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Knowledge and Practices of Pesticides Use among Beans Traders within Abeokuta, Southwest Nigeria

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Abstract

Adequate knowledge and adoption of best practices is important to avoid pesticide poisoning and ensure food safety. Therefore, knowledge and practices of pesticides use was investigated among bean traders within Abeokuta, southwest Nigeria. Structured questionnaires were administered to bean traders to collect data such as trader knowledge about pesticide toxicity, practices and self-reported clinical effects following exposure. Data were analysed using descriptive statistical tools. The pesticides products used by traders contained organophosphates (62%), pyrethroids (26%) and inorganic compounds all of which are moderately hazardous. Data from the Likert scale on knowledge of pesticides showed that 78% of traders had reasonable knowledge of the toxicity of pesticides. Traders however failed to adopt best practices on the use of pesticides. The major self-reported clinical symptoms following pesticide use were skin irritation (76%), vomiting (78%), sneezing (73%), back pain (80%) and nausea (48%). Majority of the traders also neither sought medical help at hospitals nor took medication to relieve symptoms of pesticide poisoning. Therefore, training and sensitization of bean traders is recommended to promote pesticide knowledge and safer practices.

Des Connaissances et des pratiques de l'utilisation des pesticides chez les commerçants de haricots à Abeokuta, au sud-ouest du Nigéria

Résumé

Des connaissances et une adoption adéquates des meilleures pratiques sont importantes pour éviter l'intoxication par pesticides pour garantir la sécurité alimentaire. Cela a été étudié parmi les commerçants de haricots à Abeokuta, au sud-ouest du Nigéria. Les questionnaires structurés ont été administrés aux commerçants de haricots pour accueillir des données telles que les connaissances sur les négociants sur la toxicité des pesticides, les pratiques et les effets cliniques auto rapportés après l'exposition. Les données ont été analysées à l'aide d'outils statistiques descriptifs. Les produits de pesticides utilisés par les commerçants contenaient des organophosphorés (62%), des pyréthrines (26%) et des composés inorganiques qui sont tous modérément dangereux. Les données de l'échelle de Likert sur la connaissance des pesticides ont montré que 78% des commerçants avaient une connaissance raisonnable de la toxicité des pesticides. Les

commerçants n'ont toutefois pas adopté les meilleures pratiques sur l'utilisation de pesticides. Les principaux symptômes cliniques auto rapportés après la consommation de pesticides étaient une irritation de la peau (76%), des vomissements (78%), des éternuements (73%), des douleurs au dos (80%) et des nausées (48%). La majorité des commerçants ne cherchaient pas non plus l'aide médicale chez les hôpitaux et ils n'ont pas pris de médicaments pour soulager les symptômes d'empoisonnement des pesticides. Par conséquent, la formation et la sensibilisation des traders de haricots sont recommandées pour promouvoir les connaissances sur les pesticides et les pratiques plus sûres.

Introduction

Beans *(Vigna unguiculata)* are less expensive sources of dietary proteins, rich in water soluble vitamins. Out of the various legumes available in Nigeria, beans are the most widely grown, traded and distributed food commodity (Akibu, 2008).

However, bean production and storage are greatly threatened with severe insect pest infestation, leading to damage of stored produce and reduced profits to farmers and traders (Dahiru*et al*., 2014). With absence of modern grain storage facilities, bean traders and storekeepers rely mostly on chemical pesticides to control insect infestation. These compounds include organophosphates, carbamates, organochlorines and pyrethroids which are potentially hazardous to humans and wildlife (Karami-Mohajeri and Abdollahi, 2011).

There have also been global environmental concerns regarding unsafe use of pesticides for stored agricultural produce (Kariathi*et al*., 2016). Inappropriate use of agricultural pesticides as frequently observed in developing countries such as Nigeria is of grave concern due to its implication on human health and environmental safety. For years, there have been recurring reports of poisoning arising from consumption of pesticide treated beans sometimes leading to death (Etonihu *et al.,* 2011). Several research has also found unsafe levels of pesticide compounds and its residues in food produce bought in retail markets (Oyeyiola *et al*., 2017; Olutona and Aderemi, 2019).

