

Full Length Research Paper

Assessment of the Level of Awareness on Agrochemicals' Safety Measures among Rice Farmers in the Federal Capital Territory, Abuja, Nigeria

Idu, E. E., Ajah, J., and Ifowodo, J. J.*

Department of Agricultural Extension and Rural Sociology, University of Abuja, Nigeria.

*Corresponding Author E-mail: avojacobs29@gmail.com

Received 28 June 2022; Accepted 30 July 2022; Published 5 August 2022

ABSTRACT: This study was conducted to assess the level of awareness of agrochemical safety measures among rice farmers in the Federal Capital Territory, Nigeria. Multi stage sampling technique was used to sample respondents for the study while primary data were collected using well-structured questionnaire. Descriptive statistics and multiple linear regression analysis were used to actualize the objectives of the study. The socio-economic characteristics of the respondents showed that majority (82.5%) of the rice farmers were male while 70% of them were married. The average household size of the respondents was 6.38 while the average age of respondents was 39.06 years, and this implies that majority of the respondents are still within the productive active age and can effectively engage in farming activities. Meanwhile, the average year of farming experience of the respondents was 21.31 years. Also, most (53.06%) of them had at least a secondary school education, their average farm size was 2.3 hectares while the average income of the farmers was N180,035.5. The result revealed that most of the respondents were aware of agrochemicals' safety measures, which are wearing of personal protective equipment when using agrochemicals, operational safety habits, proper disposal practices and safe storage of agrochemicals. Also, majority (97.22%) of the respondents were aware of the health implications associated with the use of agrochemicals. It was recommended that more awareness on the implications of unsafe use and exposure to agrochemicals should be carried out through a series of high level sensitization and enlightenment campaigns.

Keywords: Awareness, agrochemicals, safety measures, rice production

INTRODUCTION

Agrochemicals are chemically synthesized compounds that are used in agricultural production to improve productivity and also to control pests and diseases (Omari, 2014). It includes fertilizers, pesticides, and plant regulators. Farmers have over the years resorted to the use of agrochemicals in the bid to control pests and improve productivity. Agrochemicals are grouped into fertilizers and pesticides (insecticides, herbicides, fungicides, rodenticides, etc.). Horna *et al.* (2008) states

the use of pesticides by farmers to control weeds, increase agricultural productivity, and preserve agricultural products has reached a crescendo which requires urgent attention. There are concerns about the indiscriminate use of agrochemicals by farmers. The use of Personal Protective Equipment (PPE) among other safety protocols remains largely disregarded by farmer. Also, desisting from eating, drinking, and smoking during agrochemical application is not always adhered to by

farmers. According to Mabe et al. (2017) instead of farmers properly disposing of empty containers of agrochemicals, farmers use them for fetching water, keep cooked food in them, store seed stocks for next season usage, etc.

Many farmers do not have adequate knowledge and information on the health hazards associated with handling and use of pesticides (Owusu-Boateng and Amuzu, 2013). According to Okoffo *et al.* (2016), inappropriate use of pesticides to control pests and diseases has major health implications for smallholder farmers. Improper use and disposal of containers of pesticide are mainly result from inadequate knowledge, inadequate equipment, and storage, application of unregistered and uncertified pesticides, and the use of an excessive dosage. The exposure of farmers to agrochemicals has short term and long term effects (Gill and Garg, 2014). The ability to apply the right quantity is dependent on awareness of the health implications and the physiological effect on crop output and the quality of the products. Agrochemicals affect crops directly. Overdose and much exposure of crops to agrochemicals cause a lot of damage to the crops, thereby affecting the output level. In some cases, residues of agrochemicals remain in edible parts of crops which could cause health issues when consumed (Cocco *et al.*, 2013).

Rice farmers are exposed to agrochemicals when these chemicals are used during cultivation, and these include fertilizers, insecticides, herbicides and fungicides. It has been estimated that cereal crops receive between 5 and 8 applications of pesticides during a growing season. During storage, most cereals are treated with several chemicals to protect them from pests and diseases (Kuponiyi and Adewale, 2008). Some chemicals used by farmers are badly labelled, poorly packaged, and irresponsibly promoted and these add to the hazards involved in pesticides use. The use of pesticides is on the rise, even as agricultural production intensifies, and the increase in the inappropriate use and handling of agrochemicals, most likely results in environmental and health problems. Without proper education and the requisite training, there are tendencies of over application of the chemicals beyond the recommended rate or frequency per season. Runoff from these chemicals become a source of contamination for food crops and even spread to water bodies (Kuranchie-Mensah *et al.*, 2013).

Objectives of the study

The broad objective of the study is to assess the level of awareness of agrochemicals' safety measures among rice farmers in the Federal Capital Territory, Abuja:

- (i) Describe the socioeconomic characteristics of rice

farmers in the study area.

