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Farmers Perception on Pesticides Usage and Safety Practices in Danko/Wasagu Local Government Area Kebbi State, Nigeria

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***Abstract*— The study examined farmer's perception on pesticide usage and safety practices in Danko/Wasagu Local Government area of Kebbi State. Structured Questionnaires were used to obtain information from the respondents. Descriptive statistics comprising frequency distribution tables and percentages were used for Data Analysis. Likert scale was used to determine farmer's perception on pesticides usage and precautionary measures employed when handling pesticides. The result of the study showed that majority of the respondents (90%) were male while female formed the minority in pesticide usage with only (10%). The study also showed that all the respondents (100%) were married and engaged in agricultural activities. The study further revealed that all the respondents never had any formal training on the use of pesticide from either governmental or non -governmental organizations. The research study also found out that all (100%) of the respondents were not aware of pesticide effects on man and environment. Likert Scale Analysis showed a positive perception by farmers on awareness of pesticide usage and safety practices. On perception of the respondents on the effect of pesticide on man and the environment, the study revealed that Nausea, Dizziness, Diarrhea, Respiratory Difficulty, Skin Irritation, Rashes, Fever, Peeling of the Skin, Vomiting, and Headache were the serious effects of pesticides on man. Majority the farmers (80%) do not employ precautionary measures when using pesticides. It is concluded that respondents had positive perception on pesticide usage and safety practices. It is therefore recommended that appropriate authorities should enforce the use of protective clothing, appropriate equipment and correct handling practices when using pesticides. Existing pesticide regulations and monitoring policies should be enforced. Government should also intensify efforts at registering and controlling distribution of pesticides and banning hazardous ones. It should also enforce the making of less toxic pesticides available to farmers.**

***Index Terms*— Farmers, Perception, Pesticides Usage, Safety Practices.**

I. INTRODUCTION

The global population is projected to be 9 billion by year 2050, and food availability and people's access to the food are matters that are increasingly important. Pesticides can help reduce the yield losses caused by the pests (e.g. insect pests, pathogens, weeds), and to feed the increasing world's population (Verger and Boobis, 2013). Agriculture is one of the most dangerous occupations although it is the second largest sector in the world as a source of work force. A large number of agricultural workers and farmers suffer from work accidents and diseases every year (ILO, 2010). Each and all individuals are faced with some types of pesticide exposure, but farmers and farming workers are particularly at high risk of pesticide exposure due to added risk of occupational exposure (Hashemi et al., 2012a). Crop protection products particularly the use of pesticides against pests is one of several factors that are contributing to the huge growth in agricultural production. Pesticides are major inputs of the modern agricultural production, and due to their high capability and trustworthiness for crop protection against pests and warranty of high crop yields (Ahmed et al., 2011; Cooper and Dobson, 2007; Damalas, 2009; Fan et al., 2015). To protect human health against vector-borne diseases, for example, malaria, dengue, Zika fever, Chikungunya fever (Cuervo-Parra et al., 2016; WHO, 2009; Wilson and Tisdell, 2001), and to protect home sites, storages, lawns from weeds, pathogens and both insect and mammal pests pesticides are also used (Nayak et al., 2015; Sarwar, 2016; Spliid et al., 2004).

Pesticides are chemicals usually synthetic sometime biologically used to kill or contain the activities of pests (Wikipedia, 2014). Crop damage from pest infestation often result in serious consequences, warranting the need to use pesticide. However, despites their benefits, pesticide are potentially hazardous to man and the environment when inappropriately handled (Larson, 2003). Factors such as balanced use, optimum dosing, correct application method and timing helps in ensuring improved agricultural productivity (Bhan, 2014). Use of agrochemicals has led to increased food production. However, exposure to other organisms during their application including human, is poorly controlled (Damalas, 2017). Their use has significantly increased the concentration of toxic materials in food and the environment, with negative effects on plant and animal health. (Anderson, 2016) The world health organization (WHO) has estimated that more than three million farmers in developing countries are poisoned by agrochemicals each year (WHO, 1992; Larson, 2003).