Adequate knowledge about the toxicities of pesticide products and the adoption of best practices in pesticide use is of prime importance to avoid poisoning, reduce pesticide residues in food and ensure environmental safety. Frequent exposure to pesticide compounds by traders can cause both acute and chronic health complications such as skin dermatitis, respiratory disorders, neurologic disorders, cancer and death (Erhunmwunse *et al*., 2012).

This study was conducted to investigate the level of pesticide knowledge and practices of pesticide use among bean traders within Abeokuta Metropolis, southwest Nigeria. It also sought to understand the magnitude of self-reported clinical effects and how they are managed among the bean traders following pesticide exposure. Information from this study will be useful and will serve as guide to relevant agencies involved in education, administration and control of hazardous chemical compounds within Abeokuta and Nigeria

Materials and Methods

Study Area

The study area, Abeokuta is an ancient town in Ogun State, southwest Nigeria. The study area is metropolitan with boisterous trading activities, possibly due to its closeness to Lagos, an economic nerve centre. Major trading of farm produce and foodstuffs take place in markets every four days. Out of eight major markets within the town, five markets (Kuto, Lafenwa, Iberekodo, Elega and Bode Olude) were purposively selected for this study based on the high volume of bean sales taking place within these markets. In the selected markets, ten (10) bean traders were randomly selected and interviewed. Figure I shows the map of the study area.

