

IMPACTS OF AGROCHEMICALS ON HUMAN HEALTH AND THE ENVIRONMENT IN BADEGGI AND ENVIRONS, NIGER STATE, NIGERIA

NAFIU HASSAN¹ M. A. EMIGILATI²

Department of Geography, Federal University of Technology, Minna, Nigeria

Abstract

Continuous use of agrochemical against agricultural pest and disease vectors poses serious threats upon both human health and environment in the study area. The study thus sought to determine the farmers knowledge, attitude and practices with regard to use of agrochemicals in crop production within Baddegi and environs, Niger State and their potential impact on environment and human health. The main data for the study were sourced using structured questionnaire, oral interview and field survey which were the main instruments for data collection. The study respondents were 387 and simple random sampling was used to distribute the questionnaires among the respondents. Three hundred and forty one (341) questionnaires were returned and the analysis was done on this basis. Data collected using questionnaire and oral interview were analysed statistically through frequency percentage, 3-point likert scale and statistical mean in the study area. The study revealed type of agrochemicals to apply in farms were determine through use own experience, asks what other farmers have used, as advised by extension officer and experiments on different types then choose. The names of agrochemicals used in the study area include Glyphosate, Orizo plus, Urea, NPK, Gamaline and Butter clow. The study also revealed that 292 respondents affirmed that their exist health problems associated with the use of agrochemicals in the study area and 49 respondents said they do not suffer any health problem due to the use of agrochemicals. These health problems include skin, eye, stomach and respiratory irritations. The finding shows that surface water ranked the highest on the effect of agrochemical with 87 respondents and air ranked the least affected component of the environment. This implies that all the components of the environment were effected with agrochemicals in the study area as affirmed

by the respondents. In conclusion, the study found out that farmers had inadequate knowledge, poor attitude and practices with regard to use of agrochemicals in crop production that resulted in adverse environmental and human health effects.

Keywords: *Agrochemicals, Environment, Human health and Badeggi*

Introduction

The rapid expansion of the agricultural sector in Nigeria has resulted in increased demand for agrochemicals (Ariga *et al.*, 2016). The use of agrochemicals has many benefits, increased crops and animal yields and reduced post-harvest losses (Oerke, *et al.*, 2014). The benefits associated with the use of agrochemicals have resulted in an increase in the importation of assorted agrochemicals in the Country.

Agrochemicals are highly toxic and have been associated with serious human health and environmental damages (Briggs *et al.*, 2009). Extensive use of agrochemicals in the agricultural fields is among the most prominent sources of ground water contamination (Singh *et al.*, 2014). According to Konradsen (2017), about one-half of the human poisonings occur more in less-developed countries, even though these places account for only 20% of the world's use of pesticides. Many chemical substances identified as persistent organic pollutants (POPs) under the Stockholm Convention are still being used in agriculture and industry and these results in negative health and environmental consequences (Ashburner and Friedrich, 2011).

Today all over the world consumers are becoming increasingly aware of the importance of food safety and are therefore demanding high standards in marketed and processed foods with emphasis also on agricultural practices with minimum detrimental impact on the human health and environment (MOA, 2014). Previous pilot studies on pesticide handling in most developing countries like Nigeria, showed that once the product reaches retailers shelf, level of control is usually very minimal.

According to the latest estimates, approximately 2.36 billion kilograms of Agro Chemicals were used worldwide in 2007, producing a business worth of \$40 billion USD – this is a fifty-fold rise in the amounts of Agro Chemicals used

internationally since 1950 (Environmental Protection Agency, 2011). Patterns of consumption have been shifting as well in developing countries, their global share of Agro Chemicals use has doubled in the past three decades, going from 20% to 40% (Promise, 2016).

Niger State in central Nigeria main economic activities is agricultural related including mixed farming (crops and livestock keeping). Major cash crops include coffee, tea and horticultural production with maize, beans and potatoes grown mainly as food crops (Booker *et al.*, 2009). Major livestock cash enterprises include dairy cows, poultry, pigs, bees with fish farming also being promoted. Pesticides, fertilizers, animal feeds and veterinary drugs are normally purchased through farm inputs retail outlet stockiest commonly known as —Agrovets in trading centres. The study thus sought to determine the farmers knowledge, attitude and practices with regard to use of agrochemicals in crop production within Badeggi and environs, Niger State and their potential impact on environment and human health.

