KNOWLEDGE AND PRACTICES RELATING TO THE USE OF PESTICIDES AND HERBICIDES AMONG FARMERS IN AYEDAADE LOCAL GOVERNMENT AREA, OSUN STATE

BY

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A PROJECT IN THE DEPARTMENT OF HEALTH PROMOTION AND EDUCATION SUBMITTED TO THE FACULTY OF PUBLIC HEALTH, COLLEGE OF MEDICINEIN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF PUBLIC HEALTH (HEALTH PROMOTION AND EDUCATION) OF THE UNIVERSITY OF IBADAN

MARCH, 2016

DEDICATION

This project is dedicated to God Almighty. Without Him nothing is possible.

ACKNOWLEDGEMENTS

Glory, honor and adoration be unto Almighty God, the king of kings and lord of lords, the one that knows the beginning and end who made this MPH programme for me.

My sincere and profound gratitude goes to my supervisor Dr F.O.Oshinamewhose criticism and guidance aided the perfection of this work. I am delighted to have been supervised by him.

I am deeply indebted to the Head of department of health promotion and education,ProfessorOladimejiOladepo for his guidance during the design stage of the study. I also acknowledge the contribution of the assistance rendered to me by the non-teaching staff of the department.

Special thanks to my very wonderful parents Mr.Olaposi Akinleye and Mrs. Esther Abimbola Akinleye (iyaonile) for their love, encouragement and support throughout the course of this programme. I am equally grateful to my brothers and precious sister,OreoluwaAkinleye throughout the conduct of the study.

Behind every successful man there isusually awoman. I really appreciate my lovely and darling wife (Mrs Yemi Akinleye) that God gave me for her maximum understanding, love and support in all areas. I am grateful to her for always being there for me

Special thanks to the head of Environmental health unit UCH Ibadan, (Mrs Bukola Akerele) for herunderstanding throughout the course of this programme.She created the enabling environment for me to participate in this programme without tears.

Thanks to all my friends and all my classmates for their wonderful contributions and helpful suggestions.

All thanks also to the farmers in Ikoyi Ayedaade Local Government Area of Osun State who voluntarily participated in this research. I wish to acknowledge all authors and organizations whose articles, reports and books contributed to enrich this work.

Akinlolu OlaoluwaAKINLEYE

ABSTRACT

Pesticides and herbicides could posed a number of problems to users if not properly used, It has been reported that pesticides and herbicides could lead to abdominal pain, dizziness, headache, nausea, vomiting as well as skin and eye problems and killing of beneficial insects. Pesticides and herbicides by design are meant to kill or harm living organisms. In Nigeria, there is dearth of information relating to farmers' knowledge and practices relating to pesticides and herbicides. The knowledge and practices relating to the use of these agro-chemicals among farmers in Ayedaade Local Government (LGA) area of Osun State wastherefore explored in the study.

A cross sectional study was conducted among 400 farmers in Ayedaade LGA.A validated interviewer administered questionnaire which contained 59- point knowledge scale was used and scores were categorized as ,≤ 30,>30-40 and 40 above for poor, fair and good scores respectively. Data were analyzed using descriptive statistics, Chi square, t-test and F-test. Chi square analysis was carried out to test the level of association between knowledge of respondents and age at 5% level of significance.

Respondents mean age was 47.5±10.7. Male accounted for 80% 0f the sample, 70% were married, 21% were single, 6% were divorced and 3% were separated. Some(29.3%) of the respondents hadsecondary school certificate as their highest level of education, 21.8 % had HND, 15% had B.Sc. while 16.5% had no formal education. Majority (63.5%) of the respondents were Christians.Majority of the respondents had heard pesticides and herbicides which imply. More than half (57.2%) of the respondents never received training relating to pesticides and herbicides while less than half (43.8%) of the respondents had previous training on pesticides and herbicides. Most of the respondents did not use personal protective devices such as nose cover, eye goggle, and garment and cover boot when handling pesticides and herbicides.

Educational intervention such as training and supportive supervision by farm extension workers are needed to address the gap in knowledge and promote adoption of personal protective measures among the respondents.

Word count: 345

Keyword: pesticides, herbicides, knowledge, farmers.

CERTIFICATION

I certify that this project was carried out by **Akinleye**,Akinlolu Olaoluwa in the department of Health promotion of and Education, Faculty of public health, college of medicine, University of Ibadan,Ibadan,Nigeria

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ACRONYMS

CUE	Critical use Exemptions
EPA	Environmental protection Agency
GDP	Gross Domestic Product
GS	Geological survey
GMO	Genetically Modified Organisms
MB	Methyl Bromide
ODTS	Organic Dust Toxicity Syndrome
PPEs	Personal Protective Equipments
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Pesticides and herbicides could pose a number of problems to users if not properly used.(Walla, 2013). It has been reported that pesticides and herbicides could for instance lead to abdominal pain, dizziness, headache, nausea and vomiting as well as skin and eye problems (Banjo, Aina, and Rije, 2010).The World Health Organization, (WHO, 2008.). Had estimated that each year, 3 million farmers in the developing world experience severe adverse effects from pesticides. The rise in synthetic pesticides was accelerated in the 1940s with the discovery of the effect of DDT, BHC, Aldrin, 2, 4-D, Parathion and Chlordane.

Pesticides by design are meant to kill or harm living organisms. Anything that can kill or harm living organisms has potential to harm or kill human beings too. Pesticides are supposed to kill unwanted pests, but they also kill natural predators of crop pests (Alamu and Okonkwo, 2013).The pests targeted by pesticides could quickly develop resistance to the pesticides. In order to prevent frequent attacks from pests, farmers are often encouraged to spray higher and higher doses of pesticides. Many of the pesticides have toxic effects and this implies that care should be taken while using them.

The word "pesticide" refers to any substance or mixture of substances, intended for preventing, destroying, repelling or mitigating any pest (Salako, Sholeye, & Dairo, 2012). It may be a chemical substance, biological agent (such as a virus or bacterium), antimicrobial, disinfectant or device used against any pest. The Food and Agricultural Organization, (FAO) defines the term pesticide in the most explicit manner as: *any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals which cause harm.* Botanical pesticides have the advantage of providing novel modes of action against insects that can reduce the risk of cross-resistance as well as offering new leads for design of target-specific molecules (Isman, 2011).

Herbicides on the other hand, are used by farmers to control weeds, infestation and diseases. Farmers are in high risk group, thus require bio monitoring studies are therefore, required to assess diseases caused by acute and chronic exposure to pesticides and herbicides (Garcia, Ascencio, Oyarzun, Hernandez, and Alavarado, 2012). Pesticide exposure may pose a potential risk to humans, causing neuritis, certain psychiatric manifestations, neurological, immunological, metabolic and endocrine disorders (Ariyo, 2013). Herbicide poisoning it has also been linked to increased incidence of leukemia and bladder cancer in farmers, following genotoxic effects of some pesticides (Garcia et al., 2012). Results of this type have led many researchers to evaluate the genetic risks associated with pesticide exposure. Incidentally many farmers also have little or no knowledge on how, what, when and how often to apply agrochemicals on their crops. Consequently destruction of entire crops fields, pollution of water bodies and occurrence of human health and environment risks could result. (Larry, 2012).

Pesticides and herbicides are used by farmers in farm settlements in Ayedaade Local Government Area of Osun State, Nigeria. However, farmers level of knowledge and practices relating to pesticides and herbicides in the settlement has not been well explored. This constitutes the main focus of the study.

1.2 Statement of the problem

Appropriate use of pesticides and herbicides by farmers has brought immense benefits to humankind. They could, if not well used, lead to adverse health effects. The practice can, for instance lead to acute and chronic health problems among farmers (Solomon, 2013). A study by Ariyo (2013), showed that the chemical constituents of pesticides and herbicides could be hazardous to farmers health. The spraying of pesticides and herbicides has been shown to pose a risk to farmers' health and health of others living in farm settlements where these agro- chemicals are applied (Nicol and Anne, 2009). Providing farmers and farming communities with information they need to manage pesticides and herbicides risk is an important process that requires understanding of how farmers use pesticides and herbicides for farming activities. However, there is dearth of information on farmers' knowledge relating to use of pesticides and herbicides in Nigeria with special reference to Ayedaade

Local Government Area of Osun State with several farm settlements. Furthermore, farmers' sources of information relating to pesticides and herbicides are yet to be explored.

Also, yet to be well investigated are farmers' pattern of use of pesticides and herbicides and the protective measures adopted by them. This study was therefore designed to determine farmers' knowledge relating to use of pesticides and herbicides, assess their pesticides and herbicides use practices and identify the protective devices used by them while using the agro- chemicals.

1.3 Justification for the study

This study will provide baseline information on the knowledge and practices relating to the use of pesticides and herbicides among farmers which could be used for developing educational programmes for farmers relating to use of pesticides and herbicides. The results from this study could also be used to guide policy formulation relating to pesticides and herbicides use by farmers in the study area.

1.4 Research questions

1 What is the level of awareness and knowledge of respondents relating to pesticides?
2 What is the level of awareness and knowledge of respondents relating to herbicides?
3 What is the level of knowledge of respondents relating to dangers or hazards associated with exposure to pesticides and herbicides?
4 What are the pesticides and herbicides used by the farmers?
5 What are the personal protective equipment used by farmers while using pesticides and herbicides?

1.5 Objectives

1.5.1 Broad objective: The broad objective of the study was to investigate the knowledge relating to pesticides and herbicides usage, identify pesticides and herbicides used by crop farmers and identify the personal protective measures used by farmers in Ayedaade Local Government Area, Osun State Nigeria.

1.5.2 The specific objectives were to:

1 Assess the level of knowledge of respondents relating to pesticides.

2 Assess the level of knowledge of respondents relating to herbicides.

3 Assess respondents knowledge on dangers associated with exposure to pesticides and herbicides

4 Identify the pesticides and herbicides used by the respondents.

5 To identify the use of Personal Protective Equipment (PPE) or measures used by Respondents

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual clarifications

Farming is a practice that involves the production of animals and crops, as well as utilization of forest resources for the consumption of man and supply of raw materials for industrial processing (Olubunmi, 2015). Modern farming involves the use of pesticides and/or herbicides depending on the type (Ehigiator, 2012). There are various types of farming activities; the common ones in Nigeria are crop farming and animal husbandry (Alamu, 2014).

