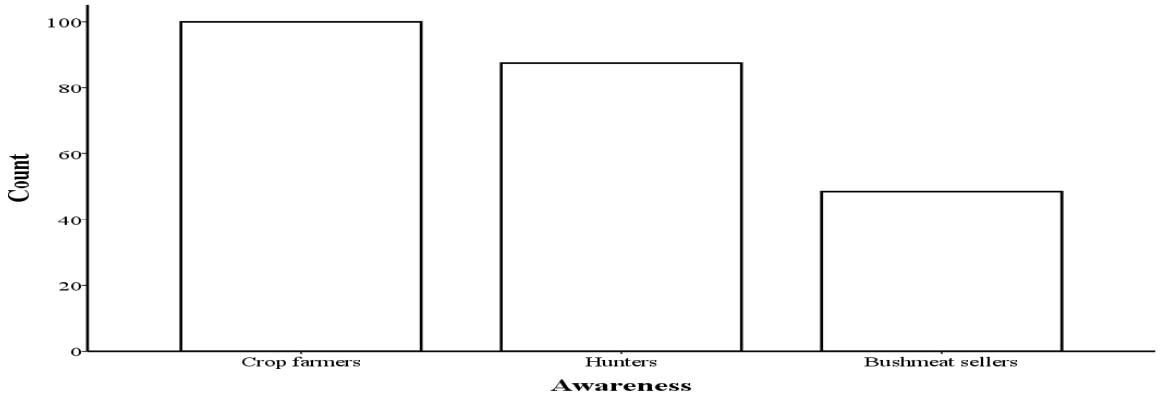


Figure 2: Awareness Level of Respondents to Pesticide Usage in Oyo State

Pesticides were used for different purposes (Figure 3). The hunters (35.90%) used pesticides for weed control while bushmeat sellers (71.40%) used it for pest control. Likewise, bushmeat sellers (28.60%) used pesticides for weed, rodent and pest control.

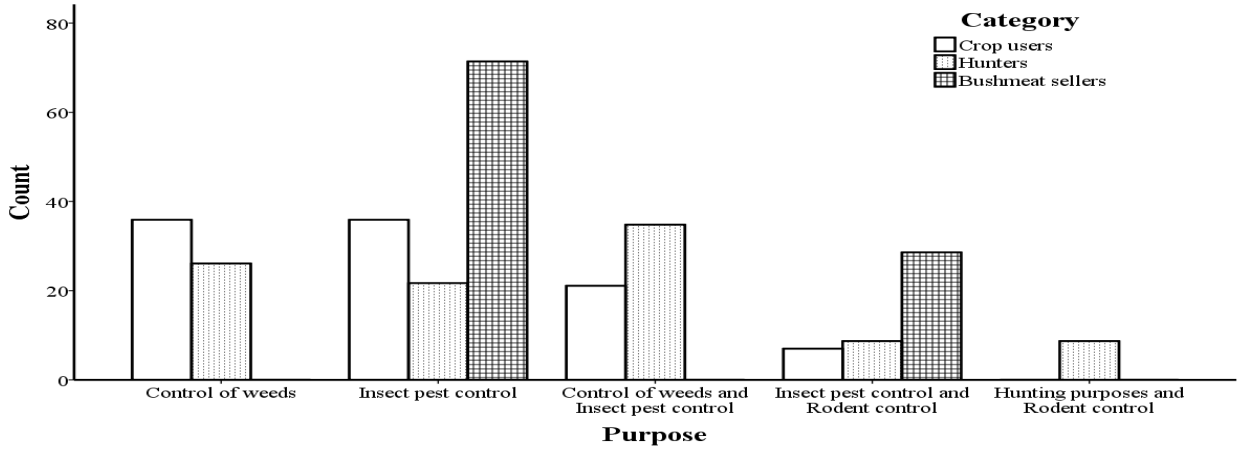


Figure 3: Purpose of pesticide used by respondents in the study areas

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Socio-economic Features of Respondents in the Selected Study Area

The results in Table 1 showed that the average age of the respondents were 36.40±2.11 years. Majority of crop farmers (92.20%) and all of hunters (100%) were male while the majority (90.30%) of bushmeat sellers was females. High utilisation of pesticides was noticed in ages 31-40 and 41-50 for crop farmers and bushmeat sellers while for hunters, ages 21-30 and 31-40 utilised pesticides more. All married crop farmers (100%), majority of bushmeat sellers (90.30%) and most (52.10%) of the hunters utilised pesticides. Majority (63.30%) of crop farmers with tertiary education qualification, most (54.30%) hunters with senior secondary school certificate and majority (67.70%) of bushmeat sellers with primary school certificate used more pesticides. Households ranging between <10 and 10 - 20 used more pesticides in all the categories assessed. The average income across the three categories varied even though <₦20,000 and ₦20,000 - ₦40,000 were the commonest average recorded in this study.