Statement of the Research Problem

Several studies have been identified with impacts of agrochemicals on human health and the environment both nationally and internationally and those researchers include Erhunmwunse, Dirisu and Olomukoro (2012); Aikpokpodion, Lajide, Ogunlade, Ipinmoroti, Orisajo, Iloyanomom and Fademi (2015); Ize-Iyamu, Abia and Egwaikhide, (2011); Leonila (2012); Maton (2016) and Gupta (2012). Based on these researches, a gap have been identify which is impact of agrochemicals on human health and the environment in Badeggi irrigation sites in Katcha Local Government Area, Niger State, Nigeria. Continuous use of agrochemical against agricultural pest and disease vectors poses serious threats upon both human health and environment in the study area. In the study area, it is very difficult to find out the impact of human health and the environment due to inadequate awareness, training and adequate knowledge for using agrochemicals. Agrochemicals users in farms are vulnerable to agrochemical related health problems due to inadequate regulatory and preventive mechanisms in the study area. The study will looks into these problems which include farmers' knowledge, attitudes and practices on agrochemicals applications in crop production; farmers source of information

regarding the use agrochemicals in the study area; the types and quantities of agrochemicals used by farmers in their major production processes in the study area and will also examine environmental and human health adverse effects associated with agrochemical usage in the study area.

The Study Area

Baddegi is located within Latitude 9° 30" 10N to 9° 68" 10N and Longitude 6° 50" 23E to 6° 90" 13E. It is located at an elevation of 118 meters above sea level and its population amounts to 11,657 in 2015.

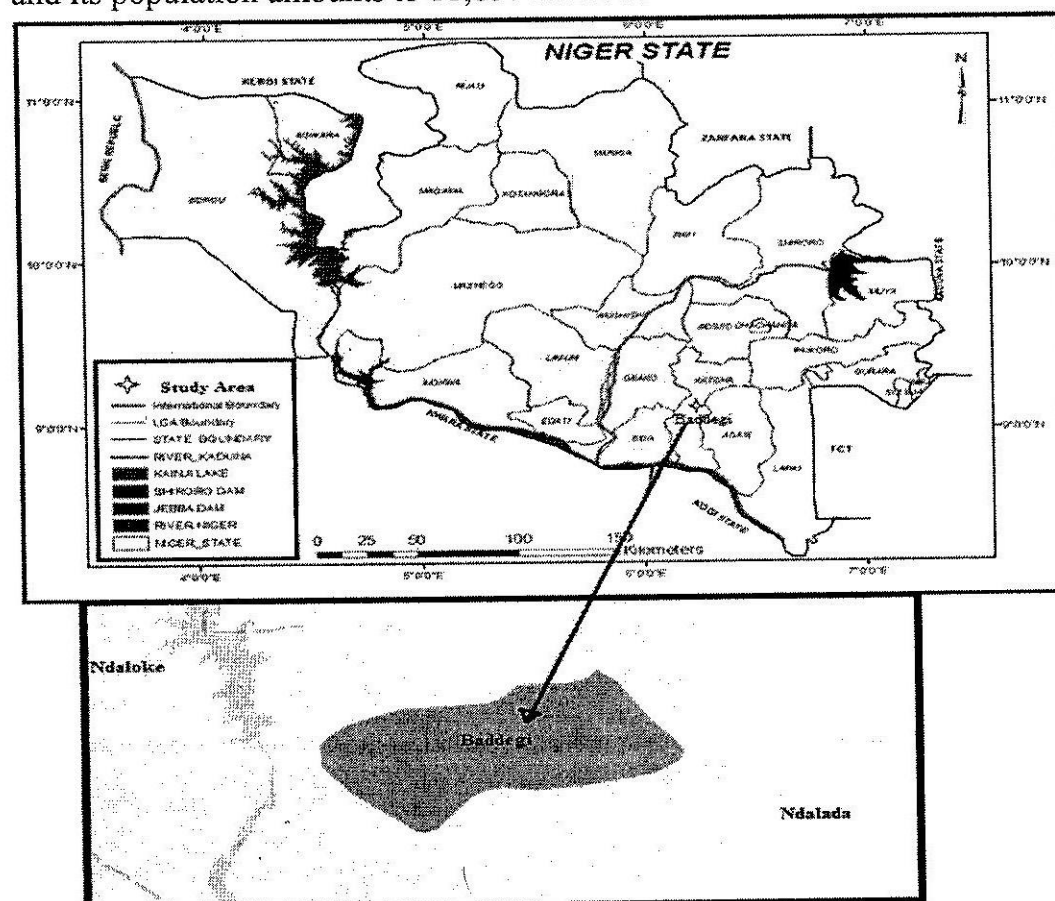


Figure 1: Map of the Study Area

Source: Niger State Geographic Information System (2018)

