

Assessment of Risk Factors in Handling of Agro-Chemicals among Arable Farmers: A Public Health Concern in Oriire Local Government Area Oyo State, Nigeria.

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ABSTRACT: Recently, there is pressure on arable farmers to produce adequate staple food items to catch up with ever increasing human population and geometric rise in demand for food items. Farmers therefore leverage on usage of agrochemicals to enhance productivity in farm produce. The study in its major objective assessed the severity of risk factors in handling of agro-chemical among Arable farmers in the study area.

Specifically, the study examined the socio-economic characteristics of the arable farmers; identified the commonly used agro-chemicals; investigated the purposes necessitating usage of agro-chemicals; assessed the severity of various risk factors associated with the use of agro-chemicals and the research hypothesis determined significant relationship between the selected socio-economic characteristics of the respondents and severity of risk factors in handling of agro-chemicals among the Respondents.

A well-structured interview schedule was used to collect primary data. A total of 90 respondents were selected. Both descriptive statistics and inferential statistical analysis were employed in data analysis. The study revealed that there are male (63.3%) arable farmers in the study area than female, the population is slightly youthful with 44 years as the mean age and 70.0% are married. The respondents maintain an average of five individuals per household and are moderately educated with only 22.2% of them having no formal education. The study also deduced that Elimination of weeds, improvement of crop yield and rejuvenation of soil nutrients as major the purposes necessitating the use of agro-chemical. However, exposure of farmers to health risk, disruption of ecosystem and food poisoning sequel to harmful residual effects of agrochemicals constitute major risk factors associated with the use of Agro-chemicals

Chi-square analysis was used to test the hypothesis. The hypothesis revealed that there was a significant relationship between selected socio-economic characteristics: marital status ($\chi^2 = 34.44$, $p=0.001$), religion ($\chi^2 = 48.26$, $p=0.001$) and years of experience ($\chi^2 = 14.18$, $p=0.0027$) meanwhile sex, membership of social organization and sources of labour do not appear to have a significant impact on the risk factors of handling of agro-chemical in the study Area.

The study recommended strict adherence to dosage and specifications to avert overdose of agrochemicals that could result into harmful residual effect on farm produce which could constitute food poisoning causing public health concerns.

Also, enforcement of wearing of safety kits and after-use precautions of agrochemicals should be prioritized to avert health risk to farmers in the course of usage of agrochemicals.

Finally, detailed illustration and safety measures should be mandated to be conspicuously pasted on all agrochemicals by their producers to guide farmers on safe use of agrochemicals

INTRODUCTION

Agricultural practice is the major livelihood in rural Nigeria, it entails all activities directly related to cultivation of crops, rearing of animals and all other activities bothering on agro-processing in the agricultural value chain (Pragya & Abha 2018). Farmers in their quest to catch up with geometric increase in demand for agricultural products and the need checkmate destructive tendencies of rodents, pests and weeds have resulted to use of Agro-chemicals. Cultivation of staple food items is a major responsibility of the agricultural sector, and the need to expand farming practices is essential to catch up with ever increasing demand for food and agricultural products. Recently however, farming has encountered numerous constraints ranging from limited fertile land, diminished crop yields, pest control challenges, shortage of labour, and consequences of climatic change Elumalai and Punniyakotti (2025). To enhance food production and checkmate incidence of pests during crop cultivation, there has been a heavy reliance on

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agrochemicals such as hormones, fertilizers, antibiotics and pesticides. In recent times, the global use of these chemicals has increased geometrically. Fertilizers, including nitrogen, phosphate, and potassium, along with pesticides such as insecticides, herbicides, and fungicides, are widely used in agricultural production Haruna A.E., et al. (2024). However, excessive application and reckless handling of these chemicals has led to widespread contamination of the ecosystem, pollution, affecting air, soil, freshwater, aquatic life, climatic changes, plants, animals, and ultimately humans