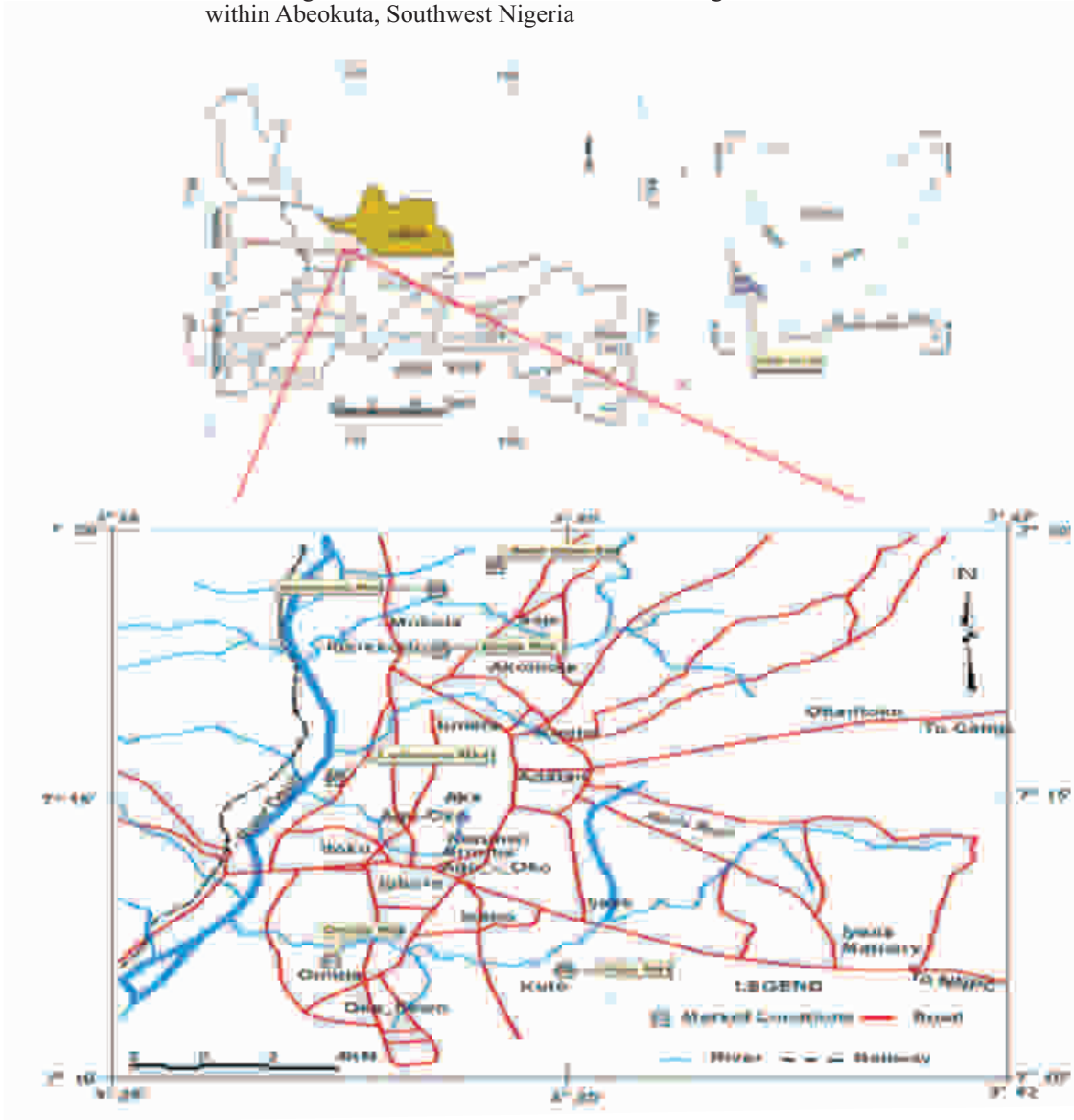


Figure 1: Map of the study area showing selected markets

Data Collection

Verbal consent was obtained from all the participants prior to questionnaire administration. Interviews were also conducted in the local languages of the traders so that there was no loss of meaning in questions. A structured questionnaire was administered to the randomly selected traders in each market. The questionnaire addressed the knowledge traders have on pesticides used against bean fly, their practices related to pesticides use, self-reported clinical effects following pesticide use, and ways of managing them. The questionnaire also sought after details about the socio-demographic characteristics of the traders.

Data Analysis

Data obtained from questionnaire administration were subjected to descriptive statistical tools such as tables and charts using SPSS 23.0 software. The knowledge of the bean traders regarding pesticide toxicity was assessed using the Likert scale of four scale questions to which respondents either agreed to or disagreed to. Respondents who scored above 14 out of a total attainable score of 20 were classified as having "good" pesticide knowledge. Trader knowledge was inferentially compared across markets using the ANOVA tool.

Results and Discussion

The demographic characteristics of 50 bean traders within Abeokuta metropolis interviewed in this study are given in Table 1. Majority (82%) of the respondents were male while only 16% were females. About 70% of the respondents were between the ages of 25 and 44. Forty percent of the respondents had no formal education while 20% of the bean traders had either secondary or post-secondary education. Almost half (48%) of the respondents sell in bulk quantities and to consumers who buy in small quantities. 20% of the traders sell in wholesale while 32% of the traders were retailers.

Trader Knowledge about Pesticides

The pesticides products used to control bean fly by bean traders within this study were mainly organophosphates (62%), with dichlorvos as the active ingredients. Other pesticides used include phostoxin, a pellet-like solid which produces phosphine gas when in contact with moisture. Some traders (12%) also used Rambo insecticide powder which contains permethrin as the active ingredients (Table 2). All the pesticides used belonged to the WHO class II which are moderately hazardous chemicals and are to be used with caution.

The pesticides used by bean traders are hazardous to human health and environment if used inappropriately, or without adequate knowledge on their toxic nature. A Likert scale data showed that majority (78%) of the beans traders scored 14 and above and therefore had good knowledge regarding toxicity of pesticides. Twenty two percent of beans traders scored <14 and are classified as having low knowledge of pesticide toxicity (Figure 2). An analysis of variance between market showed no significant difference (P = 0.82) in trader knowledge about pesticide toxicity across markets.