Farming could be for subsistence purpose and in this kind of farming, the land is limited and the cultivation systems are primitive and there is very little surplus to sell and there is also limited or no use of pesticides and herbicides. In Subsistence farming, Farmers may make use of small amount of pesticides and herbicides to prevent crops from certain diseases (Satya, 2014). On the other hand, Intensive agricultural farming is intensive in the sense that it is a system of cultivation using large amounts of labor and capital relative to land area. In this kind of farming, large amounts of labor and capital are necessary for the application of fertilizer, insecticides, fungicides, and herbicides for growing crops.

Pesticides are chemical groups more widely used by farmers, both to prevent the production of harmful organisms and quality of crops and for the control of vectors and pests of public health importance (Garcia, Francisco and Sandra,2012). A pesticide can also be regarded as any substance or mixture of substances used to destroy, suppress or alter the life cycle of any pest.

2.2 Pesticides

A pesticide can be a naturally derived or synthetically produced substance. Different types of pesticides include: natural pesticides, bactericides, baits, fungicides, insecticides and rodenticides. (EPA, 2013). Natural pesticides could be extracts of pyrethrum, garlic, tea-tree

oil and eucalyptus oil. When these natural chemicals are used as pesticides they become subject to the same controls as pesticides produced synthetically (A. Singh & Kaur, 2012). Each year North American farmers use about three times natural pesticides (Kazemi, Tahmasbi, Valizadeh, Naserian, & Soni, 2012).

Bactericide pesticides on the other hand destroy, suppress or prevent the spread of bacteria that may likely affect crops. For example, these products could be used to control black spot (bacterial blight) on garden plants or in orchards. Household disinfectants and some industrial disinfectants are excluded and not considered pesticides (Agri info, 2015).
Baits pesticides may be 'ready to use' products or products which need to be mixed with a food to control pest. This category includes baits prepared for the control of insects (such as cockroaches and ants) (Bullen, 2011). Fungicides control, destroy, make harmless or regulate the effect of a fungus. Examples include chemicals used to treat grey mould on grape vines and fruit trees, or Downy mildew on cucumbers (El-Sisi, 2013).

Insecticides are substances that destroy, suppress, stupefy, inhibit the feeding of, or prevent infestations or attacks by, an insect or insects. Insecticides are used to control a wide variety of insect pests, including thrips, aphids, moths, fruit flies and locust (Tijani & Nurudeen, 2012). However, Agricultural crops can be genetically modified to make them more resistant to pests and diseases, or tolerant to certain herbicides. These are called *Genetically Modified Organisms* (GMO) For example, a gene from the bacterium *Bacillus thuringiensis* can be incorporated into cotton to provide protection against the larval stages of the cotton bollworm and native bollworm. (EPA, 2013). Example of commonly used pesticides by farmers in Nigeria include-*Nopest, Perfect killer, pest off, Best, Blue bold, DD force.* (Agri info, 2015). Many pesticides used by farmers could be harmful to health if not used appropriately (S. Singh & George, 2012).

2.3 Herbicides

Herbicides are substances used to destroy, suppress or prevent the spread of a weed or other unwanted vegetation, for example, the herbicide glyphosate is used to control a range of

weeds in home gardens, bush land and agricultural situations. Herbicides inhibit the growth of plants, especially weeds (Hamid,Aiyelaagbe and Balogun, 2011).

The first widely used herbicide was 2, 4-dichlorophenoxyacetic acid, often abbreviated as 2, 4-D was first commercialized by the Sherwin-Williams Paint Company and first used in the late 1940s. It is easy and inexpensive to manufacture, and kills many broadleaf plants while leaving grasses largely unaffected (although high doses of 2, 4-D at crucial growth periods can harm grass crops such as maize or cereals). The low cost of 2,4-D has led to continued usage today and it remains one of the most commonly used herbicides in the world (Stanley et.al, 2013).

Contact herbicides destroy only the plant tissue in contact with the chemical. Generally, these are the fastest acting herbicides. They are less effective on perennial plants, which are able to regrow from rhizomes, roots or tubers (Sebiomo, Ogundero, & Bankole, 2012). On the other hand, systemic herbicides are translocated through the plant, either from foliar application down to the roots, or from soil application up to the leaves. They are capable of controlling perennial plants and may be slower acting but ultimately more effective than contact herbicides (Hamid et.al, 2011).

Herbicides can also be classified by their uses as pre-emergent herbicides and post-emergent, pre-emergent herbicides are applied to the soil before the crop emerges and prevent germination or early growth of weed seeds while Post-emergent herbicides are applied after the crop has emerged (Hamid et.al, 2011).

2.4 Farmers' Knowledge relating to pesticides and herbicides

Rural farmers account for the greater part of the population of any developing country such as Nigeria. When the rural farmers lack knowledge and information related to pesticides, they could be groping in the dark relating to their use. This situation could be dangerous to their health (Obidike, 2011). Pesticide application is a widely control method applied in many countries for pests and diseases. However, a study carried out in Cameroon by Mahob & Hoopenit (2014). Has shown that farmers have little knowledge on appropriate pesticides use for the control of a specific pest.

Similar to many countries, pesticide related issues have become a major concern in the recent past. Many researches have been conducted relating to pesticides and herbicides with a view to evolving technical alternatives which are eco-friendly in agriculture. Very little emphasis has however been given to the knowledge and behavior of farmers related to pesticides and herbicides (Nagenthirarajah and Thiruchelvam, 2011). A study conducted in Pampaimadu, Sri Lanka among vegetable farmers nearly 60% of the farmers had medium level knowledge of pesticides use. Only 6% of the farmers had good level of knowledge related to the recommended pesticides and precautionary measure that should be adopted (Sivparsad, Chiuraise, Laing, and Morris, 2014).

A similar study done in Osun and Edo states, Nigeria to examine farmers' knowledge of precautionary measures relating to agro-chemicals usage on cocoa production showed that there was low knowledge score on precautionary measures among farmers in both states. More than 50% of the cocoa farmers in the two states were in the habit of eating, drinking and smoking while spraying agro chemicals (Ogunjimi and Farinde, 2012). About 65% of cocoa farmers in Osun state had no extension contact and training on safe handling of chemicals compared to 97.0% of the farmers in Edo state. However, majority (60%) of the farmers in the two states claimed that they had health problems which are characterized by the following symptoms: body itching, cough and difficulty in breathing. These health related symptoms could be attributable to their use of pesticides (Ogunjimi and Farinde, 2012).

A study carried out in Ogun state, Nigeria reported that majority of the farmers studied lacked basic knowledge of herbicides application and its handling. More than half of the farmers (55.8%) had no formal education or firsthand training on herbicides (Banjo et al., 2010).

Another study conducted in Oyo state revealed that most farmers were knowledgeable about the advantages inherent in the use of herbicides .The farmers, however; they did not know much about the dangers associated with herbicides use. It was noted in the study that some of the farmers indulged in risky herbicides use practices (Tijani and Nurudeen, 2012).

2.5 Hazards or risks associated with the use of pesticides and herbicides

The advantages of pesticides include enhanced economic potential in terms of increased production of food and fibre, and amelioration of vector-borne diseases. They also have their debits which are their adverse effects to man and his environment (El-Sisi, 2013). There is now overwhelming evidence that some agrochemicals(pesticides and herbicides) do pose potential risks to humans and other life forms and unwanted side effects to the environment (Garcia et al., 2012). Many farmers are exposed to pesticides and herbicides on a daily basis. If such farmers do not observe proper precautions, illness or even death could occur (Dennis, 2015). Pesticides have been found to be effective in fighting pest, they have also been associated with long-term health challenges which include carcinogenic, mutagenic, reproductive and hormonal effects (Singh & George, 2012). Agrochemicals which are able to induce changes in the genetic material of somatic and germinal tissue are considered mutagenic, such chemicals can contribute to the appearance of congenital malformations and etiology of cancer (Hotton and Barminas, 2011).

The health challenges from pesticides depend on the ways they have been used. Exposure to pesticides can range from mild skin irritation to birth defects, tumors, genetic changes, blood and nerve disorders, endocrine disruption and even coma or death (EPA, 2013). The immediate symptoms of pesticide contamination include headache, body weakness, blurred vision, vomiting, irritability, impaired concentration and abdominal pain. The chronic effects include the following: inhibition of human immune system, alteration of acetyl cholinesterase glutathione-s-transferase activities, changes in the concentrations of superoxide dismutase and cortisol. The aftermath of the above alterations may lead to reduced sperm counts, blood and liver diseases, depression, asthma, nerve damage and optical impairment (Ariyo, 2013).

Most of the pesticides reach their destination more than their target (EPA, 2013). Pesticide can contaminate land and water when they escape from production sites and storage tanks, when it runs off from field. They could also be harmful when they are sprayed aerially (Tashkent, 1998). It has been observed that if peradventure, pesticides enter aquatic environment, there could be dangers to fish, birds, wild animals and plants in that habitat

making it inconsumable for humans and if consume may lead to health challenges (Olurominiyi and Emily, 2011).

A study conducted by Environmental Protection Agency, USA has estimated that there are close to 10,000 cases of poisoning from pesticides and herbicides each year in the USA.Misuse and abuse of pesticides by farmers can cause a lot of damages to their health or lead to death and even the death of an entire population (Bradely, 2014).

A study done by Ariyo (2013), shows that all members of the family of a local chief who was a prominent cocoa farmer at Okebode in southwestern Nigeria were hospitalized after eating a leaf vegetable undergrowth in a cocoa farm that was earlier sprayed with pesticides. A study has also reported that six family members died in Gombi Local Government Area of Adamawa State, Nigeria after eating *moin moin* prepared from beans suspected to be preserved with some pesticides (Olurominiyi and Emily, 2011). In the same year, many citizens of Bekwarra Local Government Area of Cross River State found themselves in the hospital after eating *moin moin* and beans suspected to have been contaminated by pesticides. Pesticides and herbicides can enter the body through many routes, but the most common ways are through the skin and (Ariyo, 2013).

