

Study on the Assessment of Agro-Chemicals Usage and Health Implications in Owalla, Owerri North Local Government Area, Imo State

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ABSTRACT:

The study assessed the usage of agro-chemicals and health implications in Owalla, Owerri North Local Government Area, Imo State. A total of 95 respondents were selected using multi-stage, purposive and random sampling techniques and were administered an open and ended questionnaire. The findings revealed that sources of agro-chemicals shows that the majority of the respondents (65.2%) got their agrochemicals in the open market. The distribution of respondents according to the most utilized agro-chemicals, majority (36.8%) maintained that they make use of fertilizer while (34.7%) went for pesticides than other forms of agro-chemicals. The inhabitants (42.1%) were mostly civil servants, farmers (31.5%) while students were (26.3%). The results also showed that majority (83.1%) of the respondents responded that agrochemicals were harmful while (16%) thought otherwise. Majority (51.5%) of the respondents maintained that agrochemicals did not affect their farm income. However, (48.4%) pointed out that agrochemicals had positive impact on their farm income. Based on the constraints to adoption of agrochemicals, most of the respondents (86.3%) pointed out that the major constraints to adoption of agrochemicals is inadequate funds, difficulty to use (7.3%) and difficult to learn (6.3%). (18.9%) of the respondents indicated that their income between N200,000 - N250,000 and above due to utilization of agrochemicals on their farm.

Keywords: *Agro chemical, usage, health implications Owalla*

INTRODUCTION:

Agriculture depends heavily on environmental resources such as land, water, sunlight, and biological agents that support crop growth and pest management. The rapid growth of the global population has necessitated increased agricultural production to meet rising food demands. This need has driven the promotion of intensive land use practices, the use of agrochemicals, improved irrigation, and the development of pest-resistant crop varieties (FAO, 2022). In many developing countries, agricultural development policies emphasize the use of external inputs such as modern machinery, synthetic fertilizers, and other agrochemicals as a means of boosting food production (Nyongesa et al., 2023 Wesseling et al 2023; Wesseling et al 2021). This shift has led to an increased reliance on chemical-based methods rather than biological, cultural, or mechanical approaches for enhancing crop yields and managing pests, weeds, and plant diseases (Adeniyi et al., 2023). Agrochemicals, which include any chemical products used in agriculture to improve productivity, control pests, and manage plant

diseases, have become integral to modern farming practices. These substances encompass fertilizers and agricultural pesticides, including widely used insecticides, herbicides, fungicides, and rodenticides (Musa et al., 2021). Other, less-known agrochemicals include plant growth regulators, defoliants, and certain disinfectants. While these chemicals are critical for pest control in agriculture and public health-such as targeting mosquito vectors of diseases like malaria-pesticides inherently pose toxicity risks to non-target organisms, including humans (Ezeonu et al., 2022). As such, the safe application, handling, and proper disposal of these chemicals are crucial to minimizing their adverse impacts on health and the environment. Although agrochemicals offer substantial benefits in improving yields, studies have linked their misuse to significant environmental and health risks, including contamination of soil and water resources. The growing population pressure in Imo State has led to the fragmentation of land into smaller plots, driving the need for intensive agricultural practices among local farmers. This has resulted in a shift from the

traditional cultivation of crops like cassava, maize, and potatoes to more intensive horticultural practices, which require shorter growing seasons and promise quicker economic returns. The decline in the profitability of traditional cash crops has further motivated farmers to diversify into short-season crops like vegetables, which are often more susceptible to pests and diseases (Horne et al., 2023; Dorsey, 1991). Consequently, the use of agrochemicals has increased significantly, as farmers seek to achieve commercial yields and maintain crop quality. While regulatory measures ensure the safe formulation, manufacture, and registration of pesticides, responsibility for proper use falls heavily on farmers at the retail level. However, the increased use of agrochemicals has heightened concerns about their safe handling, as misuse can have severe environmental and health implications (Adeniyi et al., 2023). Inappropriate usage and application practices can lead to adverse effects on both human health and the ecosystem. Therefore, this study aims to assess the level of agro-chemical usage and its health implications in Owalla Village, Owerri North LGA Imo State, to promote safer agricultural practices and reduce the potential risks associated with these chemicals.