- (ii) Determine the level of awareness of agrochemicals' safety measures among rice farmers in the study area.
- (iii) Determine the rice farmers' level of awareness of the health implications associated with the use of agrochemicals.

METHODOLOGY

The study was carried out in the Abuja-Federal Capital Territory, Nigeria. FCT-Abuja is the capital city of Nigeria was founded in 1976 from parts of the state of Nassarawa, Niger, Kaduna and Kogi. It is within the middle belt region of the country. The territory is located just north of Lokoja the confluence of the Niger River and Benue River. It is bordered by the states of Niger to the West and North, Kaduna to the northeast, Nasarawa to the East and South, and Kogi to the Southwest.

Multi stage sampling technique was used to sample respondents for the study. The first stage involved the purposive selection of three (3) agricultural zones out of the four (4) agricultural zones in the Federal Capital Territory. The zones were selected because the rice producing areas of the territory are located there. The second stage involved the selection of three (3) blocks each from these zones. The third stage involved the selection of four (4) cells from each of the blocks. Finally, from each of the cells ten (10) respondents were selected. The total number of the respondents for the study was 360.

Primary data was used for the study and they were collected with the aid of a well-structured questionnaire which was administered to rice farmers in the study area by the researcher with the help of well-trained ADP enumerators who are familiar with the locality.

Data analysis

Objectives of the study were actualized using descriptive statistics such as frequency, percentage and mean. The data collected from the field were analyzed with the computer software SPSS. After analysis, the research findings were put into categories based on the research objectives and presented through the use of tables.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The result in Table 1 revealed that most (82.5%) of the respondents were male while the remaining 17.5% were female. It also revealed that 70% of the farmers were

Table 1: Socio economic characteristics of rice farmers in the study area.

Socio Economic Variables	Frequency	Percent (%)	Mean
Gender			
Male	275	82.5	
Female	97	17.5	
Marital status			
Married	252	70	
Not married	108	30	
Household size			
1-5	155	43.06	
6-10	147	40.83	6.38
11-15	43	11.94	
16-20	15	4.17	
Age (years)			
20 and less	22	6.11	
21-30	98	27.11	
31-40	75	23.61	39.06
41-50	64	17.78	
51-60	81	22.50	
61 and above	10	2.78	
Farming experience (years)			
1-10	187	51.94	
11-20	48	13.34	
21-30	47	13.05	21.31
31-40	40	11.11	
40 and above	38	10.56	
Educational qualification			
No formal education	122	33.89	
Primary education	47	13.06	
Secondary education	95	26.39	
Tertiary education	96	26.67	
Farm size (ha)			
less than 1	28	7.78	
1-3	289	80.28	2.3
4-6	43	11.94	
Income (₦)			
100000 and less	118	32.78	
100001-200000	135	37.78	180035.5
200001-300000	68	18.88	
300001-400000	33	8.62	
400001-500000	7	1.94	
Extension Visits			
None	102	28.33	
1-3	91	25.27	
4-6	52	14.44	
7-9	65	18.05	
10 or more	50	13.88	

Computed from field data, 2021

married, while the rest were not married. The household distribution of the respondents in Table 1 showed that the average household size of the respondents was 6.38. Age is a factor that can significantly affect the productivity of farmers. The average age of the rice farmers was 39.06 years, and this implies that majority of the respondents are still within the productive active age and can effectively engage in farming activities. The average

year of farming experience was 21.31 years. Farmer with many years of farming experience will likely possess the ability to make sound decisions as regards resource allocation.

Table 1 further revealed that most (53.06%) of them had at least a secondary school education, 33.89% did not have formal education while 13.06% of them had primary education. The average farm size of the

Table 2: Rice farmers' awareness on wearing personal protective equipment.

Personal Protective Equipment	Frequency	Percentage
Eye glass/goggle	340	94.4
Boots/rubber shoes	271	75.3
Hand gloves	312	86.7
Respirator/nose shield	359	99.7
Rubber hat/cap	342	95.0
Overall	309	85.8

Computed from field data, 2021

Table 3: Rice farmers' awareness on agrochemicals operational safety habits.

Operational Safety Habits	Frequency	Percentage
No talking during spraying	359	99.7
No eating during spraying	360	100
No drinking while spraying	340	94.4
No stirring of chemicals with bare hands	308	85.6

Computed from field data, 2021

respondents are 2.3 hectares. The average income of the farmers was ₦180,035.5. Most (28.33%) of the rice farmers had no contact with extension agents. The result further showed that 25.27% had between 1 to 3 contacts with extension agents while 18.05% had 4-6 contacts with extension agents.