Pesticides and herbicides can contaminate the soil, water, turf, and other vegetation if not used properly (Awosile, 2013). Herbicides can reach surface water through runoff from treated soil thereby polluting water. The results of a comprehensive set of studies done by the Geological Survey (GS) of Nigeria on major river basins across Nigeria reported that more than 90% of water and fish samples from all streams contained one, or more often, several pesticides were found in all samples from major rivers with mixed agricultural and urban land use influences and 99 percent of samples of urban streams. The GS also found that concentrations of insecticides in urban streams including herbicides (Wasim Aktar,et al 2014).

Herbicides also cause soil contamination because the capacity of the soil to hold positively charged ions in an exchangeable form is important with paraquat and other pesticides that are positively charged (Manda and Mohamed-katerere,2013). Soil pH is also of some

importance. Adsorption increases with decreasing soil pH for ionizable pesticides (Jasim and Al-timmen, 2014).

The occurrence Organic Dust Toxic Syndrome (ODTS) as a result of improper use of pesticides and herbicides is a common respiratory illness. It manifests by temporary influenza-like illness with fever, headache, and muscle aches and pains... For those who are susceptible, repeated exposure damages lung tissue, causing shortness of breath and a growing inability to perform strenuous work. Victims eventually may find it a struggle even to get out of a chair (Sebiomo et al., 2012).

2.6Pattern of use of pesticides and herbicides

A study conducted in Ogun state revealed that about 38% of the farmers applied pesticides occasionally depending on insect infestation. About 54% of the farmers repeatedly applied them on a monthly basis. Large number of farmers administered pesticide immediately after planting (Banjo et al., 2010). They also noted that the use of pesticides and herbicides was observed to be high; pesticides were used frequently, probably because farmers assumed that the only solution to pest is to spray it frequently.

Some of the precautionary measures that must be taken by farmers while handling pesticides and herbicides include that farmers should not eat, drink or smoke while handling or spraying pesticides and herbicides .Farmers should avoid contact with eye and skin (Nagenthirarajah and Thiruchelvam, 2008).In Nigeria, a number of problems exist with regards to safety of pesticides application and related issues. Huge amounts of pesticides are wasted or unnecessarily applied, putting a number of persons and environment involved at risk of intoxication. This is mainly because the principles of application technology are not known. (Ariyo, 2013).Often times, the equipment used to administer pesticides and herbicides are obsolete and working conditions are poor. Regulation of the chemicals used as pesticides is weak (Pimentel, 2011).

Farmers need to be educated on the need to avoid eating, drinking or smoking during pesticides applications. Spraying of pesticides should be done only when the weather conditions are suitable (Salako et al., 2012). Personal Protective Equipment (PPE) must be

utilized in order to minimize risks to the handlers. Alternatives to pesticides are available and include methods of cultivation, use of biological pest controls (such as pheromones and microbial pesticides), genetic engineering, and methods of interfering with insect breeding. Application of composted yard waste has also been used as a way of controlling pests. These methods have become popular and are often safer than traditional chemical pesticides (Salako et al., 2012) The primary benefit of using pesticides is the direct gains or profit expected from the crop not considering the pesticides effect on their health. For example the effect of killing caterpillars feeding on the crop brings the primary benefit of higher yields and better quality of cabbage to them (Saikia, Baruah, and Das, 2012). Pesticides have been an integral part of the process by reducing losses from the, diseases and insect pests that can markedly reduce the amount of harvestable produce (Toluwase and Apata, 2013).Warren (1998) also drew attention to the spectacular increases in crop yields in the United States in the twentieth century. Vector-borne diseases are most effectively tackled by killing the vectors. Insecticides are often the only practical way to control the insects that spread deadly diseases such as malaria, resulting in an estimated 5000 deaths each day (Wasim Aktar,et.al 2014).

2.7 Theoretical framework

A theoretical framework is an analytical tool with several variations and contexts. It is a model that can.

This study is guided by the PRECEDE model as it offered the identifying factors that are linked to knowledge and practices relating to the use of pesticides and herbicides, it was initially developed by Lawrence Green and associates to provide a road map for designing health education and health promotion programs (NIH,2005; Hazavvehei, 2003). It emphasizes planning interventions by focusing on the expected outcomes of action based on epidemiological, social, behavioral, environmental, educational, organizational, administrative and political diagnosis of asocial, health and/or educational situation.

According to the framework, any behavior is caused by some behavioral antecedents. The antecedents could be categorized into three groups factors- predisposing, enabling and reinforcing factors (NIH, 2005). The predisposing factors which influence behavior include awareness, knowledge, attitude, interest, beliefs, perceptions, norms, values and culture. Within the context of this study, knowledge and awareness of pesticides and herbicides, knowledge of source of information on pesticides and herbicides among farmers in Ayedaade Local Government of Osun state can influence the way the make use of these agro chemicals.

The enabling factors are those that are due to resources such as skill, time, money, and drug. These factors have the potential for influencing the practice and behavior relating to use of pesticides and herbicides among farmers in Ayedaade Local Government. The reinforcing factors refer to influence of significant others. These include stakeholders such as Government, Agricultural agencies, Farmers union leaders. These stakeholders have the potential to influence the farmers to be fully aware of the provisions of the policy by providing support.

PRECEDE MODEL

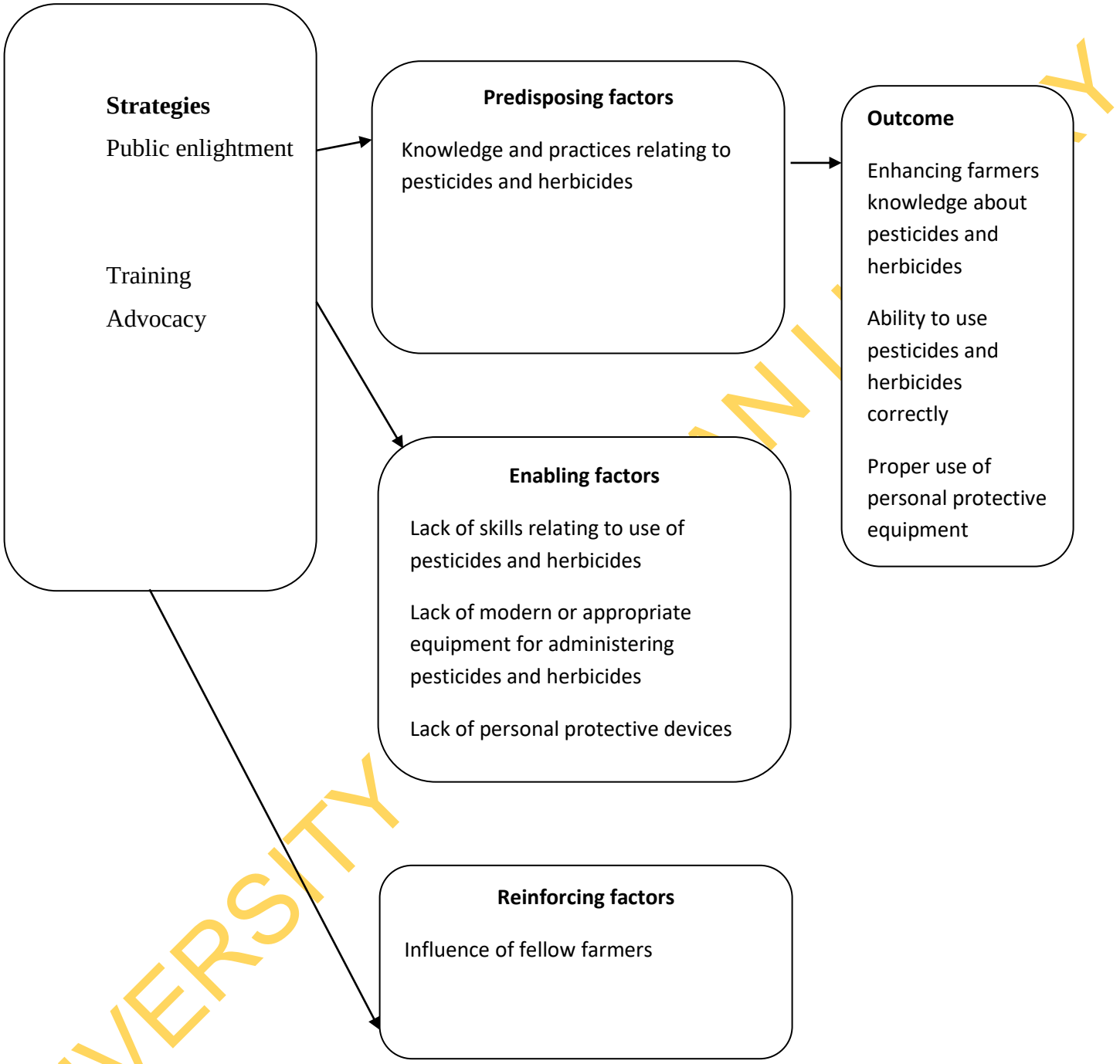

Figure 2.1: The adaptation of PRECEEDE framework for studying knowledge and practices relating to use of pesticides and herbicides among farmers in Ayedaade local government area of Osun state

CHAPTER THREE

METHODOLOGY

This section contains the research design, study population, sampling technique, methods and instrument for data collection and data management and analysis.

3.1 Study design

The study was descriptive-cross-sectional survey. It was designed to investigate farmers' knowledge and practices relating to the use of pesticides and herbicides in farm settlements in Ayedaade Local Government Area (LGA) of Osun state, Nigeria.

3.2 Study setting

This study was carried out in the farm settlements located in Ikoyi in Ayedaade LGA of Osun state. The farm settlements were as follows; Alipanu, Alaguntan, Akinlade and Ibiri farm settlements. The four farm settlements had a total a total of 636 farmers (comprising both male and female). Farming is the major occupation of people of the LGA. The farmers in the settlements mainly grow cocoa, banana, cassava and maize. Most of the farm settlements are medically underserved.