Objectives:

- To assess agrochemical usage among farmers.
- To identify the most commonly used agrochemicals.
- To evaluate farmers' awareness and perception of the potential health effects associated with agrochemical use.
- To identify constraints affecting agrochemical adoption.

MATERIALS AND METHODS:

Area of Study:

This study employed a phenomenological research design and was conducted in Owalla Village located in Owerri North Local Government Area of Imo State Nigeria. It is bordered by communities such as Okwu, Owaelu, Umuoba, Umunahu, Uzoagba, Orji and Amata. Owerri North lies within Latitude 5.4567° or 5°27' 24.3" north and Longitude of 7.1027° or 7° 6' 9.8" east with the elevation 115 metres (377 feet). The main economic activities in this region are trading and farming. The local farmers predominantly cultivate cassava (akpu), yam (una), cocoyam (ede), as well as cash crops like palm oil and palm kernel. To manage pest and disease infestation and improve crop varieties, the farmers rely on agrochemicals, which, in turn, have implications for the local ecosystem. The agrochemicals are sourced from neighboring villages, local markets, and non-governmental organizations.

Research Design:

This study utilized a descriptive survey research design, which involved collecting data through field interviews using a structured questionnaire with both closed and open-ended questions. The descriptive survey approach allows for the collection of data regarding people's attitudes, opinions, practices, or other educational or social issues (Orodho and Kombo, 2002). The survey targeted horticultural farmers in Owalla Village, focusing on their use of agrochemicals. To ensure the reliability and validity of the questionnaire, a pre-test was conducted with ten farmers who were not included in the main survey. The data collection took place during the short rainy season of 2024. The interview process was explained to each respondent to ensure a conducive environment for collecting accurate and honest information. This research combined qualitative and quantitative methods to analyze agrochemical usage among farmers in Owalla Village.

Sampling Procedure and Sample Size:

A multi-stage sampling procedure was employed to select respondents among the farming community in the study area. A multi-stage sampling procedure was employed. Three villages (Umuosugwu, Ugodike, and Umuagwu) were purposively selected, and a total of 110 questionnaires were distributed among farmers in the study area. Out of these, 95 questionnaires were correctly completed and returned for analysis.

Data Collection and Processing:

Data collection involved multiple tools, including interview schedules, key informant interviews, and observation checklists. Primary data was obtained directly from the respondents, while secondary data was sourced from documents such as reports, newspaper articles, and government publications. Interviews with farmers and stakeholders in the agrochemical industry, including stockists, provided further insights. The questionnaire addressed various aspects of agrochemical usage, such as the types, quantities, and frequency of use, as well as the perceived risks of these chemicals to human health and the environment. Personal observations were also used to verify the information gathered.

Data Analysis:

Data obtained were analyzed using descriptive statistics that include the use or frequency distributions and percentages. Chi-square (χ^2) was used to test for the presence of associations in the variables obtained.

Demographic characteristics of the respondents (Table 1) showed that people of the age bracket 51-60 (21.0%) Above 60 (21.0%) were the highest respondent followed by 41-50 (16.8%), 31-40 (14.7%) while less than

20(12.6%) was the least. Gender wise, Male (68.4%) were higher than female (31.7%). Marital status showed that Majority (68.4%) were married followed by single (15.9%), Divorced (10.5%) while widow (5.2%) was the least. Level of education showed that (36.8%) had tertiary education followed by secondary education (31.5%) while adult literacy (7.3%) was the least. Farming experience showed that (35.8%) had above 50 years farming experience followed by 41-50 years (25.3%), 31-40 years (21.0%) while below 10 years (2.1%) was the least. However, (52.6%) has less than 1 farm size followed by 1-5(27.4%) while 6-10 (20.0%) was the least Respondent source of information (Table 2) reveals that the majority of the respondents (65.2%) got their agrochemicals in the open market while (18.9%) through extension workers and (15.7%) through non-governmental organization. In Umuosuwagwu and Ugodike, Market was their source of information (64.5%and 69.2%) respectively was the highest respondent while NGOs (16.1%and 12.8%) respectively was the least respondent. In Umuagwu, market (60.0%) was the highest respondent while extensions (20.0%) and NGOs (20.0%) was the least Distribution of respondents according to the most utilized agro-chemicals (Table 3) showed that (36.8%) maintained that they make use of fertilizer,(34.7%) uses pesticides, (26.3%) uses herbicides while (5.2%) uses fungicide. In Umuosuwagwu, Fertilizer (50.0%) was the highest respondent on most utilized agrochemical followed by herbicides and pesticides (25.0% and 25.0%) respectively while fungicide (0.0%) was the least. Also in Ugodike, Pesticides (38.4%) was the highest respondent on most utilized agro-chemical followed by Fertilizer (30.7%), Herbicides (23.0%) while Fungicide (7.6%) was the least. Similarly in Umuagwu, Fertilizer (50.0%) was the highest respondent on most utilized agro chemical while none used pesticides and fungicides. The level of usage of agrochemicals by the inhabitant (Table 4) showed that civil servants (42.1) were the highest