In Nigeria, agricultural sector is the major supplier of food, raw materials and 70% of Nigeria's population largely

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depend on this sector for survival (Olakunle, 2016). Due to the country's drive to increase agricultural production and the upsurge of different species of pest that damage and ravage agricultural products` in field and storage, farmers have resorted to the use of agrochemicals as an important control strategy (Ajibola, 2015). An estimated 125,500, 130,000 metric tons of pesticides are used annually (Asogwa, 2013). According to Rahman and Chime (2013), 7% of rice and yam farmers apply pesticides, and 41% of farmers apply pesticides to at least one food crop in Nigeria. The application of pesticides is often imprecise, with unintended worker exposures. Ogwa and Dongo (2013) on problems associated with pesticide usage and application in cocoa production in southern Nigeria found the use of pesticides for insect pest control has generated public health problems and environmental pollution in Nigeria.

Exposure to insecticides is one of the most important occupational risks among farmers in developing countries. In some situation exposure to insecticides can occur from accidental spills of chemical leakages of faulty spraying equipment (Ateya, 2016). The exposure of farmers increases in the case of not paying attention to the instructions on how to use the insecticides and particularly when they ignore basic safety equipment (Ajayi, 2018).

Despite the fact that several pesticides are banned and restricted or unregistered in many countries despite them been listed as hazardous by the World Health Organization (WHO, 2012); Fagewonyomi (2015), Stated that many of them are still widely promoted and applied especially in developing countries where weak controls and dangerous work condition make their impact even more devastating. In view of the adverse environmental effects from the usage of insecticide, lack of awareness of health consequences by some farmers, it therefore becomes imperative to identify farmers and pest management practices in their farming activities by investigating farmer's awareness and perception about the effect of pesticides used in the environment.

II. METHODOLOGY

Description of the Study Area

Danko/Wasagu local government is one of the twenty one (21) Local Government Areas of Kebbi State. It covers a geographical area of four thousand, two hundred and eight (4,208km^2) square kilometers, with an estimated population of about two hundred and sixty five thousand, two hundred and seventy one (265,271) people (NPC, 2006). It is bordered in the south by Sakaba Local Government Area, in the west by Zuru Local Government Area, in the North-East by Bukkuyum Local Government Area of Zamfara State (KBSG, 2003).

Danko/Wasagu Local Government lies between latitude $11^0 25``$N and longitude $5^0 40``$ E of the equator. The area is flat or low topographically with a fertile soil, covered by sandy soil, sometimes coarse in texture with several Fadama and alluvial plain soil, suitable for Agricultural activities. The area is made up of eight (8) administrative districts namely; Danko, Wasagu, Ribah, Waje, Kanya, Bena, Kyabu and Wari Districts. The weather is marked by a single raining season and long dry season. The average rainfall is 720mm, the raining season period is between May to October, raining season is about five months. The average temperature is 37^0 C - 38^0 C. November to February are particularly cold due to dry hamattan and from March to April are generally hot (Girma, 2008). Types of crops grown include cereals (Maize, millets, sorghum and rice) horticultural crops like hot pepper and amaranths, livestock kept are cattle, sheep and goat at peasant level.

Sampling and Sample Size

Agricultural Development Project (ADP) in Danko/Wasagu Local Government Area has 3 Extension Blocks headed by a Block Extension Supervisor (BES). Each Block has 8 villages under it headed by a village Extension Worker (VEW) Hence, purposive sampling techniques was employed to select six (6) villages namely: Wasagu, Bena, Kyabu, Maga, Ribah and Waje. Two villages from each block. Twenty (20) questionnaire were administered, in the selected six (6) villages, which gave a total of one hundred and twenty (120) questionnaire distributed to the respondents in the study area. Frequency of the use of pesticide was considered as the basis for selection of the study areas, as provided by the village Extension Workers.