Materials and Methods

The sources of data used include primary and secondary. The primary data for the study were sourced using structured questionnaire, oral interview and field

survey which were the main instruments for data collection. It was used to elicit responses from the respondents which was mainly for the farmers using agrochemicals in their farms to enhance production in the study area. The secondary data sources include information from relevant maps, dissertations, textbooks, newspapers, journals, unpublished texts, published texts, collection of e-books and the internet.

The study respondents were 387 and simple random sampling was used to distribute the questionnaires among the respondents. Three hundred and forty one (341) questionnaires were returned and the analysis was done on this basis. Data collected using questionnaire and oral interview were analysed statistically through frequency percentage, 3-point likert scale and statistical mean in the study area.

Results and Discussions

As indicated in Table 1, the common problems affecting crops in the study area include soil fertility loss, diseases, pests and weeds.

Table 1: Common Problems Affecting Crops

Options	SA (5)	A (4)	DK (3)	D (2)	SD (1)
Soil fertility loss	89	2	0	0	0
Diseases	37	0	0	0	0
Pests	49	23	0	0	0
Weeds	111	30	0	0	0
Total	286	55	0	0	0

Note: strongly agree (SA) = 5; agree (A) = 4; don't know (DK) = 3; disagree (D) = 2 and strongly disagree (SD) = 1

Source: Field Survey (2019)

As revealed in Table 1, weeds ranked the highest common problem affecting crops with 111 respondents strongly agreeing, soil fertility loss ranked second with 89 respondents strongly agreeing and diseases ranked the least with 37 respondents strongly agreeing. This implies that the major common problem

Table 4: Presence of ill health problems associated with the use of agrochemical

Options	Frequency	Percentage (%)
Yes	292	85.6
No	49	14.4
Total	341	100

Source: Field Survey (2019)

As revealed in Table 5, rating the risk of agrochemicals effects on soil, air, surface water, aquatic organism and birds were done in four categories. Moderately harmful ranked the highest with 153 respondents and not harmful ranked the least with 42 respondents. Surface water ranked the highest on the effect of agrochemical with 87 respondents and air ranked the least affected component of the environment. This implies that all the components of the environment were effected with agrochemicals in the study area as affirmed by the respondents.

Table 5: Rating the risk of agrochemicals effects on soil, air, surface water, aquatic organism and birds

Options	Not harmful	Slightly harmful	Moderately harmful	Very harmful
Soil	7	21	35	31
Air	1	5	16	6
Surface water	13	6	87	37
Aquatic organism (fish)	19	14	11	25
Birds	2	0	4	2
Total	42	46	153	100

Source: Field Survey (2019)

As revealed in Table 6, 109 respondents affirmed that they take precaution to ensure they not harmed when applying agrochemicals and 232 respondents said they do not precaution when applying agrochemicals in the study area. The precaution taken by the respondents was wearing protective gears like nose

mask, eye google, robber gloves, long sleeved overall, hat/headscarf as well as protective shoes. This implies that majority of the respondents do not take precaution when applying agrochemicals in the study area which was the root cause of the health problems mentioned in the study.

Table 6: Presence of precaution when applying agrochemicals

Options	Frequency	Percentage (%)
Yes	109	32.0
No	232	68.0
Total	341	100

Source: Field Survey (2019)

As shown in Figure 2, rating the knowledge of agrochemicals users in the study area were categorise into five and they include negligible, very little, little, enough and more than enough.