Table 1: Socio-economic Features of Respondents in Oyo State

Variable	Category	Frequency (%) Crop farmers (n = 128)	Hunters (n = 48)	Bushmeat sellers (n = 32)
Gender	Male	92.20	100.00	9.70
	Female	7.80	0.00	90.30
Age (years)	= 20	0.00	17.80	6.50
	21 – 30	13.30	35.60	9.70
	31 – 40	25.80	35.60	51.60
	41 – 50	47.70	6.70	32.30
	51 – 60	13.30	4.40	0.00
	> 60	0.00	0.00	0.00
Average age	36.40±2.11			
Marital status	Single	0.00	10.40	0.00
	Married	100.00	52.10	90.30
	Widowed	0.00	14.60	9.70
	Divorced	0.00	16.70	0.00
Education	Non formal	0.00	32. 60	0.00
	Primary school	7.00	8.70	67.70
	Secondary school	29.70	54.30	32.30
	Tertiary	63.30	4.30	0.00
Household size	< 10	57.80	52.10	80.60
	10 – 20	14.80	43.80	19.40

	21 – 30	7.00	4.20	0.00
	31 – 40	20.30	0.00	0.00
Monthly income	< 20,000	0.00	72.90	75.00
	20,000 – 40,000	36.60	20.80	14.30
	41,000 – 60,000	8.90	6.30	10.70
	61,000 – 80,000	26.70	0.00	0.00
	81,000 -100,000	8.90	0.00	0.00
	> 100,000	18.80	0.00	0.00

The high awareness level on pesticide usage recorded from the three categories of respondents can also be used as an indicator that they were all conscious of their possible negative effects. This result correlates with the findings of Jeamponk and Thipsaeng (2014); Tijani *et al*. (2018) who presented data on high awareness level of pesticides by users in Thailand and Nigeria. According to Ahmed *et al.* (2011), level of awareness correlates with manner of pesticide usage although Murray and Tayler (2000) overruled the previous but state that awareness alone rarely depicts practice. This result is in tandem with the reports of Williamson *et al*., (2008) about indiscriminate pesticides use in Benin, Ethiopia, Ghana and Senegal. Also, regardless of their level of awareness on the risk and threat of pesticides and its residues on biodiversity, most respondents (particularly the hunters) in a bid to generate higher income resort to baiting bushmeats with highly potent chemical pesticides. Not only is this a danger for food security, it is also a danger to humanity's very survival (Entsie, 2002). However, considerations have been geared towards the use of highly harmful pesticides to curtail adverse effects by some scientists (Konradsen *et al*., 2003). Comparing this harmful method adopted by hunters to the assertion of Osibanjo (2001), it supports the view that negative effects caused by pesticides in Nigeria will linger for long because there is either no environmental legislation or its implementation.

The increased outcomes obtained for pesticides used in order to combat insect pests may be linked to the reality that it is widespread belief that pesticides are substances and/or combination of mixtures designed to avert, terminate and regulate pests that affect plant, man or animal (Lami and Amana, 2015; USEPA, 2007). The bushmeat sellers used insecticides in particular to wade off insect infestation on their products which unknown to them may be poisonous, dispersed into the environment and causing non-target species impact (Ademoroti, 1996). This process further increases man and animal exposure to pesticides (Forget, 1991). Other uses of pesticides as indicated by crop farmers in this study affirms the report of Lami and Amana (2015), which involves; its usage as a plant development controller, defoliant, moisture controller or agent for thinning fruit or as an untimely drop of fruits either before or after harvest to safeguard the products against decay, during storage, marketing and transportation and in the preservation and commercialisation of wood, wood products or animal foodstuffs.

Male and female crop farmers in Nigeria spray pesticides, with the bulk of the total

workforce resting on the male population. However, the results showed that male used more pesticides than their females' counterpart as early reported by scholars such as Zyoud *et al*., 2010; Oluwole and Cheke, 2009. This means that the male folks are probably more vulnerable to pesticides effects since they usually come in touch through their usage. The level of awareness of approved and banished pesticides is a crucial factor determined by age as aged farmers reduce risks taking and consequently are slow to embrace new methods, views and suggestions. Researchers from other countries revealed similar results (Recena *et al*., 2006). The respondents tend to believe and stick to the old way which has worked for them over the years unlike most pesticide users who are young and willing to try newly introduced products. Damalas and Hashemi (2010) showed positive attitudes of young farmers to pesticides in Greece but this is likely to increase pesticide use, induce pesticides and its catastrophic impacts more quickly than in advanced nations (Yudelman *et al*., 1998).

The per capita income of farmers plays a crucial role in determining their marital status and family size (Olawepo, 2010). Farmers with multiple wives often have larger families, which can reduce their per capita income due to increased financial responsibilities. This situation may limit their capacity to hire external labour, as more family members depend on the available income. However, larger families may also provide an internal labor source for farming activities, thereby reducing reliance on hired labour. The study revealed that most pesticide users were married, with a smaller proportion being widowed or divorced and very few were single. This suggests that farmers rely on family labour for pesticide application and allocate financial resources towards acquiring necessary inputs and services.