followed by farmers (31.5%) while students (25.3%) were the least. In Umuosuwagwu, civil servants (37.0%) were the highest followed by students (35.2%) while farmers (17.6%) were the least. In Ugodike, civil servants (35.4%) and farmers (35.4%) were the highest while students were the least. Also, in Umuagwu, civil servants (50.0%) were the highest followed by farmers (33.3%) while students (16.6%) were the least. Distribution of respondents according to weather agrochemicals are harmful or not (Table 5) showed that majority of the respondents (83.1%) responded that agrochemicals are harmful and (16.8%) pointed out that agrochemicals are not harmful. In Umuosuwagwu, (85.7%), Ugodike (85.7%) and Umuagwu (83.1%) majority of the respondents responded that agrochemicals are harmful against Umuosuwagwu (14.2%), Ugodike (14.2%) and Umuagwu (17.1%)that pointed out that agrochemicals are not harmful. Distribution of respondents according to the effects of agrochemicals on farm income (Table 6) shows that 51.5% said No while 48.8% Yes. In Umuosuwagwu (55.0%) and Ugodike (60.0%) optioned No while in Umuosuwagwu (44.4%) and Ugodike (40.0%) optioned Yes. In Umuagwu, (64.0%) optioned Yes while (36.0%) optioned No. Some constraints to the use of agrochemicals (Table 7) showed that majority optioned lack of fund followed by difficulty to use (7.3%) while difficulty to learn (6.3%) was the least. In Umuosuwagwu (88.2%) and Ugodike (88.2%) optiones lack of fund while difficulty to use (5.8%) and difficulty to learn (5.8%) was the least. Also in Umuagwu lack of fund (81.4%) was the highest followed by difficulty to use (11.1%) while difficulty to learn (7.4%) was the least. Distribution of respondents according to income (Table 8) shows that 18.95% of the respondents had an income of N200,000-N250,000 followed by 17.89% that earn 150,000-200,000, 16.8% earn 100,000-150,000,15.7% earn below 50,000 while the least was 4.2% that earn 300,000 and above.

Table 1: Demographic characteristics of the respondent

Variables	Respondents	Percentage
Age		
Less than 20	12	12.6
21-30	13	13.6
31-40	14	14.7
41-50	16	16.8
51-60	20	21.0
Above 60	20	21.0
Gender		
Male	65	68.4
Female	30	31.7
Marital Status		
Married	65	68.4
Single	15	15.9
Divorced	10	10.5

Widow	5	5.2
Level of Education		
Adult Literacy	7	7.3
Primary	23	24.2
Secondary	30	31.5
Tertiary	35	36.8
Farming experience		
<10	2	2.1
11-20	5	5.3
21-30	10	10.5
31-40	20	21.0
41-50	24	25.3
Above 51	34	35.8
Farm Size		
<1	50	52.6
1-5	26	27.4
6-10	19	20.0
Total	95	100.0

Table 2: Respondents source of information

Sourced	Villages			
	Umuosuwagwu	Ugodike	Umuagwu	Total
Extensions	6(19.3)	7(17.9)	5(20.0)	12(18.9)
Markets	20(64.5)	27(69.2)	15(60.0)	62(65.2)
NGOs	5(16.1)	5(12.8)	5(20.0)	15(15.7)
Total	31(32.6)	39(41.0)	25(26.3)	95(100.0)

Table 3 Distribution of respondents according to the most utilized agro chemicals