Table Showing the Selected Districts, Villages and Sample Size

SN	LGA Danko/Wasagu	Block	Village	No of Respondents Selected
1		Wasagu	Wasagu	20
2		Wasagu	Bena	20
3		Danko	Kyabu	20
4		Danko	Maga	20
5		Sakaba	Ribah	20
6		Sakaba	Waje	20
Total				**120**

Source: Field Survey, 2021

Instruments for Data Collection

The basic instruments used for data collection for this research study was structured questionnaire. A structure questionnaire containing both open and close ended questions, was used to collect primary data from the respondents. Oral interview was however used to collect data from those who cannot read and write.Secondary data were sourced from test books, journals, conference papers, magazine, websites etc.

Methods of Data Analysis

The data collected from the administered questionnaires were coded, tabulated and analyzed using descriptive Statistic. Descriptive statistic such as frequency distribution tables, percentages, mean and Ranking were used to analyze the data. Likert scale was used to analyze the perception of farmers on pesticide usage and safety practices.

Model Specification

Likert scale is psychometric scale for measuring attitude in a research where questionnaire are used. So it can be used to examine perception.

For perception scale under positive statement scores assigned are: -

Strongly Agreed_____5
Agreed_____4
Undecided_____3
Disagreed_____2
Strongly disagreed_____1

For negative statement the score assigned are

Strongly agreed 1
Agreed 2
Undecided 3
Disagreed 4
Strongly disagreed 5

Where average mean score= Total sum of attitude score
Total number of respondents

The mean score = $\frac{\sum fxi}{N} = \frac{5+4+3+2+1}{5}$

RESULTS

Table 1 Socioeconomic Characteristic of the Farmers

Variables	Frequency	%
Gender		
Male	108	90
Female	12	10
Total	**120**	**100**
Age		
7-20	0	0
20-34	24	20
35-50	96	80
Total	**120**	**100**
Education		
Illiterate	2	2
Primary	36	30
Secondary	17	14
Tertiary	19	16
Non Formal Education	46	38
Total	**120**	**100**
Marital Status		
Married	120	100
Single	0	0
Total	**120**	**100**
Secondary Occupation		
Civil servants	43	36
Trading	29	24
Only farming	48	40
Total	**120**	**100**
Experience		
1-9 years	22	18
10-19years	26	22
20years and above	72	60
Total	**120**	**100**
Crops Grown		

Guinea corn	62	52
Maize	19	16
Rice	19	16
Pepper	10	8
Beans	10	8
Total	**120**	**100**
Training on Pesticides		
Yes	0	0
No	120	100
Total	**120**	**100**
Farm Size (ha)		
0-1 (ha)	10	8
1-2(ha)	48	40
2-3(ha)	34	28
Above 4(ha)	29	24
Total	**120**	**100**

Source: Field Survey, 2021

Table 2- Farmers knowledge, understanding and view about pesticides (n=120)

Harmful effect of pesticides	Variable	Frequency	(%)
Pesticides harm the environment	Strongly agreed	29	37.7
	Agreed	20	25.9
	Disagreed	18	23.4
	Strongly disagreed	10	13.0
Pesticides affect human health	Strongly agreed	40	51.9
	Agreed	15	19.5
	Disagreed	18	23.4
	Strongly disagreed	04	5.2
Ways by which pesticides enter the human body	Dermal Oral	39 61	50.6 79.2
	Eye contact	15	19.5
	Inhalation	25	32.5
	Don't know	11	14.2
Pesticides are essential for high crop yield and productivity	Strongly agreed Agreed Disagreed	51 14 09	66.2 18.2 11.7
	Strongly disagreed	03	3.9
Farmers read and follow pesticides labels	Yes No	17 60	22.1 77.9
Awareness on any banned or restricted pesticides	Yes No	47 30	61.0 39.0
Why Pesticides are banned or restricted	Highly Toxic Not effective Expensive	42 29 36	89.4 61.7 76.6
	Don't know	18	38.3

Source: Field Survey, 2021.*Multiple responses were recorded

Table 4.11 Distribution of the Respondents on the Safety Precautions when Using Pesticides (n=120)

S/N	Response	Frequency	Mean	Ranking
1	Use of protective clothing	96	(80.0)	4
2	Follow manufacturer guide	24	(20.0)	13
3	Never store food in empty container	62	(52.0)	8
4	Keep pesticide out of reach of children	72	(60.0)	7