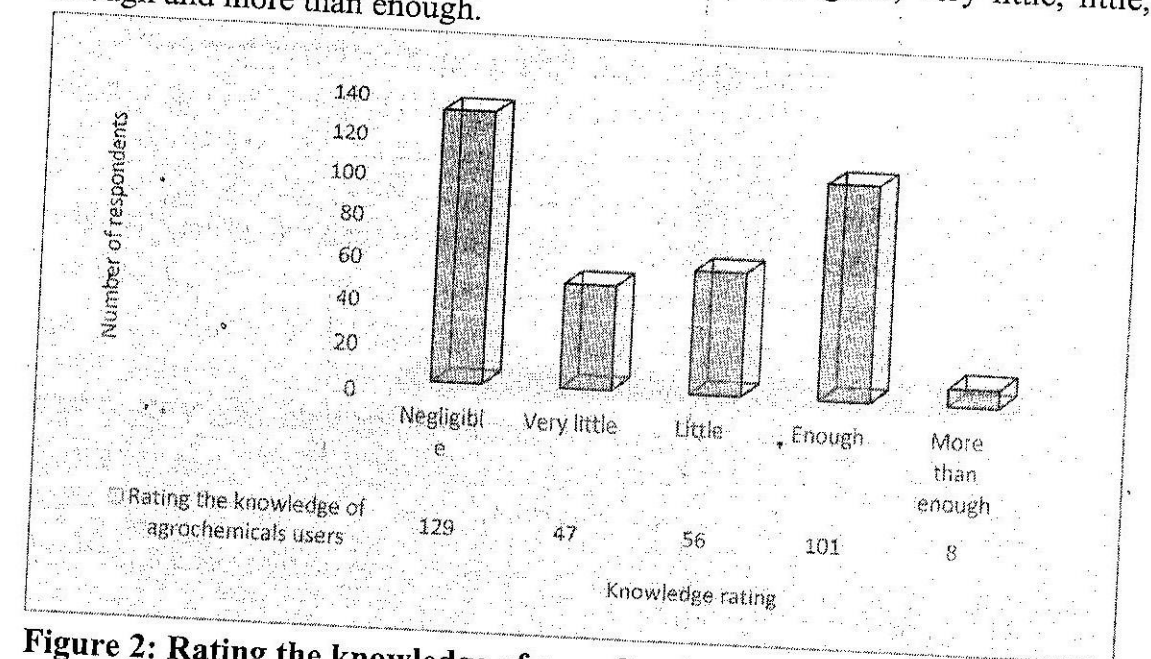


Figure 2: Rating the knowledge of agrochemicals users in the study area

Negligible ranked the highest with 129 respondents, enough ranked second with 101 respondents and more than enough ranked the least with 8 respondents. This implies that the knowledge of agrochemicals users in the study area was

affecting crops in the study area was weeds. This was equally shown in plate I of the study.



Plate I: Respondent applying agrochemical on weeds
Source: Field Survey (2019)

Plate I shows one of the respondents applying agrochemical to grasses for the purpose of agricultural activities.

As shown in Table 2, type of agrochemicals to apply in farms were determine through use own experience, asks what other farmers have used, as advised by extension officer and experiments on different types then choose. As advised by extension officer ranked the highest with 211 respondents, asks what other farmers have used ranked second with 65 respondents, used own experience ranked third with 21 respondents and experiment on different types then choose ranked the least with 3 respondents. This implies that the type of agrochemical to apply in farms were determine by the advised of extension officers in the study area. The names of agrochemicals used in the study area include Glyphosate, Orizo plus, Urea, NPK, Gamaline, Butter clow, etc.

Table 2: Determination to type of agrochemicals to apply in farms

Options	SA (5)	A (4)	DK (3)	D (2)	SD (1)
Use own experience	11	21	0	0	0
Asks what other farmers have used	65	0	0	0	0
As advised by extension officer	211	18	0	0	0
experiments on different types then choose	3	12	0	0	0
Total	104	237	0	0	0

Source: Field Survey (2019)

As revealed in Table 3, not reading the instructions on the label before using a particular agrochemical ranked the highest with 287 respondents and reading the instructions on the label before using a particular agrochemical ranked the least with 54 respondents. This implies that majority of respondents do not read neither no how to read the instructions before usage which in turn affect the environment negatively as well as their health.

Table 3: Reading the instructions on the label before using a particular agrochemical

Options	Frequency	Percentage (%)
Yes	54	84.2
No	287	15.8
Total	341	100

Source: Field Survey (2019)

As revealed in Table 4, 292 respondents affirmed that their exist health problems associated with the use of agrochemicals in the study area and 49 respondents said they do not suffer any health problem due to the use of agrochemicals. These health problems include skin, eye, stomach and respiratory irritations.

negligible which is not good at all considering the impact of agrochemicals on the environment as well as on people when it's not used properly.