Agro-chemicals are substances used to induce crop growth, control weeds, eliminate rodents and pests and to preserve agricultural products giving farm produce a prolonged shelf-life. Muhibbullah and Sarwa (2017) defined agro-chemical as a generic term for the various chemical products, such as fertilizers, antibiotics, hormone, fungicides, insecticides or soil treatment that improves the production of crops and safeguard the health of animals and induce growth and productivity in animals. Awad et al. (2018) noted that pesticides are widely used by farmers to protect crops against insects and diseases. However, excessive and indiscriminate use and handling of agro-chemicals may have adverse effects arising from inadequate knowledge of the Agro-chemicals and the safety practices. The unsafe handling and use of Agro-chemicals can lead to excessive exposures and accumulation of hazardous chemicals in the body system; this accumulation can lead to adverse effects on health and different associated symptoms ranging from acute poisoning, kidney damage, food safety risk, chronic non communicable life-threatening public health issues, such as endocrine disorders Olowogbon TS, *et al* (2021). While researchers have reported on various effects that agrochemical users regarding the safe handling of these chemicals. There is more emphasis on the need for the physical self-protection against unnecessary contact with the Agro-chemicals through the education on the use of personal protective equipment and environmental contamination Wei Zhou, Mengmeng Li, Varenayam Achal, (2025) In Nigeria, Agro-chemicals are used for numerous agricultural management practices such as weed control, enhancement and preservation of soil fertility, elimination of rodents, preservation of harvested crops while in storage and farm produce; these are usually applied by farmers who have little or no knowledge regarding some of the health implications of these chemicals

The morality rate associated with the handling of Agro-chemicals has been shown to be high in developing countries, such as Nigeria. Omar, A. W. H. et al. (2023). Agrochemical have posed a number of problems for agriculture, including the killing of beneficial insects, secondary pest outbreak, the development of pesticides resistance pests, health problems for farmers that handle the chemicals such as abdominal pain, dizziness, headache, nausea, vomiting as well as skin and eye problems. Many organizations and individuals involved in agricultural activities in Nigeria pay little attention to safe chemical handling (Agerstrand, 2017). Researchers have noted the importance of safe chemical handling for the prevention of chronic non communicable diseases Fagbohun A. A. (2024): Little is known about factors that may influence the attitudes of agrochemical user towards the prevention of health-related injury associated with the administration of Agro-chemicals. In addition to the health issues resulting from the use of Agro-chemicals, not much is known about the risk associated with safe chemical handling. Therefore this study assessed the risk factors in handling of agro-chemicals as a public health concern among arable crop farmers in Oriire Local Government, Ogbomosho, Oyo state, Nigeria.

The general objective of the study is to assess the risks factors associated with the use of Agro-chemicals as a public health concern among the arable crop farmers in Surulere Local Government of Oyo state. The specific objectives are to:

1. describe the socio-economic characteristics of the arable crop farmers within the study Area
2. identify the commonly used agrochemical by the respondents
3. examine the purpose necessitating the usage of Agro-chemicals
4. examine the severity of various risks associated with the use of Agro-chemicals by the respondents

Hypothesis of the Study

To achieve the stated objectives stated above, the hypothesis of the study is stated in a null form as:

Ho: There is no significant relationship between selected socio-economic characteristics of the respondents and the severity of risk factors associated with usage of Agro-chemicals.

METHODOLOGY

Multi-stage sampling procedure was used to select respondents for the study. The first stage involved the random sampling of 30% of wards from the 10 wards in the local government. The purposively selected wards sequel to prevalence of usage of agrochemicals are Ikoyi, Abe-Abaja and Iluju. The second stage involved random selection of two villages from each of the wards making a total of six villages. The list of registered farmers from the selected villages was obtained and 15% of the population was randomly selected to give a total number of ninety respondents that formed sample frame for the study.

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Table 1: The sampling Procedure and Sample Size

Purposive Selection of 30% political wards out of 10 based on prevalence of Agrochemical Usage	Random selection of 2 villages from each of the wards	Total Number of Registered farmers in the randomly selected Villages	Selection of 5% respondents from List of Registered Farmers in the Randomly selected villages
Ikoyi	Abule Elemo Aipo	120 113	18 17
Abe-Abaja	Abe-Abaja Alasapa	87 94	13 14
Iluju	Ladokun, Saamo	86 102	13 15
3 Wards	6 villages	602	90

Source: Author computed, 2025

DISCUSSION OF RESULTS

The study revealed an evenly distributed sex groups with 63.3% male of relatively youthful Respondents with 44 years as the mean age who are mostly married (70.0%). Majority of the respondents (78.0%) are educated at different levels from primary to tertiary level keeping an average of five individuals in their households. About an average of the respondents (51.0%) use family labour with an average of six years family experience. A good number of them participate in cooperative groups to support and sustain their farming enterprise.