Common herbicides used by farmers in Ayedaade LGA farm settlements include *Force up, Sunparaquat, Tackle, Paraeforce, weed off, Act force, Ultimax plus and Lestamine.* On the other hand, the Common pesticides used by farmers in Ayedaade LGA farm settlements include *Nopest, Perfect killer, DD force, pest off, Best and Blue bold. (*Agri info, 2015).

The populations of male and female farmers in the four farm settlements are shown in table 3.1.

Table 3.1 The distribution of farmers in each farm settlements

Name of Farm settlement	Number of male farmers	Number of female farmers	Total number of farmers
Alipanu	96	40	136
Alaguntan	165	35	200
Akinlade	120	30	150
Ibiri	132	18	150
Total	513	123	636

Source: Records of the Farmers Association in each settlement as at 2015

3.3 study population

The study population constituted of both male and female farmers in the selected farm settlements in Ayedaade LGA who were involved in arable farming.

Inclusion and exclusion criteria

The inclusion criterion for this study was that a study participant must be either male or female active farmers who were involved in arable farming. The criterion automatically excludes other categories of farmers such as animal husbandry including poultry farmers. Farmers who did not consent to participate were also excluded.

3.4 sample size

The sample size (n) for the study was determined by using Lwanga and Lemeshow (1991) sample size formula which is as follows;

$$n=\frac{Z^2 P(1-P)}{d2}$$

In the above formula, Where n=required minimum sample size

z=1.96, (95% CI)

P=0.38

q=1-0.50

d = 5% (degree of accuracy i.e. precision) constant.

- $n = \frac{1.96^2 \times 0.37(1-0.37)}{0.05^2} = 359.50$

A non- response rate of 10% of 360 was added to the calculated sample size to increase the sample size to 400.It was also done to address any possible case of incomplete responses.

3.5 Sample procedure

A multi stage sampling techniques was used in selecting the studying population as follows

First stage sampling

There are five farm settlements in Ikoyi in Ayedaade LGA. Four farm settlements were selected by balloting. The four selected settlements were Alipanu, Alaguntan, Akinlade and Ibiri farm settlements

Second stage

This stage featured proportionate determination of respondents to be selected settlement by settlement using the following

$$\frac{M \times 400}{Y}$$

Where: M = total population of farmers in each settlement

Y = total number of farmers in the four settlement=636

400 = calculated sample size for the study.

Using the aforementioned formula, the number of respondents to be studied in each settlement was determined (see table 3.2).

Table 3.2 proportionate sampling process

S/N	Name of farm settlement	Total number of farmers	proportionate sample calculation	number of respondents to be selected
1	Alipanu	136	$\frac{136\times400}{636}$	85
2	Alaguntan	200	$\frac{200\times400}{636}$	125
3	Akinlade	150	$\frac{150\times400}{636}$	95
4	Ibiri	150	$\frac{150\times400}{636}$	95
	TOTAL	636		400

Third stage

The calculated number of respondents to be selected from each farm settlement was selected through systematic random sampling using list of farmers in each farm settlement made available by farmers Association.

3.6 Methods and Instrument for data collection

The instrument that was used for data collection was a semi-structured interviewer-administered questionnaire. The instrument consist of five sections labeled A,B,C,D and E. Section A contains contained questions used to elicit respondents' sociodemographic characteristics while section B contained questions which focus on awareness and knowledge relating to pesticides. Respondents' awareness and knowledge relating to herbicides are contained in section C. The questions in section D are those framed to determine respondents' knowledge on the hazards or dangers relating to the use of pesticides and herbicides. Lastly, section E focuses on respondents' practices relating to the use of pesticides and herbicides.

3.7 Validity of the instrument

The draft instrument which was developed after consulting relevant literature. The instruments was then reviewed by my supervisor and other experts in the field of public health, their inputs were incorporated into the instruments. This made it possible to ascertain whether the content of the instrument was appropriate enough to access the issues under investigation.

The questionnaire was designed in English and then translated into Yoruba, the language mainly spoken in all the settlements by someone who is vast in both English and Yoruba languages. The Yoruba version was later given to another expert who is equally vast in Yoruba and English languages to translate back to English. This processed was embarked upon to ensure that there was no error in translation. The investigator, who is a Yoruba, also went through both versions of the instrument to ensure that the instrument was correctly translated. (See appendix I and appendix II for the English and Yoruba versions respectively).

The instrument, both English and Yoruba versions were then pretest among farmers in Atan farms, Moniya, Ibadan and Federation of Agricultural Development Union, Ibadan. (FADU) in Oyo state. The pretest communities shared similar characteristics as the study settlements and was pretty far away from the study settlements. At the end of the exercise, questions that are not clear were edited. The hired Research Assistants (RA) participated in the pretest that was done to enhance their data collection skills.

3.8 Reliability of the study

Reliability was ensured through the use of Cronbach Alpha statistical test. The Cronbach Alpha is a measure of internal consistency that reveals how closely related a set of items are as a group (Knapp, 2009). The reliability of the instrument used in this study was ensured by conducting a pretest among 40 (10% of minimum sample size) Farmers in Atan Moniya farms and Federation of Agricultural development Union, Ibadan.(FADU) which have similar characteristics with the study population as those in Ayedaade LGA farm settlements but were geographically far apart from Ayedaade. The responses were coded using a coding

guide, entered into computer and analyzed. A Cronbach coefficient score of 0.854 was obtained which implied that the instrument was highly reliable.

3.9 Data collection process

Four RA were recruited and trained to collect data using questionnaire. The goal and objectives of the research were carefully explained to them i.e. Research assistants. Training of the research assistants was done by the researcher. The training lasted for two days while process of data collection took seventeen days. Data collection was done using interviewer administered questionnaires.

In each settlement, the housing units were visited one by one. A farmer was randomly selected from each block by balloting for interview. If a selected farmer failed to consent to participate, another farmer was selected using the same approach. The investigator and the RA moved from one block to another until the required number or respondents calculated to be interviewed was reached.

3.10 Data management and analysis

The data collected were checked for completeness and accuracy in the field. Serial numbers were assigned to each copy of the questionnaire for easy identification. Data were coded and entered into a computer facilitated by use of a coding guide. (See appendix III) The tools used for data analysis and the results are presented in chapter four.

3.11 Ethical consideration

Ethical consideration was sought from the Ministry of Health ethical review committee of Osun State. (see appendix IV for details) Verbal informed consent was obtained from respondents before interview. Ethical issues such as confidentiality, opportunity to decline interview at any stage and non-exposure to risk were discussed with each respondent.

Only respondents who were able to give written informed consent were recruited into the study. The written consent does not require the names of the participant or any other identifiers but require only their signatures and date. Respondents were informed that

participation was voluntary and that data collected from them would be used only for research purposes only.

3.11 Limitation of the study.

It took quite a while to find the executive members of the farmers association in each settlement in other to seek consent to carry out the study. The officials of the association were initially skeptical about the broad objective of the study. They were afraid that the results of the study might be used against their interest.

In order to overcome this challenge, time was taken to establish to rapport with the officers. Detailed information relating to the study was provided. A letter of introduction given to the investigator by the department of Health promotion and education was tendered. The letter which conveyed for the were also tendered. In addition, the investigator made his identity card available to the officials to the farmers to scrutinize before agreeing to participate in the study.

CHAPTER FOUR

RESULT

The findings of this research are presented in this chapter under the following subsections: socio-demographic information, respondents' awareness and knowledge relating to pesticides, respondents' awareness and knowledge relating to herbicides, knowledge of the health effects relating to the use of pesticides and herbicides, practices relating to pesticides and herbicides and illnesses experienced within the month preceding the study.

Socio demographic information

Table 4.1 shows the socio-demographic details of respondents. The 400 respondents consisted of 80.0% males and 20.0% females with an overall mean age of 47.5±10.7. The age range of respondents between 41-50, 51-60 and 61-70 years accounted for 26.8%, 37.5% and 8.8% respectively. Also Majority (70.0%) of the respondents were married while 21.0% were single.

The educational qualifications of the respondents are also shown in table 4.1.Few (16.5%) of the respondents had no formal education. Respondents with secondary school education topped (29.3%) of those who declared their highest level of education.

Majority (79.5%) of the respondents were Yorubas while Igbos constituted 13.5% .Very Few (7.0%) were Hausas . Majority (63.5%) of the respondents were Christians.

Table 4.1Respondents' socio-demographic information

	N=400	
Demographic variables	**No**	**%**
Sex		
Male	320	80.0
Female	80	20.0
Age*		
<30	41	10.2
31-40	67	16.7
41-50	107	26.8
51-60	150	37.5
61-70	35	8.8
Marital status		
Single	84	21.0
Married	278	70.0
Divorced	24	6.0
Separated	14	3.0
Highest level of Education		
No formal education	66	16.5
Primary	41	10.3
Secondary	117	29.3
OND	26	6.5
NCE	3	0.8
HND	87	21.8
BSc/B.A/B.Ed	60	15.0
Ethnic group		
Yoruba	318	79.5
Igbo	54	13.5
Hausa	28	7.0
Religion		
Christianity	254	63.5
Islam	142	35.5
Traditional religion	4	1.0

*Mean age= 47.5±10.7 years.

Awareness and knowledge relating to pesticides

The results relating to pesticides ever heard by respondents are presented in table 4.2. Most of the respondents had heard of the listed pesticides that are used in farming activities. For instance, 88.2%, 95.8%, 87.8%, 82.8% and 75.3% were aware of *Nopest, Perfect killer, DD force, Pest off* and *Best* pesticides respectively.

Respondents' sources of information relating to pesticides are presented in table 4.3. The sources that topped the list were fellow farmers (73.0%), co-farmers (70.5%) and Local Government Authorities (47.5%).Less than half (42.8%) of the respondents had received training relating to pesticides use. However, out of the respondents that had received training on pesticides majority (55.5%) received the training through schools attended by them while few(23.4%) received the training through the ministry of Agriculture (see table 4.4 for details).