Most of the beans traders believed that using chemicals was the only effective means of controlling beanfly. Unfortunately, due to the absence of improved bean varieties and the lack of efficient storage facilities, the use of chemical pesticides remains the only available approach to local

Table 1: Socio-demographic characteristics of the respondents

Variables	Frequency	
	N	%
Gender		
Male	41	82
Female	9	18
Age		
25-34	10	20
35- 44	25	50
45-54	14	28
Above 55	1	2
Highest level of Education		
No formal	20	40
Primary	20	40
Secondary	8	16
Tertiary	2	4
Type of Sale		
Wholesale	10	20
Retails	16	32
Both	24	48

N refers to the number of respondent

traders. The traders also agreed that the pesticides they used are harmful to human health as evident in the clinical effects they observed on their skin or respiratory organs after application. However, most of the traders were unsure of the potential of these chemicals to affect other environmental components.

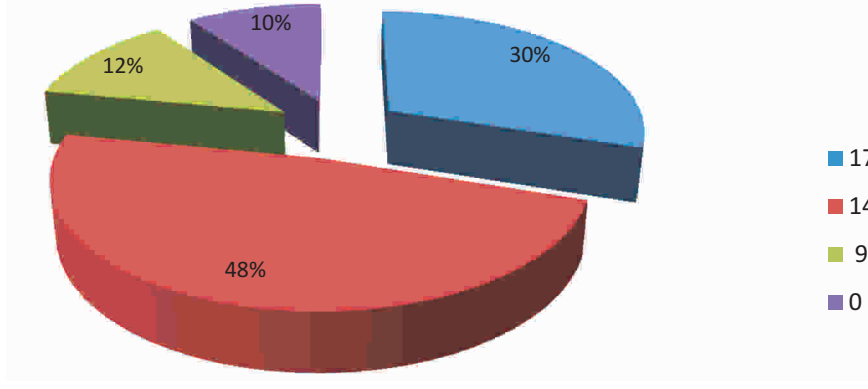
Traders Practices Regarding Pesticide Use

The practices and approach of bean traders within the study area to pesticide use is presented in Tables 3 and 4. Majority (78%) of the bean traders have no prior training regarding pesticide application and 68% of the traders do not read pesticide labels before use but follow procedures employed by colleagues or experienced traders. Similarly, large proportion of the traders sampled (>60%) were not aware that some pesticides have been banned, neither do they use any form of personal protective clothing during the application of the pesticides. Poor utilization of protective clothing during pesticide application is a major characteristic of the informal workforce. This increases a trader's exposure to the chemical via dermal contact and can be a risk factor for acute and chronic pesticide poisoning among bean traders within the study area. This is indicative that majority of the traders do not adhere to best practices in pesticide application and would require reorientation.

Table 2: Commonly used pesticides products by bean traders in the study area

Pesticide product	Active ingredient	Chemical family	WHO class	Frequency (%)
DDForce	Dichlorvos (DDVP)	Organophosphate	Class II	17(34)
Phostoxin	Aluminum Phosphide	Inorganic Pesticide	Class II	13(26)
Rambo	Permethrin	Pyrethroid	ClassII	6(12)
*Jule	Dichlorvos (DDVP)	Organophosphate	Class II	6(12)
*Onpaayan	Dichlorvos (DDVP)	Organophosphate	Class II	8(16)

* Locally formulated insecticides



Q_1	Bean fly can be controlled without chemical pesticides
Q_2	Chemical Pesticides are harmful to environment
Q_3	Chemical Pesticides can enter human body via inhalation, dermal and oral
Q_4	Pesticides can be harmful to human health

Figure 2: Responses on level of knowledge on pesticides toxicity according to Likert scale

Table 3: Safe practices and caution before pesticide use among bean traders

Variables	Frequency	
	N	%
Do you have pesticide training?		
Yes	11	22
No	39	78
Do you read and follow pesticides label before application?		
Yes	16	32
No	34	68
Do you know some pesticides are banned?		
Yes	18	36
No	32	64
Do you use PPE		
Yes	20	40
No	30	60