Distribution of Respondents by Socioeconomic Characteristics

Socio-economic Characteristics	Frequency	Percentage	Mean
Sex			
Male	57	63.3	
Female	33	36.7	
Age (years)			
≤ 30	17	18.9	
31-40	49	54.4	
41-50	15	16.7	44.0 years
≥ 51	9	10.0	
Religion			
Christianity	52	57.8	
Islam	38	42.2	
Marital Status			
Married	63	70.0	
Single	22	24.4	
Widow	4	4.4	
Divorced	1	1.1	
Level of Education			
Non-formal Education	20	22.2	
Primary Education	41	45.6	
Secondary Education	20	22.2	
Tertiary Education	9	10.0	
Household Size (People)			
1-3	25	27.8	
4-6	44	48.9	
≥ 7	21	23.3	5 Individuals
Years of Experience			
1-10	58	64.4	
10 and above	32	35.6	6.2years
Source of Labour			
Family	46	51.1	
Hired	28	31.1	
Family and Hired	16	17.8	
Membership of Social Organization			
Cooperative Society	53	58.9	
Farmers group	37	31.1	

Source: Field Survey, 2025

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Purpose Necessitating the Use of Agro-chemicals

The study further identified the purposes necessitating usage of agrochemicals among the respondents and part of the major justifications for the use of agrochemical include but not limited to: elimination of weeds (100.0%), rejuvenation of soil nutrients (100.0%), reduction of pests and disease infestation (87.8%), enhancement of crop productivity (97.8%), hastening of crop growth and development (97.8%), reservation of harvested farm produce (83.3%), enhancement of crop quality (80.0%). Other purposes are genetic inducement of crops and increased farm efficiency.

Distribution of Respondents by Purpose Necessitating the Use of Agro-chemicals

S/N	Purpose	Frequency	Percentage
1	Enhancement of crop productivity	88	97.8
2	Increased farm efficiency	75	83.3
3	Elimination of weeds	90	100.0
4	Reduction pests and disease infestation	79	87.8
5	Rejuvenation of soil nutrients	90	100.0
6	Hastening crop growth and development	88	97.8
7	Enhancement of crop quality	72	80.0
8	Improvement of crop yield	90	100.0
9	Genetic inducement of crop	63	70.0
10	Preservation of harvested farm produce	75	83.3

Source: Field Survey, 2025

Risks Factors Associated with the Use of Agro-chemicals

The study assessed the severity of a number of risk factors arising from handling and usage of agrochemicals and the study revealed that ranked as the most severe risk factors on usage of agrochemicals (wms:1.60) are disruption of the ecosystem and exposure of farmers to health risks. Also, next in severity ranking with wms 1.37 residual effects of agrochemicals on the crop and distortion in the genetic make-up of crops. Also severe (wms: 1.17) is the case of food poisoning arising from residual effects of agrochemicals on crop. Furthermore, elimination of soil micro-organisms (wms:1.08) constitute another major risk factor in the usage of agrochemical. However, increased crop resistance to agrochemicals, increased compaction and contamination of water sources all with wms: 0.21 are the least severe risk factors to handling and usage of agrochemicals among the respondents.

Severity of Various Risks Factors Associated with the Use of Agro-chemicals

S/N	Risk-Factor	Yes	No	High Risk	Mild Risk	Not Risk	a	WMS	Ranks
1	Exposure of farmer to health risk	90	100	56(62.2)	32(35.6)	2(2.2)		1.60	1 st
2	Disruption of Eco-system	90	100	56(62.2)	32(35.6)	2(2.2)		1.60	1 st
3	Residual effect of Agro-chemicals on crops	86	95.6	33(36.7)	57(63.3)	-		1.37	2 nd
4	Distortion of genetic make-ups of crops	86	95.6	33(36.7)	57(63.3)	-		1.37	2 nd
5	Contamination of water sources	79	87.8	9(10.0)	1(1.1)	80(88.9)		0.21	6 th
6	Pollution of atmospheric air	79	87.8	8(8.9)	3(3.3)	79(87.8)		0.23	5 th
7	Elimination of soil micro-organisms	10	11.1	11(12.2)	75(83.3)	4(4.4)		1.08	4 th
8	Increased soil compaction	15	16.7	7(7.8)	5(5.6)	78(86.7)		0.21	6 th
9	Increased pest resistance	6	6.7	6(6.7)	6(6.7)	78(86.7)		0.21	6 th
10	Food poisoning	75	83.3	12(13.3)	63(70.0)	15(16.7)		1.17	3 th