Table 4.5 presents respondents' knowledge on the general precautionary measures that must be taken during and after using pesticides. The correct responses were avoidance of contact with eyes (84.0%), avoidance of contact with skin (96.0%),not eating while handling pesticides (94.5%), not drinking while handling pesticides(94.0%), not smoking while handling pesticides (92.5%), washing of hands after handling pesticides (93.5%) and the washing of used equipments (92.5%).

The results on respondents' knowledge on possible risks associated with the use of pesticides are presented in table 4.6.The correct responses that topped the list of the possible risks associated with the use of pesticides (although all the responses were correct) included adverse effect on health (85.5%), pollution/contamination of water supplies (79.5%) and pollution/contamination of the air (78.0%).Contamination of crops and soil were maintained by 26.0% and 22.2%, respectively.

Table 4.2 Pesticides ever heard by respondents

N=400

Pesticides	Ever heard		
	Yes (%)	No (%)	No response (%)
Nopest	353(88.2)	47(11.8)	0(0.0)
Perfect killer	383(95.8)	43 (3.2)	4 (1.0)
DD force	351(87.8)	46(11.2)	3 (8.0)
Pest off	331(82.8)	62(15.2)	7 (1.8)
Best	301(75.3)	95(23.7)	4 (1.0)
Blue bold	283(70.8)	111(27.8)	6 (1.4)

Table 4.3 Respondents' sources of information about pesticides

N=400

Sources of information	Yes (%)	No (%)	No response (%)
Television	75(18.8)	325(81.2)	0(0.0)
Phone message	89(22.2)	307(76.8)	4 (1.0)
Local Government	190(47.5)	206(51.5)	4 (1.0)
Fellow farmers	292(73.0)	104(26.0)	4 (1.0
Family	164(41.0)	232(58.0)	4 (1.0)
Website/Internet	180(45.0)	208(52.0)	12 (3.0)
Co-workers	282(70.5)	58 (14.5)	60 (15.0)

Table 4.4 Training on pesticides ever received by respondents

Training experiences	Yes (%)	No (%)
Whether ever received training on pesticides(N=400)	128 (42.8)	272(57.2
Provider of training ever received (N=128)		
Ministry of Agriculture	30 (23.4)	
Local government	27 (21.1)	
Schools	71 (55.5)	

Table 4.5 Respondents' knowledge on general precautionary measures which must be taken during and after using pesticides

N=400

Precautionary measures	**True (%)**	**False (%)**	**Don't know (%)**
Avoid contact with eye	336 (84.0)*	16 (16.0)	48 (12.0)
Avoid contact with skin	384 (96.0)*	16 (4.0)	0.0
Not eating while handling pesticides	378 (94.5)*	6 (1.5)	16 (14.0)
Not drinking while handling pesticides	376 (94.0)*	8 (2.0)	16 (4.0)
Not smoking while handling pesticides	370 (92.5)*	14 (3.5)	16 (4.0)
Washing of hands after handling pesticides	374 (93.5)*	6(1.5)	20 (5.0)
Wash used equipments	370 (92.5)*	10(2.5)	20 (5.0)

***Correct responses**

Table 4.6 Respondents' knowledge on possible risks associated with the use of pesticides N=400

Possible risks	**Responses**		
	True (%)	False (%)	Don't know (%)
Adverse effect on health	342(85.5)*	34 (8.5)	20 (5.0)
Pollution/contamination of water supplies	318 (79.5)*	30 (12.5)	32(8.0)
Pollution/contamination of Air	312 (78.0)*	48 (12.0)	40(10.0)
contamination of crops	104 (26.0)*	254 (63.5	42 (10.5)
Soil pollution	89 (22.2)*	192 (48.0)	119 (29.8)

***Correct responses**

Awareness and knowledge relating to Herbicides

Table 4.7 presents respondents' awareness relating to herbicides ever heard of. The herbicides ever heard of by respondents included *weedoff* (90.0%), *force-up* (87.0%), *force-ss* (86.2%) and *paraeforce* (85.2%).

Respondents' sources of information relating to herbicides are shown in table 4.8.Sources that topped the list included co-workers (70.2%), farmers (68.0%), Local Government Authorities (65.2%) and website/internet (45.2%).Respondents' training experiences are shown in table 4.9.The same number of respondents that had received training relating to pesticides also received training relating to herbicides due to the fact that respondents were trained on pesticides and herbicides as part of one training package.

Table 4.10 shows respondents' knowledge on the general precautionary measures that must be taken during and after using herbicides. The correct responses were avoidance of contact with eyes (91.8%), avoidance of contact with skin (92.2%), not eating while handling herbicides (94.0%), not drinking while handling herbicides (94.0%), not smoking while handling herbicides (86.8%), washing of hands after handling herbicides (94.0%) and washing of used equipments (92.5%).

Results on respondents' knowledge on possible risks associated with the use of herbicides are highlighted in table 4.11. The correct responses that topped the list of the possible risks associated with the use of herbicides included adverse effect on health (85.5%), pollution/contamination of water supplies (68.0%), pollution/contamination of the air (65.2%) and contamination of crops (53.5%).

Table 4.7 herbicides ever heard of by respondents

N=400

Herbicides	Ever Heard		
	Yes (%)	No (%)	No response
Tackle	344(86.0)	48(12.0)	8(2.0)
Paraeforce	341 (85.2)	55 (13.8)	4 (1.0)
Force up	351 (87.8)	45 (11.2)	4 (1.0)
Sunparaquat	307 (76.8)	89 (22.2)	4 (1.0)
Ultimax plus	314 (78.5)	78 (19.5)	8 (2.0)
Force ss	345 (86.2)	51 (12.8)	4 (1.0)
Weed off	360 (90.0)	36 (9.0)	4(1.0)
Dime force	319 (79.8)	47(19.2)	4(1.0)
Act force	285(71.2)	111(27.8)	4(1.0)
Lestamine	239(59.8)	153(38.2)	8(2.0)

Table 4.8 Respondents' sources of information about Herbicides

N=400

Sources of information	Yes (%)	No (%)	No response (%)
Radio	69(17.2)	327(81.8)	4(1.0)
Television	62 (15.5)	334 (83.5)	4 (1.0)
Phone message	117 (29.2)	279 (69.8)	4 (1.0)
Local government authority	261(65.2)	135 (33.8)	4 (1.0)
Farmers	272 (68.0)	120 (30.0)	8 (2.0
Family	174 (43.5)	216 (54.5)	8 (2.0)
Website	181 (45.2)	207 (31.8)	12 (3.0)
Co workers	281 (70.2)	39 (9.8)	80 (20.0)

Table 4.9 Training on Herbicides ever received

Training experiences	Yes (%)	No (%)
Whether ever received training on Herbicides(N=400)	128(42.8)	272(57.2)
Provider of training ever received (n=128)		
Ministry of Agriculture	30(23.4)	
Local government	27(21.1)	
school	71(55.5)	

Table 4.10 Respondents' knowledge on general precautionary measures which must be taken during and after using Herbicides

N=400

Precautionary measures	True (%)	False (%)	Don't know (%)
Avoid contact with eye	367 (91.8)*	4 (1.0)	39 (7.2)
Avoid contact with skin	369 (92.2)*	23 (5.8)	8(2.0)
Not eating while handling pesticides	376 (94.0)*	9 (2.2)	15 (3.8)
Not drinking while handling pesticides	371 (92.8)*	17 (4.2)	12 (3.0)
Not smoking while handling pesticides	347 (86.8)*	15 (3.8)	38 (9.4)
Washing of hands after handling pesticides	376 (94.0)*	9(12.2)	15 (4.8)
Wash used equipments	370 (92.5)*	10(2.5)	20 (5.0)

*Correct responses

Table 4.11 Respondents' knowledge on possible risks associated with the use of Herbicides

N=400

Possible risks	Responses		
	True (%)	False (%)	Don't know (%)
Adverse effect on health	292(85.5)*	50 (8.5)	58 (5.0)
Pollution/contamination of water supplies	272 (68.0)*	76 (19.0)	52(13.0)
Pollution/contamination of Air	261 (65.2)*	83 (20.8)	56(14.0)
contamination of crops	214 (53.5)*	122 (30.5)	64 (16.0)
Soil pollution	155 (38.8)*	84 (21.0)	161 (30.2)

*Correct responses

Knowledge of Hazards or health related effects of using pesticides and herbicides

Table 4.12 presents the respondents' knowledge relating to the possible health effects of using pesticides. The correct responses included headache (32.5%), nausea (31.0%), skin irritation (56.0%), eye irritation (66.3%), dizziness (52.2%), fatigue (43.8%), leukemia (32.4%), asthma (36.0%) and allergies (17.0%). Respondents' knowledge relating to the health effects of using herbicides are shown in table 4.13. The listed correct responses included the following headache (32.5%), nausea (31.0%), skin irritation (56.0%), eye irritation (66.3%), dizziness (52.2%), fatigue (43.8%), leukemia (32.4%), asthma (36.0%) and allergies (17.0%). Majority (59.0%) of the respondents did not know whether herbicides could causes allergies or not.

The categories of knowledge scores among the respondents are highlighted in figure 4.1. The maximum knowledge score relating to pesticides and herbicides was 59 points. Scores obtained by respondents were categorized as follows: ≤ 30 =poor, >30-40 =fair and ≥41=good. The mean knowledge score of the respondents was 1.2±0.6. Majority (87.0%) of the respondents had poor knowledge with only 8.5% having good knowledge relating to pesticides and herbicides.

The comparison of respondents' knowledge scores by sex is shown in table 4.14.The mean scores among the males and females were 18.4±4.4 and 26.0±6.4 with a significant difference. The comparison of respondents' mean knowledge score by age group is highlighted in table 4.15.The mean scores among age group of ≤30, 31-40 and 41-50 years were 1.4±0.7, 1.2±0.6 and 1.2±0.5 respectively with no significant difference.(See the table for details among the age groups). Table 4.16 shows the comparison of knowledge scores of respondents by level of education. Those who had no formal education had a mean score of 1.3±0.7, followed closely by those who had primary school and tertiary education with a mean score of 1.2±0.7 and 1.2±0.6 respectively. The difference in the mean knowledge scores by level of education was not significant.