Agrochemical	Frequency (n)	Percentage (%)
Fertilizers	35	36.8
Pesticides	33	34.7
Herbicides	22	23.2
Fungicides	5	5.3
Total	95	100.0

Table 4: The level of usage of agrochemicals by the inhabitants

Occupations	Villages			
	Umuosuwagwu	Ugodike	Umuagwu	Total
Students	6(35.2)	14(29.1)	5(16.6)	25(26.3)
Farmers	3(17.6)	17(35.4)	10(33.33)	30(31.5)
Civil servants	8(47.0)	17(35.4)	15(50.0)	40(42.1)
Total	17(17.8)	48(50.5)	30(31.6)	95(100.0)

Table 5: Distribution of respondents according to weather agro-chemicals are harmful or not

Variables	Villages			
	Umuosuwagwu	Ugodike	Umuagwu	Total
Yes	30(85.7)	30(85.7)	19(76.0)	79(83.1)
No	5(14.2)	5(14.2)	6(17.1)	16(16.8)
Total	35(36.8)	35(36.8)	25(26.3)	95(100.0)

Table 6: Distribution of respondents according to the effects of agrochemicals on farm income

Variables	Villages			
	Umuosuwagwu	Ugodike	Umuagwu	Total
Yes	20(44.4)	10(40.0)	16(64.0)	46(48.4)
No	25(55.5)	15(60.0)	9(36.0)	49(51.5)
Total	45(47.3)	25(26.3)	25(26.3)	95(100.0)

Table 7: Some constraints to the use of agro chemicals

Constraints	Villages			
	Umuosuwagwu	Ugodike	Umuagwu	Total
Lack of fund	30(88.2)	30(88.2)	22(81.4)	82(86.3)
Difficult to use	2(5.8)	2(5.8)	3(11.11)	7(7.3)
Difficult to learn	2(5.8)	2(5.8)	2(7.40)	6(6.3)
Total	34(35.7)	34(35.7)	27(28.4)	95(100.0)

Table 8: Distribution of respondents according to income

Income group (annually) (N)	Frequency	Percentage (%)
<50,000.00	15	15.79
50,000.00-100,000.00	14	14.74
100,000.00-150,000.00	16	16.84
150,000.00-200,000.00	17	17.89
200,000.00-250,000.00	18	18.95
250,000.00-300,000.00	11	11.58
300,000.00 and above	4	4.21
Total	95	100.00

DISCUSSION:

The socio-economic characteristics of the respondents include age, gender, level of education, marital status, farm size, family size, house hold size and farming experience. The study was a representative of both male and females. The result in Table 1 summarized the age range, gender, marital status, and household size, level of education, farming experience and farm size of the respondents in the study area. The result shows the distribution of respondents according to their age, 12.63% are less than 20 years, 13.68% are within the age of 21 to 30 years, 14.738% 31 to 40, years, 16.84% 41 to 50 years, 21.05% ranging between 51-60 years while 21.0% of them are 60 year and above. It shows that the majority of the farmers fall within the age of 51 to 60 years. This indicates that farmers within this age group are more dynamic to innovation and adoption rate. The gender distribution of the farmers shows that 68.42% of the respondents were male while 31.78% are female. This variation could be attributed to the fact that most farms in the study area are owned by men even though women also participate actively in farming activities. The assessment of this study is in line with the findings of Nyongesa et al. (2023) who posited that 70% of women in rural areas were also engaged in food production. The result could also be attributed to the fact that women are controlled by their husband or their fathers in the study area and they

usually refer researchers to give information concerning their farms or farming activities. The marital status of the respondents shows that 68.4% were married; it implies that most of the Farmers in the study area have access to family labour who participates actively in farming activities. Based on educational level of the respondents, majority of the respondents (36.84%) had Tertiary education while 31.58% had secondary school education. This result is in line with the findings of Mohammed et al. (2005) that educational background of farmer's accounts for their managerial ability and makes them to accept agro-chemicals as increasing soil fertility and production. Majority of the respondents (35.8%) had farming experience of over 30 years. Farming experience of farmers is reported to increase their tendency of adopting improved techniques such as the use of agro-chemicals. Nyongesa (2023) reported that more experienced farmers are knowledgeable and more likely to adopt new techniques. The result of this study Table 1 reveals that the majority of the respondent (52.6%) had farm size of less than 1 hectare (<1ha), 27.4% had farm size of between 1 and 5 hectares and 20.0% had a farm size of between 6 and 10 hectares. The result of this study concurs with the findings of Bzugu et al. (2009) who reported that majority of farmers in Adamawa State cultivate less than one hectare of land. From the result of

this study, it can be said that most farmers in the study area are small scale farmers (peasant).