While applying pesticides to their products, almost all (94%) the bean traders interviewed refrained from food and drinks. Food consumption during pesticide application increases the chances of pesticide entry in the body through inhalation and ingestion. About 20% of the bean traders used on form of PPE or two (masks, gloves, boots) and only a few of the traders (10%) used sprayers during application. Majority of the traders (90%) applied the pesticide by shaking the chemical out of the container or using their bare hands (Table 4). Majority, of the bean traders (96%) either stored the pesticides containers properly in locked areas or use immediately after purchase to prevent accidental consumption by children. Some (44%) of the traders interviewed reported disposing used containers in waste bins while others dispose off used pesticide containers with reckless abandon around them. Proper disposal of pesticide containers is a vital part of pesticide management in order to prevent re-use of containers and reduce risk to human health and the environment (Karunamoorthi *et al.*, 2011).

After pesticide application, agricultural produce should be left and not consumed for a period termed the 'withdrawal period' depending on the nature of the chemicals used during which the chemicals used in preservation are allowed to break down into harmless metabolites. Majority (80%) of the traders interviewed do not observe this safe withdrawal period and do sell the beans once there is a ready buyer. This exposes the consumers to unsafe levels of these compounds with serious health consequences.

Table 4: Practices during pesticide usage by bean traders

Variables	Frequency	
	N	%
Do you eat/drink/smoke when applying pesticides?		
Yes	3	6
No	47	94
What kind of PPE do you use?		
No protective equipment	30	60
Mask	20	40
Gloves	12	24
Boots	2	4
How do you apply pesticides?		
Use sprayer/ gloved hands	5	10
Shaking of the container	18	36
Bare hands	27	54
How long do you store treated bean produce before sale?		
Sell immediately	40	80
< 1 week	8	16
>1 week	2	4
How do you store your pesticides?		
Locked in a store/box	33	66
Left unlocked in a place where children can reach	2	4
Buy and use it immediately	15	30
How do you dispose pesticide containers?		
Throw in dustbin	22	44
Throw on ground	28	56

Self-Reported Clinical Symptoms following Pesticide Use

Exposure to pesticides can have grave health implications. The major clinical symptoms following pesticide application reported by traders in this study included skin irritation, vomiting, sneezing, back pain and nausea (Figure 3). Other reported health symptoms include headache, dizziness, tiredness and dry mouth. Similar acute effects were reported by Mutune *et al*., (2018), following exposure to pesticide compounds. The severity of the health effects depends on how they are managed immediately after presentation. Only 32% of traders interviewed washed their hands after application while majority go about their activities. Almost all respondents (>92%) did not take a bathe neither did they change clothing after pesticide application (Table 5). Timely treatment of health effects following reactions to pesticide exposure is required to prevent serious injury. In this study, majority of the traders (90%) saw no reason to go to the hospital after experiencing symptoms of pesticide poisoning. Some of the traders also did not take medication and relied on the symptoms fading with time.

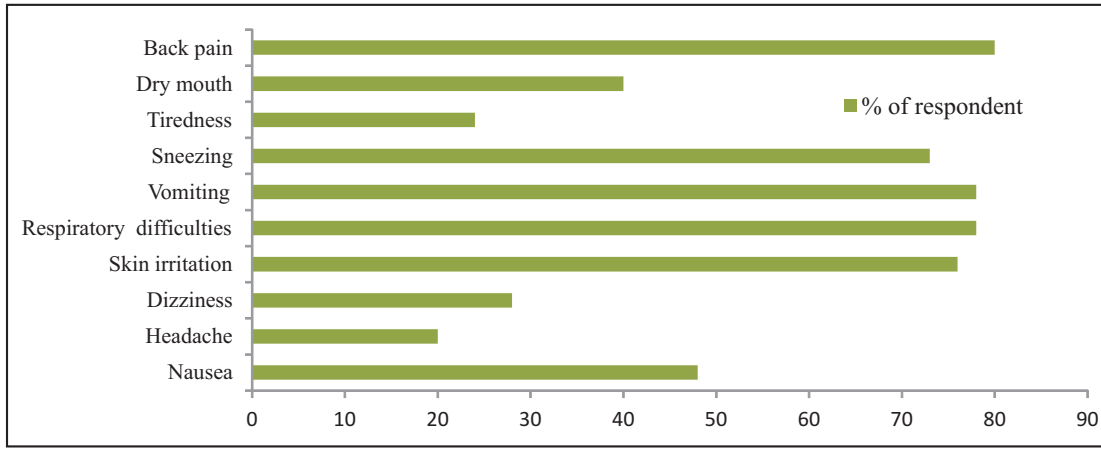


Figure 3: Self-reported clinical symptoms following pesticide use among bean traders