Table 4.12 Respondents' knowledge relating to the health effects of using pesticides

N=400

Health related effect	Responses		
	Yes (%)	No (%)	Don't know (%)
Headache	130 (32.5)*	96(24.0)	174(43.5)
Nausea	124(31.0)*	102(25.5)	174(43.5)
Skin irritation	224(56.0)*	54(13.5)	122(30.5)
Eye irritation	265(66.3)*	49(12.3)	86(21.4)
Dizziness	209(52.2)*	67(16.8)	124(31.0)
Fatigue	175(43.8)*	85(21.2)	140(35.0)
Leukemia	130(32.4)*	79(19.8)	191(47.8)
Asthma	144(36.0)*	96(24.0)	160(40.0)
Allergies	68(17.0)*	96(24.0)	236(59.0)

*Correct responses

Table 4.13 Respondents knowledge relating to the health effects of using herbicides

N=400

Health related effect	Responses		
	Yes (%)	No (%)	Don't know (%)
Headache	130 (32.5)*	96(24.0)	174(43.5)
Nausea	124(31.0)*	102(25.5)	174(43.5)
Skin irritation	224(56.0)*	54(13.5)	122(30.5)
Eye irritation	265(66.3)*	49(12.3)	86(21.4)
Dizziness	209(52.2)*	67(16.8)	124(31.0)
Fatigue	175(43.8)*	85(21.2)	140(35.0)
Leukemia	130(32.4)*	79(19.8)	191(47.8)
Asthma	144(36.0)*	96(24.0)	160(40.0)
Allergies	68(17.0)*	96(24.0)	236(59.0)

*Correct responses

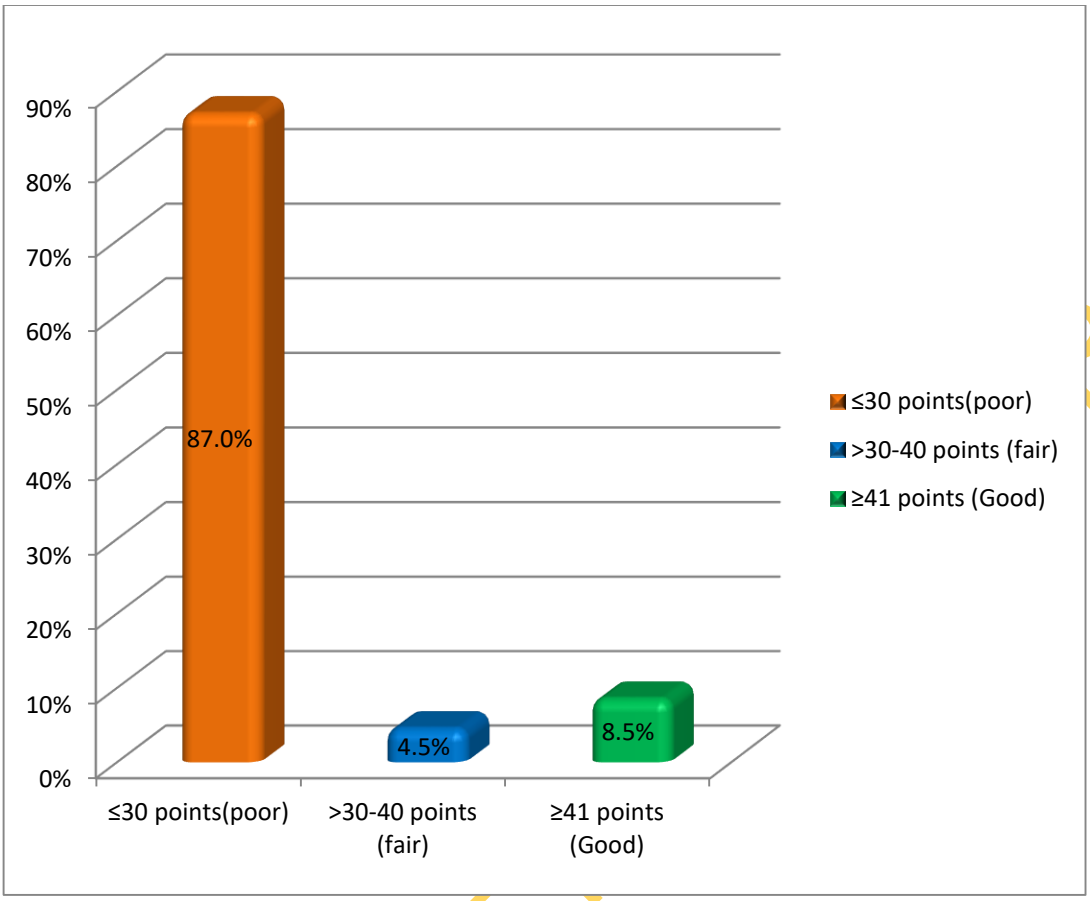

Fig 4.1 Distribution of Knowledge scores among respondents

Table 4.14 Comparison of respondents knowledge score by sex.

N=400

Sex	No	Mean	SD	t-test	P value*
Male	320	18.42	18.42		
Female	80	26.01	13.55	-5.202	0.000

***Statistically significant**

Table 4.15 comparison of respondents means knowledge scores by age group

N=400

Age group	No	X	SD	F test	P value*
<30	41	1.38	0.711		
31-40	67	1.22	0.599		
41-50	107	1.18	0.546	2.839	0.60
51-60	150	1.16	0.509		
61-70	35	1.14	0.494		

***Not statistically significant**

Table 4.16 comparison of respondents' knowledge scores by level of Education

N=400

Level of Education	No	Mean	SD	F-test	P value*
No formal Education					
	70	1.31	0.671	2.784	0.41
Primary	41	1.24	0.663		
Secondary	117	1.09	0.361		
Tertiary	168	1.21	0.581		

***Not statistically significant**

Practices relating to pesticides and herbicides

Table 4.17 presents respondents' results on pesticide ever used. Majority of the respondents had ever used the listed pesticides for farming activities. For instance, *nopest* (64.5%), *perfect killer* (64.0%), *DD force* (57.5%), *pest off (*61.7%), *best* (57.5%) and *blue bold* (71.3%) pesticides had been used by respondents. Majority (70.5%) of the respondents commonly use *nopest* pesticide. (See table 4.18 for details)

The frequency of use of the commonly use pesticides are highlighted in table 4.19. Most of the respondents (93.4%) always use *nopest* pesticide while very few (6.6%) use it occasionally. Similarly, most (95.0%) of the respondents use perfect killer always while only 5.0% use it occasionally. All the respondents used *pest off* (100.0%) and *blue bold* always.

Table 4.20 shows the results of herbicides ever used by respondents. It was revealed that majority of the respondents had used the following herbicides *Sunparaquat* (75.0%), Act *force* (75.0%), *Paraeforce* (71.5%) and Dime force (64.5%). However, among respondents that had ever used the listed herbicides, majority of the respondents commonly used *Tackle* (66.5%) and *Paraeforce* (68.8%), dime force (94.9%) and *act force*(88.0%) herbicides.(see table 4.21 for others)

The results relating to the frequency of use of common herbicides by respondents are presented in table 4.22. Majority of the herbicides were used occasionally. The herbicides used occasionally included *paraeforce* (100.0%), *dime force* (93.8%), *sunparaquat* (90.6%), *ultimax plus* (88.8%) and *force up* (86.2%).

Table 4.23 shows the results of personal protective devices ever used by respondents when using pesticides. The personal protective devices used by majority of the respondents were cover boot (69.0%), hand gloves (55.3%) and nose cover (53.3%) while face mask (36.0%) and overall/garment (35.5%) were used by few respondents. The personal protective devices commonly used by respondents when applying pesticides are shown in table 4.24.The personal protective devices commonly used included nose cover (35.2%), face mask (30.6%) and overall/garment (28.2%).

The personal protective devices(PPD) frequently used by respondents when using pesticides are shown in table 4.25.The PPD always used included cover boot(100.0%),nose

cover(53.3%) and eye goggle(50.0%). Hand gloves were used occasionally (60.0%).The detailed are contained in the table.

Table 4.26 highlights the PPD ever used when applying herbicides. These included cover boot (69.0%), nose cover (53.3%), eye goggle (47.5%) and hand gloves (44.7%)

The results relating to PPD commonly used by respondents when applying herbicides are presented in table 4.27.The PPD included the following: cover boot (25.4%), nose cover (32.9%), eye goggle (47.4%) and garment/overall (46.5%). Table 4.28 shows details of the frequently used personal protective devices among respondents when applying herbicides. The table shows that majority (66.6%) that use the garment/overall wear it always when applying herbicides,40% of the respondents used face mask always.(see table for details)

Table 4.17 Pesticides ever used by respondents

N=400

Pesticides	Ever used	
	Yes (%)	No (%)
Nopest	258(64.5)	142(35.5%
Perfect killer	256(64.0)	144(36.0%)
DD force	230(57.5)	180(42.5%)
Pest off	217(61.7)	193(48.3%)
Best	240(57.5)	170(42.5%)
Blue bold	285(71.3)	115(28.8%)

Table 4.18 Pesticides commonly used by respondents

Pesticides	commonly used	
	Yes (%)	No (%)
Nopest (n=258)	182(70.5)	76(29.5)
Perfect killer(n=256)	200(76.5)	56(23.5)
DD force(n=230)	145(56.2)	85(43.8)
Pest off(n=217)	153(59.3)	64(40.7)
Best (n=240)	120(50.0)	120(50.0)
Blue bold (n=285)	142(51.0)	143(49.0)

Table 4.19 frequency of use of common pesticides by respondents

Pesticides	Frequency of use				
	Always (%)	Occasionally (%)	Rarely (%)	Never (%)	Total
Nopest (n=182)	170(93.4)	18(6.6)	0(0.0)	0(0.0)	182
Perfect killer (n=200)	190(95.0)	10(5.0)	0(0.0)	0(0.0)	200
DD force (n=145)	120(82.8)	25(17.2	0(0.0)	0(0.0)	145
Pest off (n=153)	153(100.0)	0(0.0)	0(0.0)	0(0.0)	153
Best (n=120)	110(91.6)	10(8.4)	0(0.0)	0(0.0)	120
Blue bold (n=142)	142(100.0)	0(0.0)	0(0.0)	0(0.0)	142