Conclusion

Agrochemicals have played a key role in providing reliable supplies of agricultural produce at prices affordable to consumers, improving the quality of produce, and ensuring high profits to farmers. In conclusion, the study found out that farmers had inadequate knowledge, poor attitude and practices with regard to use of agrochemicals in crop production that resulted in adverse environmental and human health effects.

The types and quantities of agrochemicals used by the farmers do not conform to recommendations as they merely used agrochemicals in order to increase yield by controlling pest and disease and to improve marketability of their outputs without much regard of these products adverse effects to the environment and human health. It was therefore concluded that the farmers lacked adequate knowledge in determining the quantities of agrochemicals used during application. Farmers were not well sensitized on safety precautions procedures while mixing, spraying and disposing spoilt and expired chemicals as well as empty agrochemical containers wearing of protective gear while handling the pesticides posing danger to humans and environment. It was thus concluded the farmers lacked adequate capacity on environmental and human health effects associated with agrochemical use in crop production. This study recommend that agricultural stakeholders such as the Ministry of agriculture to carry out sensitization campaigns to educate farmers on proper and efficient use of agrochemicals to improve productivity as well as prevent adverse environmental and human health effects.

References

- Aikpokpodion, F., Lajide, D., Ogunlade, S., Ipinmoroti, O., Orisajo, P., Iloyanomon, K. and Fademi, K.G. (2015). Pesticides and atopic and non-atopic asthma among farm women in the Agricultural Health Study. *American Journal of Respiratory and Critical Care Medicine*, 177(1), 11-18.

- Ariga, J. M., Jayne T. S. and Nyoro, J. K. (2016). Factors driving the growth in fertilizer consumption in Nigeria, 1990-2015: Sustaining the momentum in Nigeria and lessons for broader replicability in Sub-Saharan Africa. Working Paper 24. Tegemeo Institute. Nairobi, Kenya: Egerton University.
- Ashburner, J. and Friedrich, T. (2011). Improving handling of pesticides application equipment for the safety of applicators. *Journal of pesticide management*, 1, 9-11.
- Booker, O., Beatrice, W. and Gem, A. K., (2009). The Role and Performance of Ministry of Agriculture in Nyeri district. Unpublished.
- Briggs, D. J. and F. M. Courtney (2009). *Agriculture and Environment*. New York: Longman.
- Erhunmwunse, N.O., Dirisu, A. and Olomukoro, J.O. (2012). Implication of pesticide usage in Nigeria. *Bmc Neurology*, 8(1), 6-15.
- Gupta, P. (2012). Cancer incidence among pesticide applicators exposed to captan in the Agricultural Health Study'. *Cancer Causes and Control*, 19(10), 1401-1407.
- Ize-Iyamu, Y., Abia, P. and Egwaikhide, J. (2011). Association between organophosphate pesticides exposure and thyroid hormones in floriculture workers. *Toxicology and Applied Pharmacology*, 243(1), 19-26.
- Konradsen, F. (2017). Acute Pesticide poisoning – a global public health problem. *Danish medical Bulletin*, 54(1), 58-59.
- Leonila, P. (2012). The relationship of land use practices to surface water quality in the Upper Oconee Watershed of Georgia. *Journal for Ecological Management*, 128(1-2), 39-48.
- Ministry of Agriculture (2014). Economic review of Agriculture; The central planning and project monitoring unit, Kilimo House Cathedral Road, Nairobi, Kenya.
- Maton, S. (2016). Effects of Pesticide Applications on Respiratory Health of Ethiopian Farm Workers. *International Journal of Occupational and Environmental Health*, 8(1), 35-40.
- Oerke, E.C., Dehne, H. W., Schonbeck, F. and Weber, A. (2014). *Crop production and Crop protection, Estimated losses in major food and cash*

crops. Elsevier Sciences B.V. Ameterdam (Publisher), Amsterdam-Lausanne-New York-Oxford-Shannon-Tokyo.

Promise, H. (2016). Soft-Tissue Sarcoma and Pesticides Exposure in Men: Results of a Canadian Case-Control Study'. *Journal of Occupational and Environmental Medicine*, 53(11), 1279-1286.

Singh, B. K., Walker, A., Alun, J., Morgan, W. and Wright, D. J. (2014). Biodegradation of Chlorpyrifos by *Enterobacter* Strain B-14 and Its Use in Bioremediation of Contaminated Soils. *Journal of Applied Environmental Microbiology*, 70, 4855-4863.