Level of awareness of agrochemicals' safety measures among rice farmers in the study area

Rice farmers' awareness on wearing personal protective equipment

Knowing about personal protective equipment is vital to the farmers adopting the practice of wearing personal protective equipment. Table 2 shows the result of the rice farmers' awareness on wearing personal protective equipment. Most (99.7%) of the farmers were aware of wearing respirator or nose shield during when applying agrochemicals. Also, 95% of them were aware of wearing rubber hat or cap, 94.4% were aware of wearing eye glass or goggle, 86.7% were aware of wearing hand gloves, 85.8% were aware of wearing overall while 75.3% of the farmers were aware of wearing boots or rubber shoes when applying agrochemicals. This result implies that most of the respondents were aware of wearing personal protective equipment when using agrochemicals. Chukwuji (2010) stated that the more aware farmers are of the uses and application of a technology, the more they are likely to adopt the technology. Mwangi and Kariuki (2015) asserted that if

farmers have not been properly sensitized about some agronomic practices, they may not to adopt them.

Rice farmers' awareness on agrochemicals operational safety habits

Table 3 revealed that all the respondents were aware of "not eating when spraying agrochemicals", 99.7% of them were aware of "not talking when spraying agrochemicals". Also, 94.4% of them were aware of "not drinking when spraying agrochemicals" while 85.6% were aware of "not stirring chemicals with bare hands". This result implies that almost all the rice farmers were aware of operational safety habits to adopt when mixing and applying agrochemicals. This is in agreement with Oladeji (2010) who posited that farmers were aware of the recommended operational safety habits to adopt when using pesticides for their agricultural activities.

Rice farmers' awareness on proper disposal of agrochemicals

The result for the awareness of rice farmers on how to properly dispose agrochemicals and the containers is presented in (Table 4) and majority (96.67%) of the respondents were aware of "keeping of agrochemicals containers in safe disposal site", 96.1% of the respondents were aware of "punching of agrochemical containers to avoid re-use" while 90.8% were aware of "not burying of agrochemicals in the farm". Also, 84.4% of

Table 4: Rice farmers' awareness on proper disposal of agrochemicals.

Proper Disposal	Frequency	Percentage
No burning of agrochemicals	239	66.4
No burying of agrochemicals in the farm	327	90.8
No fetching of water with agrochemicals' containers	304	84.4
Punching of containers to avoid re-use	346	96.1
Keeping of containers in safe disposal site	348	96.67

Computed from field data, 2021

Table 5: Rice farmers' awareness on safe storage of agrochemicals.

Safe Storage	Frequency	Percentage
Keep agrochemicals safe from children and unauthorized persons	360	100
Chemicals not used should be returned to the containers as soon as possible	360	100
Agrochemicals should not be stored in kitchens or toilets	348	96.67
Protective wears should not be stored with the chemicals	194	53.89

Computed from field data, 2021

Table 6: Rice farmers' awareness of health implications associated with the use of agrochemicals.

Are You Aware of Health Implications Associated with the Use of Agrochemicals?	Frequency	Percentage
I am aware	350	97.22
Not aware	10	2.78

Computed from field data, 2021

the farmers were "not fetching water with agrochemicals containers" while 66.4% were aware of "not burning agrochemicals in the farm". This implies that more than half of the respondents were aware of the recommended agrochemicals disposal practices. The findings of this study agrees with Ali *et al.* (2020) who stated that there was high level of awareness on the safe disposal of agrochemicals among farmers.

Rice farmers' awareness on safe storage of agrochemicals

Table 5 showed the distribution of the respondents according to their awareness of safe storage of agrochemicals and the result revealed that all the respondents were aware of "keeping agrochemicals safe from children and unauthorized persons" and "returning unused chemicals to the container as soon as possible". It also revealed that 96.67% were aware of "not storing agrochemicals in kitchen or toilets" while only 53.89% were aware of "not storing protective wears with chemicals". This implies that there is high awareness on recommended safe storage practices among rice farmers in the study area. Jallow *et al.* (2017) found out in their study that there was high level of awareness on safe handling of pesticides among farmers.

Rice farmers' awareness of health implications associated with the use of agrochemicals

Presented in (Table 6) is the result of rice farmers' awareness of the health implications associated with the use of agrochemicals in the study area. The result revealed that majority (97.22%) of the respondents were aware of the health implications associated with the use of agrochemicals while only 2.78% were not aware of any negative side effects of using agrochemicals. The awareness of the health implications associated with the use of the agrochemicals could be catalyst to ensuring that the respondents adopt the recommended safety measures when using the chemicals. Butler-Dawson (2010) reported that farmers were well informed of the possible health implications that could rise from exposure and absorption of agrochemicals. The study however revealed that this knowledge of the possible hazardous effect associated with the use of agrochemicals has not prevented most of the farmers from exhibiting some risky behaviors when using or applying the chemicals.