5	Always close pesticide container well	49	(34.0)	9
6	Keep pesticide in separated store	77	(64.0)	6
7	Properly disposed used container	84	(70.0)	5
8	Do not eat during pesticide usage	98	(82.0)	3
9	Wash your body properly after application	113	(94.0)	1
10	Mix pesticide in a well ventilated area	36	(30.0)	10
11	Don't wash and use container	110	(92.0)	2
12	Do not use faulty equipment	26	(22.0)	12
13	Don't use domestic container to mix pesticide	29	(24.0)	11

Source: Field Survey, 2021*Multiple Responses were recorded

III. DISCUSSION

Table 1 shows the gender of the respondents. The results indicated that men were the majority in the study with 90% and female form the minority with only 10%. In the study conducted by (Oluwole and Cheke, 2009) to determine the environment and health effect of pesticide use in Nigeria 93.3% of the farmers were male.

The majority of the farmers' who were found to be intensively using pesticides were within age brackets of 35-40 representing 80% and 20% between the ages of 20-34. It means that teenagers were not actively involved in farming activities and young adults were more involved in farming. Age is a socioeconomic factor in farmer's awareness as young adult tend to know more about pesticides than the very young farmers. Older farmers are more aware of pesticide usage due to experience in farming over the years (Tijani and Nurudeen, 2005).

Farmer's level of awareness in using pesticides is related to their educational status as educated farmers can read labels on pesticide containers and also access information from stem sources hence reducing the level of information that should be disseminated by the change agents. In the study, it was determined that 2% of the farmers were illiterate, 46% had finished primary school, 17% had secondary education, and 16% had tertiary education and 19% non -formal education. Most of the farmers could not read and write as found out by this study. Marital status of the farmers was 100% as all the farmers interviewed were married. Secondary occupation of the respondents besides farming were civil service constituting 35%, traders forming 24% and 40% were exclusively involved in farming. Therefore, since greater percentage of farmers were aware of pesticides and used it over the years, it can be said that they were aware of the hazards associated with pesticides.Experience of farmers on farming is an important factor in acquiring skill in farming and effective use of inputs. The famers who participated in the study had been farming for many years of which 18% of them farmed for 1-9years, 22% 10-19years and 60% above 20years.From the experiences gathered by farmers over the years, it will be easier for them to properly handle pesticides on the farms.It was found out by the researcher that farmers in this study area mostly cultivates Guinea corn constituting 52%,16% cultivated maize, 4%cultivated rice and another 4% grew beans and all of which mostly used pesticides on their farms. The use of pesticides by the farmers have increased agricultural productivity and hence increased income and improved standard of living.

All the respondents in the study area who were interviewed testified that they have not received any kind of training on pesticide usage from either governmental or non -governmental organizations. Farmers therefore need regular training on pesticide usage so as to encourage safety practices on pesticide handling and minimize wrong usage. Majority of the had farm size of 1-2 hectares constituting 40% farmers, 28% of the respondents cultivated between 2-3 hectares of farm lands, 24% farmers possessed above 4 hectares of land and only 8% of the respondents had 0-1 hectares. Larger hectarage possession by the respondents means large output in return. The findings of Tijani (2006) supported that the larger the size of the farm the more the need for pesticides usage and the lesser the size of the farm the lesser the need for pesticide usage.

Table 2 shows the level of Farmers' knowledge on pesticides usage and safety practices including potential effects on human and environment, awareness of pesticides laws and exposure routes were presented in table 2. 71.4% of the farmers agreed that pesticide use poses some potential risk to human health while 63.6% agreed that it poses risk also to the environment. When farmers were asked to indicate how pesticides enter the human body, oral (79.2%), dermal (50.6%), inhalation (32.5%), and eye contact (19.5%) were stated as the most common routes of exposure to pesticides. About 14.2% of the farmers indicated their lack of knowledge of any route of exposure to pesticides. The majority of the farmers (58%) are aware that some pesticides have been banned or are restricted for use. The gaps identified in this study could be used for knowledge-based training programs for farmers. Training activities and programs can leads to increased levels of knowledge about safety precautions while handling pesticides. It is imperative that proper training programs on pesticide safety and on the hazards of pesticide exposure be developed to address gaps in farmers' knowledge about pesticides (Alam and Wolff, 2016; Jallow *et al*., 2017). The majority (84.4%) of the farmers indicated that pesticides application is essential for high crop yield and productivity. It is important to note that pesticide usage on our farms nowadays helps to improve crop productivity and reduce the drudgery associated with farming.