Table 4.20 Herbicides ever used by respondents

N=400

Herbicides	Ever used	
	Yes (%)	**No (%)**
Tackle	275(68.2)	125(31.2)
Paraeforce	286(71.5)	114(28.5)
Force up	294(73.5)	106(26.5)
Sunparaquat	260(75.0)	140(25.0)
Ultimax plus	204(50.7)	196(49.3)
Force ss	218(54.5)	182(45.5)
Weed off	284(71.0)	116(29.0)
Dime force	258(64.5)	142(35.5)
Act force	260(75.0)	140(25.0)
Lestamine	275(68.2)	125(31.2)

Table 4.21 Herbicides commonly used by respondents

Pesticides	Commonly used	
	Yes (%)	No (%)
Tackle (n=275)	183(66.5)	92(33.5)
Paraeforce (n=286)	197(68.8)	89(21.2)
Force up (n=294)	174(59.2)	120(40.8)
Sunparaquat (n=260)	171(65.7)	89(34.3)
Ultimax Plus (n=204)	180(88.2)	24(11.8)
Force ss (n=218)	170(78.0)	48(22.0)
Weed off (n=284)	267(94.0)	17(6.0)
Dime force (n=258)	245(94.9)	13(5.1)
Act force (n=260)	229(88.0)	31(12.0)
Lestamine (n=275)	200(72.8)	75(27.2)

Table 4.22 Frequency of use of common herbicides by respondents

	Frequently used				
Herbicides	**Always**	**occasionally**	**Rarely**	**Never**	**Total**
Tackle (N=183)	43(23.5)	140(76.5)	0(0.0)	0(0.0)	183
Paraeforce (N=197)	0(0.0)	197(100.0)	0(0.0)	0(0.0)	197
Force up (N=174)	24(13.8)	150(86.2)	0(0.0)	0(0.0)	174
Sunparaquat (N=171)	16(9.4)	155(90.6)	0(0.0)	0(0.0)	171
Ultimax plus (N=180)	20(11.2)	160(88.8)	0(0.0)	0(0.0)	180
Force ss (N=170)	25(14.8)	145(85.2)	0(0.0)	0(0.0)	170
Weed off (N=267)	67(25.1)	200(74.9)	0(0.0)	0(0.0)	267
Dime force (N=245)	15(6.2)	230(93.8)	0(0.0)	0(0.0)	245
Act force (N=229)	29(12.7)	200(87.3)	0(0.0)	0(0.0)	229
Lestamine (N=200)	30(15.0)	170(85.0)	0(0.0)	0(0.0)	200

Table 4.23 Personal protective devices ever used by respondents when using pesticides N=400

Personal protective devices	Ever used	
	Yes (%)	No (%)
Garment/overall	142(35.5)	258(54.5)
Face mask	144 (36.0)	256(64.0)
Nose cover	213(53.3)	187(46.7)
Eye goggle	190(47.5)	210(52.5)
Cover boot	276(69.0)	124(31.0)
Hand gloves	221(55.3)	179(44.7)

Table 4.24 Personal protective devices commonly used by respondents when using pesticides

N=400

Personal protective devices	Commonly used	
	Yes (%)	**No (%)**
Garment/overall (n=142)l	40(28.2)	102(71.8)
Face mask (n=144)	44(30.6)	100(69.4)
Nose cover (n=213)	75(35.2)	138(64.8)
Eye goggle (n=190)	40(21.1)	150(78.9)
Cover boot (n=276)	55(20.0)	221(80.0)
Hand gloves (n=221)	50(23.1)	171(76.9)

Table 4.25 Personal protective devices frequently used by respondents when using pesticides

Personal protective devices	Frequently used				
	Always	Occasionally	Rarely	Never	Total
Garment/overall (n=40)	30(90)	10(10)	0(0.0)	0(0.0)	40
Face mask (n=44)	20(45.5)	22(54.5)	0(0.0)	0(0.0)	44
Nose cover (n=75)	40(53.3)	35(46.7)	0(0.0)	0(0.0)	75
Eye goggle (n=40)	20(50.0)	20(50.0)	0(0.0)	0(0.0)	40
Cover boot (n=55)	55(100.0)	0(0.0)	0(0.0)	0(0.0)	55
Hand gloves (n=50)	20(40.0)	30(60.0)	0(0.0)	0(0.0)	50

Table 4.26 Personal protective devices ever used by respondents when using Herbicides

N=400

Personal protective devices	Ever used	
	Yes (%)	No (%)
Garment/overall	129(35.5)	271(54.5)
Face mask	183 (36.0)	217(64.0)
Nose cover	213(53.3)	187(46.7)
Eye goggle	190(47.5)	210(52.5)
Cover boot	276(69.0)	124(31.0)
Hand gloves	179(44.7)	221(55.3)

Table 4.27 Personal protective devices commonly used by respondents when using herbicides

Personal protective devices	Commonly used	
	Yes (%)	No (%)
Garment/overall (n=129)	60(46.5)	69(53.5)
Face mask (n=183)	50(27.3	133(72.7)
Nose cover (n=213)	70(32.9)	143(67.1)
Eye goggle (n=190)	90(47.4)	100(52.6)
Cover boot (n=276)	70(25.4)	206(74.6)
Hand gloves (n=179)	100(55.8)	79(44.2)

Table 4.28 Personal protective devices frequently used by respondents when using Herbicides

Personal protective devices	Frequently used				
	Always(%)	Occasionally(%)	Rarely(%)	Never(%)	Total
Garment/overall (n=60)	40(66.6)	20(33.4)	0(0.0)	0(0.0)	40
Face mask (n=50)	20(40.0)	30(60.0)	0(0.0)	0(0.0)	50
Nose cover (n=70)	45(64.3)	25(35.7)	0(0.0)	0(0.0)	70
Eye goggle (n=90)	30(33.3)	60(66.7)	0(0.0)	0(0.0)	90
Cover boot (n=70)	50(71.4)	20(29.6)	0(0.0)	0(0.0)	70
Hand gloves (n=100)	70(70.0)	30(30.0)			

Illness experiences among the respondents within the last one month preceding the study

Table 4.29 presents the respondents' illness experiences within the last one month preceding the study. Few of the respondents (8.5%) experienced illness within last one month preceding the study. The experienced illnesses were; headache (3.9%), cough (20.6%) and malaria (76.5%).

Table 4.29 Respondents history of illness within the last one month preceding the study

History of illness	Yes (%)	No (%)
Prevalence of illness within last month preceding the study (N=400)	34(8.5)	366(91.5)
Illness expression (N=34)		
Headache	1(3.9)	
Malaria	26(76.5)	
Cough	7 (20.60	

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATION.

Socio-demographic characteristics and related information

Majority of the respondents were aged 36-70 years, this is similar to the findings of Ogunjimi and Farinde (2012) in a study on Farmers' Knowledge Level of Precautionary Measures in Agro-Chemicals Usage on Cocoa Production in Osun and Edo States, Nigeria. Majority of the respondents were male. This is because farming in Nigeria involves the use of crude tools and instruments and needs a lot of strength. It is therefore perceived and believed that women do not have the strength and power to go into farming. However, wives of farmers always do help their husbands with harvesting, weeding, processing and other activities that are less stressful. This may also be reason why majority of the respondents were married so that their wives can assist them.

Marital status is an important factor that determines the per capita income of the farmer. Family members could serve as source of cheap labour for the farmer on his farm. With a large family, application of pesticide on the farm will be easier and lesser number of hired labour will be used (Tijani & Nurudeen, 2012). Although large family size tends to reduce the farmers per capita income because more number of people will depend on him for survival hence reducing his real income. This result is similar to what was observed in a study conducted in Maiduguri, Nigeria by Abubakar, Mala, Mumin, Zainab, and Fatima, (2015). Majority of the respondents were Yorubas, this is more so because the study was conducted in a South-western part of Nigeria.

As the farmers level of education increase, its' effects on agricultural production is meant to be positive. This is due to the fact that an educated farmer is at advantage in understanding and adopting new techniques of production (Tijani and Nurudeen, 2012). The more educated a farmer is, the more his decision making on the farm is enhanced as he becomes a better manager of farm resources for increased productivity from the set of farm inputs. Interestingly only few of the respondents (16.5%) had no formal education. More than a quarter of the respondents had secondary education while a little less than a quarter had HND while 15.0% of the respondents had B.sc/BA/B.Ed. This result showed that gradually, even people with tertiary education are getting involved in farming in the study area. This is

contrary to the study in Maiduguri by (Abubakar et al., 2015) although that can be explained by the different level of literacy observed in the Northern and South-western part of Nigeria. The finding of the study is similar to a study conducted in Oyo State , Nigeria by Tijani & Nurudeen, (2012) which revealed that 27.3% and 25.8% of the respondents completed secondary and tertiary education respectively. The varying levels of education and the farmers should be taken into consideration in any educational intervention targeted at them.

Knowledge and awareness on pesticides

Farmers' awareness about pesticides should correlate with the educational status. Educated farmers can read publications and access information on the internet while the uneducated ones cannot do this, thus limiting their level of awareness due to lack of information (Tijani & Nurudeen, 2012). In this study, almost all the respondents had heard about pesticides and this shows that the farmers are very familiar with pesticides. This may be attributed to the educational level of the respondents. The result is similar to Tijani and Nurudeen (2012) in a study on Assessment of Farm Level Pesticide Use among Maize Farmers in Oyo State, Nigeria.

This study also found that majority of the respondents (75%) did not source for information relating to pesticides or get to know about all chemicals they use through modern method like television, radio, or internet. They however got their information through co farmers, farmers association and local government. It is very important that farmers get their information from reliable, current and relevant sources.