Conclusion and Recommendation

This study evaluated the level of awareness of agrochemicals' safety measures among rice farmers in the Federal Capital Territory, Abuja and based on the results obtained from the study, the following conclusions

were reached. Majority of the farmers were males and married with a fairly large household size. The farmers were middle aged and literate, which means that many of them are well positioned to be aware, understand and adopt agrochemicals' safety measures.

There is a high awareness on agrochemicals safety measures among the farmers which include the wearing of personal protective equipment, operational safety habits, proper disposal practices and safe storage of agrochemicals. Also, there is a high awareness on the possible health implications that could arise from using agrochemicals among the farmers.

Despite the high awareness of the health implications associated with the use of agrochemicals, there is a general low level of adoption of safety measures among rice farmers in the study area. Meanwhile, adoption of agrochemicals safety measures is significantly influenced by the household size of the rice farmers, as well as their age and level of education.

Based on the findings, the following recommendation was made. More awareness on the implications of unsafe use and exposure to agrochemicals should be carried out through a series of high level sensitization and enlightenment campaigns. These campaigns should be front-lined by ministries, departments and agencies like the Agricultural Development Programme, Ministry of Agriculture, and the agricultural services department of the FCT Administration.

REFERENCES

- Ali, M. P., Kabir, M. M. M., Haque, S. S., Qin, X., Nasrin, S., Landis, D., & Ahmed, N. (2020). Farmer's behavior in pesticide use: Insights study from smallholder and intensive agricultural farms in Bangladesh. *Science of the Total Environment*, 747, 141160.
- Butler-Dawson, J. L. (2010). Pesticide exposure, risk factors, and neurobehavioural performance among vulnerable populations. PhD thesis, University of Iowa.
- Chukwuji, C. O. (2010). Adoption of organic inputs in soil fertility management practices by smallholder farmers in Delta State of Nigeria. *International Journal of Agriculture and Rural Development*, 1(2), 99-107.
- Cocco, P., Satta, G. & Dubois, S. (2013). Lymphoma risk and occupational exposure to pesticides: results of the epilymph study. *Occupational and Environmental Medicine*, 70(2), 91-98.
- Gill, H. K. & Garg, H. (2014). "Pesticides: environmental impacts and management strategies," in *Pesticides-Toxic Aspects*. S. Soloneski, Ed., pp. 188-230, InTech, Rijeka, Croatia.
- Horna, D., Smale, M., Al-Hassan, M., Falck-Zepeda, R. J. & Timpo, S. E. (2008). Insecticides use on vegetables in Ghana: would GM seed benefit farmers? IFPRI Discussion Paper 007855.
- Jallow, M. F., Awadh, D. G., Albaho, M. S., Devi, V. Y., & Thomas, B. M. (2017). Pesticide knowledge and safety practices among farm workers in Kuwait: results of a survey. *International journal of environmental research and public health*, 14(4), 340.
- Kuponiya F. A. & Adewale, J. G. (2008). The Use of Safety Devices in Adoption of Agro-Chemicals by Rice Farmers in Obafemi-Owode Local Government Area of Ogun State. *African Journal of Food, Agriculture, Nutrition and Development*, 8(4), 427-440.
- Kuranchie-Mensah, H., Yeboah, P. O., Nyarko, E. & Golow, A. A. (2013). Studies on organochlorine pesticide residue in fishes from the Densu River Basin, Ghana. *Bulletin of Environmental Contamination and Toxicology*, 90(4), 421-426.
- Mabe, F. N., Talabi, K. & Danso-Abbeam, G. (2017). Awareness of Health Implications of Agrochemical Use: Effects on Maize Production in Ejura-Sekyedumase Municipality, Ghana. *Hindawi Advances in Agriculture*. Pp: 11.
- Mwangi, M. & Kariuki, S. (2015). Factors determining adoption of new agricultural technology by smallholder farmers in developing countries. *Journal of Economics and Sustainable Development*, 6(5), 208-227.
- Okoffo, E. D., Mensah, M. & Fosu-Mensah, B. Y. (2016). Pesticides exposure and the use of personal protective equipment by cocoa farmers in Ghana. *Environmental Systems Research*, 5(17).
- Oladeji, J. O. (2010). Perceived health status and safety practices of agro-input dealers in Oyo State, Nigeria. *Nigerian journal of rural sociology*, 11(2), 71-77.
- Omari, S. (2014). Assessing Farmers' knowledge of effects of agrochemical use on human health and the environment: a case study of Akuapem South Municipality, Ghana. *International Journal of Applied Sciences and Engineering Research*, 3(2).
- Owusu-Boateng, G. & Amuzu, K. K. (2013). A survey of some critical issues in vegetable crops farming along river Oyasia in Opebea and dzorwulu, Accra-Ghana. *Global Advanced Research Journal of Physical and Applied Sciences*, 2(2), 24-31.