Table 3 revealed the safety precautions adopted by farmers when using pesticides, with the following mean. A cumulative mean of 80.0 respondents perceived protective clothing as an important strategy in handling pesticides. Mean of 20.0 respondents supported following manufacturer guide when using pesticides. Never store food in empty containers with a mean of 52.0 was perceived by the respondents as been an effective precautionary strategy when

handling pesticides. Keep pesticides out of reach of children with a mean of 60.0 was perceived as very effective in protecting children from poisoning by chemicals, mean of 34.0 agreed that closing pesticide containers tightly will always serve as a way of taking absolute precautionary measure in using pesticides. keep pesticide in separate store with mean of 64.0, properly disposal of used containers constituting a mean of 70.0, avoidance of eating or drinking during pesticide usage 82.0, washing of bodily parts properly after pesticide application 94.0, mix pesticide in a well ventilated location 30.0, do not wash used containers in water bodies 92.0, do not use faulty equipment when applying pesticides 22.0 and avoidance of usage of domestic containers to mix pesticide 24.0.

From the above it can be deduced that handling pesticides and application of diluted formulation require that applicators use appropriate personal protective equipment (Ajayi and Akinnifesi, 2017). Lack of personal protective equipment and unsuccessful used of pesticide are major problems during pesticide application (Damola et al., 2006). In the study by Yassin et al., (2002) 19.6% of the farmers wear hand glove, 21.7% use mask, 14.8% wear boots and 19.0% wore protective clothing. In the study conducted by Oluwole and Cheke, (2007) it was reported that 88.9% of the farmers applied pesticides without taking any personal precaution only 11.1% of the farmers wore boots while preparing and applying pesticide. In the study conducted by Gabar and Abdullatef, (2012) 53% of the respondents threw away empty packages, 40% used them at home and 4% burn them. In a study by oluwole and cheke, (2009). 98% of the farmers kept pesticide either in the bed rooms, sitting room or food store. Storing pesticide in places other than designated places exposes children and non-users to hazard (Tijani, 2006).

IV. Conclusion

The study examined the perception of farmer's on pesticides usage and safety practices in Danko/Wasagu LGA of Kebbi Sate. The socioeconomic characteristic (Respondents gender age, education, experience and farm size) significantly had positive impact on the awareness, effects and safety practices on pesticides usage in the study area. Generally, respondents had positive perception on pesticide usage and safety practices.

V. Recommendations

Sequel to the findings of this study, the following recommendation were made to enhance farmer's perception on pesticides usage and safety practices.

i. Farmers need training to encourage appropriate practices for safe use and handling of chemicals and pesticides by educating them about the risk involved in the misuse and abuse of the poisonous materials.
ii. Local suppliers are the major distributors of pesticides to farmers. They lack training on usage and storage at the shop level on safety practices. Regulatory and adequate monitoring policies are strongly recommended
iii. Government should intensify efforts at registering and controlling distribution of pesticide and banning hazardous ones.
iv. Government should enforce the making of less toxic pesticides available to farmers
v. The manufactures of pesticide should be enforced to fix label (warning) in the language users commonly understand and package chemicals in containers that can hardly be used.
vi. The Government should ensure that school curriculum in agriculture and science from the elementary schools contain pesticides usage and safety practices
vii. Government should provide approval places for disposal of empty pesticide containers and offenders apprehended, to minimize pollution on the environment.
viii. Prices of pesticides should be subsidized so that the very poor farmers can afford it. This is necessary because pesticide usage can boost agricultural output and reduce drudgery associated with farming.

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