Education level significantly influenced pesticide use among farmers. A substantial proportion of pesticide users had tertiary (58.60%) and secondary education, while none had only primary or non-formal education. These findings align with those of Gaber and Abdel-Latif (2012), who emphasized that educated farmers possess better awareness of pesticide-related health risks. Similarly, Jensen *et al*. (2011) and studies from Cambodia reported a 55% reduction in mild pesticide poisoning cases among educated farmers who adhered to safety precautions, in contrast to their illiterate counterparts.

Household size also affected pesticide use, with smaller households tending to use pesticides more frequently. This finding supports Olawepo (2010), who noted that family size significantly impacts a farmer's resources, influencing labour availability and cost. Larger households typically reduce disposable income due to higher dependency, making it more challenging to invest in pesticides. Subsistence farmers, primarily smallholders, face a greater risk of pesticide exposure than larger-scale farmers, who often delegate pesticide application to hired labour. This observation aligns with WHO (1991), which highlighted that small-scale farmers lacking formal training and appropriate protective clothing are more susceptible to pesticide toxicity and its adverse health effects. Although men primarily handle pesticide application, gender-based labour division exposes other family members. Children often purchase pesticides and fetch

water for mixing, while women engage in planting, weeding and harvesting, inadvertently increasing household exposure to toxic chemicals (Mancini *et al*., 2005). Similar studies in Nepal reported that pesticide users often disregarded discomfort or unusual health symptoms, perceiving them as trivial, thereby neglecting necessary precautions (Atreya, 2008).

Continued exposure to pesticides whether through direct application, inhalation, ingestion, or dermal contact can lead to a range of health issues, including dizziness, convulsions, headaches, gastrointestinal disturbances and muscle spasms (Kedia and Palis, 2008). The severity of symptoms varies based on the pesticide's toxicity, dosage, and individual physiological responses (Ritter and Arbuckle, 2007). Additionally, research has established a correlation between pesticide exposure levels and the manifestation of related health symptoms (Kishi *et al*., 1995). Households residing near pesticide-treated areas face a heightened risk of long-term health complications, often undetected, due to chronic exposure (Larsen *et al*., 2017). Furthermore, contaminated food, water and dairy products may exceed permissible pesticide residue limits, posing additional health risks (Joko *et al*., 2020).

Income level indirectly influences pesticide acquisition, type and usage. Higher earnings enable farmers to invest in protective equipment, thereby mitigating pesticide-related health hazards. This finding aligns with previous studies, which reported that lack of proper protective clothing and inadequate training among small-scale farmers contribute significantly to pesticide toxicity and its detrimental effects (FAO, 1993). Research has shown that high-income pesticide users adopt better safety measures and stay informed about pesticide-related developments (Moradhaseli *et al.*, 2017; Sapbamrer *et al*., 2020). To minimize pesticide poisoning incidents, the WHO (1991) recommended restricting pesticide application to trained professionals. However, Wilson and Tisdell (2001) observed that many farmers continue to increase pesticide usage despite economic and social costs, lack of awareness about long-term consequences, the unavailability of alternatives and an underestimation of associated expenses.

Among the surveyed farmers, crop farmers exhibited the highest pesticide usage. Those with an average monthly income of 20,000–40,000 ranked highest in pesticide use, followed by those earning between 61,000–80,000, while those earning above 100,000 used pesticides the least. These findings corroborate previous research, which indicates that income levels indirectly influence pesticide procurement, selection and usage (Olawepo, 2010; Moradhaseli *et al*., 2017; Sapbamrer *et al*., 2020).

Conclusion

The study underscores the high level of pesticide awareness among respondents, with significant variations in usage patterns across occupational groups. Despite awareness, pesticide misuse persists, particularly among hunters and bushmeat sellers who utilize toxic substances for non-agricultural purposes. The results indicate that income level, education and household size significantly influence pesticides application. The reliance on banned and highly toxic pesticides due to their affordability and accessibility poses serious health and environmental risks. The study reaffirms that while awareness is high, it does

not necessarily translate to safe practices, leading to adverse ecological and human health consequences.

Recommendations

Based on the findings of this study, there is a critical need for targeted awareness campaigns and training programs on the safe handling, application and disposal of pesticides, particularly among hunters and bushmeat sellers, who exhibited lower awareness levels. Government agencies and environmental stakeholders should enforce stricter regulations on pesticide importation, distribution and usage plus ensuring that only approved and less toxic alternatives are accessible. Furthermore, extension services should be strengthened to educate farmers on integrated pest management (IPM) strategies, promoting environmentally friendly alternatives to chemical pesticides. Regular monitoring of pesticide residues in agricultural produce and the environment is essential to safeguard public health and biodiversity. Lastly, policy interventions should focus on subsidising safer pesticides and providing financial incentives to farmers who adopt sustainable pest control practices, thereby reducing the indiscriminate use of hazardous chemicals.

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