Nyongesa (2023) reported that farm size has a close positive association with the ability to obtain credit as a major determinant of adopting farm practice. The result of this study in Table 2 reveals that the majority of the respondents (65.2%) got their agro-chemicals in the open market while 18 through extension workers and 15 through non-governmental organization. This implies that most farmers obtained agro-chemicals in the open market. This result is in consistent with works done by Nyongesa (2023) who stated that Agro-chemicals are mostly on sale in the open market. The distribution of respondents according to the most utilized agro-chemicals. Majority (36.8%) maintained that they make use of fertilizer and 34.7% uses pesticides than other forms of agro-chemicals. This agrees with the findings of News (1967) who posied that application of fertilizer and pesticides increased crop yield. The result also shows that when fertilizer and pesticides are combined give more yield. Distribution of respondents according to whether agro-chemicals are harmful or not. Majority of the respondents (83.1%) responded that agro chemicals are harmful against and 16.8% pointed out that agro-chemical are not harmful.

This result is consistent with works reported by WHO (2023) that estimated that about 20,000 people have died due to agro-chemicals poisoning. Effects of agrochemicals on farm income (Table 6) shows that majority (51.5%) of the respondents maintained that agro-chemicals did not affect their farm income, 48.4% respondent pointed out that Agro-chemicals affects their farm income. According to Nyongesa (2023) the use of agro-chemicals accounts to sustainable yield (increase income). Most often the impact of these agro-chemicals are not felt or seen either due to wrong application or farmers bought the adulterated commodity in the open market. Constraints to Agro-Chemicals Utilization (Table 7) reveal that the major constraint to adoption of agro-chemicals is inadequate fund. Majority of the farmers are poor. They usually own a few number of animals whose droppings may not be adequate for their farms. On the other hand, some of the farmers pointed out that it is difficult to apply agro-chemicals and they do not have the skill and equipment to use on their farms. Agro-chemicals application requires safety measures like hand gloves, and protective clothing to avoid contact with body; this discourages farmers from applying agro-chemical on their farms. Most agro-chemicals possess offensive odour which may affect adoption, by and large some farmers maintained that they are allergic and hence do not like the odour and cannot use it on their farms. Distribution of respondents according to income (Table 8) shows that 18.95% of the respondents had an income of N200, 000- N250,000 and above due to utilization of agro-chemicals on their farms. Southgate (2006) posited that from the

mid-1960s through 1980s, the green revolution enabled millions of people in Asia and Latin America to escape famine and poverty, by increasing agricultural productivity through the use of modern agricultural techniques. In contrast, majority of African countries did not adopt those technologies and agricultural yields in most of these countries stagnated and declined in the same period. He concluded by stating that "today, millions of Africans suffered from malnutrition and continued to leave lives of penury engaged in toil subsistence agriculture". This is not a true reflection of what was obtainable in the study area

CONCLUSION:

From the research conducted, it was discovered that the most utilized agrochemicals are fertilizer and pesticide. And this could be as a result of easy accessibility of this Chemical in the Open Market in the three villages under study. From this we deduce that agrochemicals are mostly used by Civil servant and this could be to their level of exposure in the field of Agriculture. Most respondents perceived agrochemicals as potentially harmful to human health, highlighting the need for improved awareness, training, and safe handling practices.

There is a need for regular training programmes on safe agrochemical handling and the use of personal protective equipment (PPE). Agricultural extension services should intensify awareness campaigns to reduce health risks associated with agrochemical exposure and promote environmentally sustainable farming practices.

LIMITATIONS OF THE STUDY:

The study was limited to Owalla Village and involved a relatively small sample size. The findings may therefore not be generalized to all farming communities in Imo State. In addition, health implications were assessed based on self-reported responses rather than clinical examinations.

Ethical Approval:

Ethical approval for this study was obtained from the Department of Animal and Environmental Biology, Imo State University, Owerri, Nigeria.

Conflict of Interest:

The author declares no conflict of interest.

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