Source: Field Survey, 2025

Test of Hypothesis

H₀: The null hypothesis stated that there is no significant relationship between selected socio-economic characteristics of Crops Farmers and severity of risk factors in Handling and usage of Agro-chemicals among Crop Farmers in Oriire Local Government. The table below revealed that there is significant relationship between socio economics characteristics such as religion ($\chi^2 = 48.26$, $p = 0.001$), marital status ($\chi^2 = 34.44$, $p = 0.001$), years of farming experience ($\chi^2 = 14.18$, $p = 0.0027$) and severity of risk factors in handling and usage of agro-chemicals among arable crop farmers in Oriire Local Government Area. Therefore, the null hypothesis was rejected.

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This result implies that religion, marital status, years of experiences affect the severity of risk factors in handling and usage of agro-chemicals among the Respondents

Therefore the null hypothesis was rejected and the alternative hypothesis was accepted which are sex ($\chi^2 = 0.178$, $p = 0.673$), membership of social organization ($\chi^2 = 2.44$, $p = 0.1185$), and source of labour ($\chi^2 = 4.8$, $p = 0.0906$)

HA: The alternative hypothesis therefore stated that there is significant relationship between the socio-economics characteristics of the respondents and severity of risk factors in handling and usage of agro-chemicals among arable the Respondents .

Chi-square showing Relationship between Socio-economic Characteristics of the Respondents and Assessment of Risk Factors in Handling of Agro-chemicals Among Arable Crop Farmers.

Variable	χ^2	P value	df	Remark
Sex	0.178	0.673	1	NS
Religion	48.26	0.001	2	S
Marital status	34.44	0.001	4	S
Membership of Social Organization	2.44	0.1185	1	NS
Years of experience	14.18	0.0027	3	S
Source of Labour	4.8	0.0906	2	NS

Source: Computed data 2025

S: Significant; reject null hypothesis

NS: Not Significant; accept null hypothesis

H_0 : Null Hypothesis

DF: Degree of freedom

χ^2 : Chi-square

5% level of significant

CONCLUSION

The public health concerns and morality rate due to poor handling and usage of Agro-chemicals have been on the high side lately. Farmers have been exposed to health risks such as respiratory problems, abdominal pain, dizziness, headache, nausea, and vomiting as well as skin itching and eye problems. The fact that farmers make use of agrochemicals to produce what the society consume makes the study more relevant to public health concerns. The study revealed a male dominated youthful and active population in their productive age. Most common among the agrochemicals used by Respondents include: Paraforce, Clear weed, Atrazine, Sunphosphate, and Glyphosate systemic herbicide(100%), Force-up and Urea fertilizer Wedlezz herbicide, Uproot herbicide, Touchdown forte and Gibberellin Acid

Major among purposes necessitating the usage of agro-chemicals include: elimination of weeds, rejuvenation of soil nutrients, improvement of crop yield and lower labour cost resulting in better profit margin, enhancement of crop productivity and hastening crop growth, reduced pests and disease infestation, increased farm efficiency and genetic inducement of crop and preservation of harvested farm produce

The various risks associated with usage of Agro-chemicals were: exposure of farmer to health risk, disruption of Eco-system, food poisoning sequel to residual effect of Agro-chemicals on crops, distortion of genetic make-ups of crops, degradation of soil micro-organism, Pollution of atmospheric air, contamination of water sources and increased soil compaction.

RECOMMENDATION

Arising from the findings of the study, strict adherence to safety rules and regulations coupled with application of recommended specification and dosage of agrochemicals to avert incidence of harmful chemical residual effects on farm produce that could be a source of threat to public health concerns should be prioritized.

Also, it was recommended that Producers of agrochemicals should be explicit and detailed about Users' instructions and illustrations of safety measures in handling of all agrochemicals for farmers' use.

Finally, concerned authorities and stakeholders in the agricultural sector should embark on aggressive enforcement of wearing of safety kits and adequate after-use precautions in the course of usage of agrochemicals by farmers.

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