Table 5: Management of self-reported clinical symptoms after pesticide exposure by bean traders

Variables	Frequency	
	N	%
Wash Hands?		
Yes	16	32
No	34	68
Take bath?		
Yes	4	8
No	46	92
Remove Clothing/PPE?		
Yes	1	2
No	49	98
Go to the hospital?		
Yes	5	10
No	45	90
Take medication?		
Yes	24	48
No	26	52

Conclusion

The results of this study showed that the majority of bean traders within the study area have good knowledge of the hazards of pesticide to human health. Majority of the traders refrained from food and drinks during pesticide application. However, they do not use protective clothing neither do they follow instructions on pesticide labels in pesticide application. Acute health effects such as sneezing and vomiting are experienced by traders following pesticide application.

Despite this, majority of the traders neither sought medical help at the hospital nor took medication to relieve symptoms of pesticide poisoning. These results call for action from relevant authorities involved in education, administration and control of hazardous chemical compounds. The traders also need to be sensitized on best practices in the use of pesticides to reduces the risk of poisoning and environmental contamination.

References

Akibu, Y. (2018). Beans production and consumption in Nigeria. Available at http://www.belvynaglobal.com/beans-production-and-consumption-in-nigeria. Assessed April 15, 2021.

Dahiru, B., Abdullahi, G., Bukar, N., (2014). Pesticides use among grain merchants in Mubi grain markets of Adamawa State, Nigeria. *Agrosearch* 14(1):1-13.

Erhunmwunse, N., Dirisu, A., Olomukoro, J. (2011). Implications of pesticide usage in Nigeria. *Tropical Freshwater Biology*, 21 (1):15 - 25.

Etonihu, A.C., Aminu, B.A., Ambo, A.I., Etonihu, K. (2011). Iodine content and pesticide residues of some Nigerian food grains. *Continental Journal of Agricultural Science* 5 (1):26-32.

Karami-Mohajeri S., Abdollahi M. (2011). Toxic influence of organophosphate, carbamate, and organochlorine pesticides on cellular metabolism of lipids, proteins, and carbohydrates: A systematic review. *Human and Experimental Toxicology* 30 (9): 1119-1140.

Kariathi, V., Kassim, N., Kimanya, M., (2016). Pesticide exposure from fresh tomatoes and its relationship with pesticide application practices in Meru district. *Cogent Food and Agriculture* 2(1), 1196808, DOI: 10.1080/23311932. 2016. 1196808

Karunamoorthi, K., Mohammed, A., Jemal, Z. (2011). Peasant association member's knowledge, attitudes, and practices towards safe use of pesticide management. *American Journal of Industrial Medicine,* 54 (12): 965-970.

Mutune, B., Gachohi, J., Kikuvi, G., Niassy, S., Bii, C. (2018). Knowledge and practices of pesticides used against the bean fly (*Ophiomyiaphaseoli*) and associated health effects among bean (*Phaseolus vulgaris*) Smallholder farmers in Kabaru Location, Nyeri County. *International Journal of Health Sciences* 6(1): 77-89.

Olutona, G., Aderemi, M. (2019). Organochlorine pesticide residue and heavy metals in leguminous food crops from selected markets in Ibadan, Nigeria. *Legume Science* 1(1), e3, DOI: 10.1002/leg3.3

Oyeyiola, A., Fatunsin, O., Akanbi, L., Fadahunsi, D., Moshood, M. (2017). Human Health Risk of Organochlorine Pesticides in Foods Grown in Nigeria. *Journal of Health Pollution* 7(15): 63–70.

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