Absence of adequate education among farmers and effective regulatory measures has led to concern about the impact of these pesticides application on public health. The findings from this study revealed that more than half of the respondents never received training or lecture on the use of pesticides or anything relating to pesticides chemicals from other farmers. This is similar to the findings of Ogunjimi and Farinde (2012), which showed that majority of cocoa farmers in Osun State (50.5%) never received training relating to pesticides they prefer sales agents and cocoa merchants for brief description on usage of pesticides. Also in a similar study conducted by (Obidike, 2011) among Rural farmers in Nsukka local government area of Enugu state, it was noted that rural farmers lack access to knowledge and information related to pesticides. This will surely have impact on their methods of pesticide application they adopted for use. Inappropriate use of pesticides may have a long

term impact on the health of farmers, their workers and the final consumers of their farm produce.

Awareness and knowledge on Herbicides

Findings of this study revealed that majority of the respondents had heard about herbicides. This is similar to what was noted by Banjo et al (2010) who reported that most (98%) of the farmers were aware of herbicides. The most popular herbicides among the farmers were *weedoff* followed by *force-up*, *force-ss* and *paraeforce*. In most cases the trend of herbicides use by farmers over the years is probably based on farmers' knowledge and perception in relation to effectiveness of herbicides, pest, farm size, and price and weather condition. In African countries, many Government extension programmes encourage the use of herbicides and pesticides but do not consider their effect in the environment, the associated health risks and limited of knowledge of pesticides and herbicides being used.

Farmers' education is significantly related to the media farmers sought information from. This means that level of literacy of the farmers is determined to a greater extent by their information searching behaviour. In the study, the major sources of information on herbicides were through farmers, relying on hand to hand passage of information on anything relating to herbicides and also from local government. This is also similar to the findings of Madu et al. (2012) in a study on Farmers' Media Use Pattern in Adamawa State, Nigeria which reported that Farmers' education is significantly related to the media where farmers seek and find information on eight agricultural practices. If this trend is going to continue, then the Local Government authorities must be ready to ensure that current, reliable and adequate information about herbicides and their application get to the farmers. They should also ensure that farmers use only the approved pesticides and herbicides.

Incorrect pesticide use results not merely in actual yield loss but also in health and possible effects of air and water pollution. Human contacts with pesticides, whether in the field, during pesticide application, weeding, pruning, harvesting, re- entry to collect fire wood, may lead to acute and/or chronic exposures, with adverse health effects especially if precautions are not taken (Ngowi et al., 2008). The correct use of pesticides is therefore critically important. Too much of a chemical may damage or kill the plants or animals it was intended to protect, while too little may not provide adequate pest control. Many desirable plants and animals, including humans, can be harmed by the incorrect or careless use of

pesticides. Herbicides and pesticides must be used wisely, properly and safely (Johnson, Knight, . Moses, Carpenter, 2013).

In this study, some of the safety precautions mentioned by the respondents were avoidance of contact with eyes (84.0%), avoidance of contact with skin (96.0%), not eating while handling pesticides (94.5%), not drinking while handling pesticides (94.0%), not smoking while handling pesticides (92.5%), washing of hands after handling pesticides (93.5%) and the washing of used equipments (92.5%). These safety precautions were actually to prevent entry of the pesticides and herbicides into the body through the skin, lungs and mouth. After applying pesticides, it is necessary to always wash hands and face before eating, drinking or smoking. It is also important to protect your eyes and cover any open wounds when handling pesticides to prevent pesticides from entering the body

Although respondents showed good knowledge of safety precautions, this may not necessarily translate into practice. In some studies conducted in Nigeria,, these precautionary measures are scarcely observed by farmers as they were found eating, smoking or drinking in-between spraying activities (Asogwa & Dongo, 2009). The left over pesticides and empty containers are not properly disposed off as the containers are sometimes washed and used for domestic purposes (Asogwa and Dongo, 2009).

Knowledge on possible risks associated with the use of pesticides and herbicides

Findings from this study revealed that although more than three-quarter of the respondents were aware of adverse effects of pesticides on health but 87.0% of the respondents had poor knowledge of the specific health related effects of exposure to pesticides and herbicides. Only very few of them had good knowledge. This may have an impact on their perceived susceptibility and severity which may reduce their safety precaution practice and likelihood of adopting preventive measures.

Human Health and environmental safety are the two most important issues in the long-term application of pesticides (Oruonye and Okrikata, 2010)**.** Pesticide use is associated with risk and can be hazardous if not handled properly. According to Takagi et al. (1997), risks associated with pesticide use can be those that relate to human beings, and or the environment. Human exposure to pesticides is an important health and social issue as it

usually results in serious health problems such as epilepsy, stroke, and respiratory disorders. Death has been known to occur in some places as a result of exposures to these pesticides.

The chemical constituents present in pesticides could pose to their health they misuse it (Benjamin et al., 2012). In this study, some of the respondents (68.0%) were aware that pesticides can contaminate or pollute water supply, while only few (38.8%) agreed that pesticides can contaminate or pollute soil. Some of the respondents were also aware that wrong pesticide application could pollute and contaminate air and crops. These findings are similar to the findings of A.Ariyo (2013) that the concentrations of pesticides have been detected in almost all segments of environment and food due to their extensive use and abuse of pesticides.

Medical expenses (consultation fees and medicine); costs of recuperation (meals, medicines, doctors or hospitals); transportation costs (to health care facility); labour losses (for victims and their caretakers); are rarely included in analysis of the costs of pesticides. The main reason for not costing health problems particularly, the medical costs is due to the fact that local health officials do not often diagnose symptoms in relation to exposures, and are not adequately trained to identify adverse effects of pesticides (Ngowi et al, 2001; Ngowi and Partanen, 2002). In addition most farmers do not keep records of their expenditures, as they do not appreciate its importance. Also, many of those vulnerable to pesticide-related symptoms are poor farmers who are often illiterate (Ngowi, Mbise, Ijani, London, and Ajayi, 2008).

Personal protective equipment/devices for pesticides and herbicides

The study revealed that majority of the respondents do not usually use PPEs such as nose cover, eye goggle, garment and cover boot when handling pesticides and herbicides. These forms of risk behavior could expose them to some of the health harzards that may be associated with exposure to chemical constituents of pesticides and herbicides.

Although almost all the respondents use cover boot when applying pesticides, they showed poor practice when it comes to wearing other PPD. Only few of them used other PPDs when applying pesticides. The personal protective devices commonly used included nose cover (35.2%), face mask (30.6%), overall/garment (28.2%). Talking about the frequency of use of PPDs, the personal protective devices (PPD) frequently used by respondents were cover boot (100.0%), nose cover (53.3%) and eye goggle (50.0%).

Exposure to pesticides is one of the most important occupational risks among farmers in developing countries. In some situation, exposure to pesticides can occur from accidental spills of chemicals, leakages or faulty spraying equipment (Akingbohungbe, 2009). The exposure of farmers increases in the case of not paying attention to the instructions on how to use the pesticides and particularly when they ignore basic safety guidelines on the use of personal protective equipment (Ajayi and Akinnifesi, 2008; Damalas and Ilias, 2011).

Personal protective equipment (PPE) is the first line defense against potential exposures to pesticides and herbicides and the types of PPE required vary according to the toxicity and physical form of the chemical. Herbicide contamination during application can be reduced by wearing protective clothing such as rubber gloves, overalls, aprons, hats, goggles and boots (Iyagba and Harcourt, 2013). At a minimum, the following protective items should be available when using pesticides; Clean clothing, including a long-sleeved shirt, long trousers and/or coveralls or a spray suit made of a tightly woven fabric or a water- repellent material, waterproof gloves, unlined and without a fabric wristband, waterproof boots, wide brimmed, waterproof hat and safety glasses.

The respondents showed even a poorer practice relating to the use of PPD when applying herbicides. Although 66.6% of the respondents use the garment/overall wear it always when applying herbicides, only 40% of the respondents used face mask always. Only few of them used even the cover boot when applying the herbicides. Other PPD included the following: nose cover (32.9%), eye goggle (47.4%) and garment/overall (46.5%).

This findings could be attributed to poor knowledge of health harzards of pesticides and herbicides. Also lack of adequate training relating to pesticides and herbicides (Nagenthirarajah and Thiruchelvam, 2011). This has a great implication for the health and wellbeing of the farmers as it may lead to chemical ingestion, absorption, inhalation and intoxication. This will in turn lead to higher rate of lost time, and farm accident burden which will reduce the efficiency and productivity of the farming population (Toyin Samuel Olowogbon, Segun Bamidele Fakayode and Oke, 2013).

Pattern of Herbicide and pesticide use

Majority of the respondents had ever used the listed pesticides for farming activities. The most commonly used pesticide among the respondents was *nopest* although most of them said they had used *blue bold* before. Other pesticides used by the respondents were *perfect killer*, *pest off and best*. The use of pesticide was observed to be high among the respondents. This could probably be because farmers assume that the only solution to pest problems is to spray more frequently. It may also be because farmers were not receiving agricultural extension services which include education on appropriate pesticides use. This study is supported by a studies conducted by(Banjo, Aina, & Rije, (2010) and Ngowi, Mbise, Ijani, London, and Ajayi, (2008).

In general, the frequencies of pesticides application by farmers were high. Such heavy use of pesticides may result in frequent contact with pesticides, which can lead to significant health problems. The adverse effects of pesticides to health are attributed to some active ingredient as contained. WHO (2009). Most of the respondents (93.4%) always use *nopest* pesticide. Similarly, most (95.0%) of the respondents use *perfect killer* while all the respondents used *pest off* and *blue bold* always. This result also suggests that the respondents might be mixing or changing pesticides. This may be associated with a lot of factors.

It was also revealed that majority of the respondents had used the following herbicides *Sunparaquat, Act force, Paraeforce and Dime force.* However, among respondents that had ever used the listed herbicides, majority of the respondents commonly used *Tackle* (66.5%) and *Paraeforce* (68.8%), *dime force* (94.9%) and *act force* (88.0%) herbicides.

Implication for health promotion and education

Findings from this study reveal the need for health promotion and education approaches that will be used to tackle various issues earlier discussed. This study clearly showed the poor level of knowledge on the use of pesticides and herbicides among respondents. Health promotion and education is about helping people to be able to attain their full health potential (Kessler and Renggli, 2011).This can however be achieved through programs designed to help improve physical, psychological, educational and work outcomes for an individual. These programs can also help in controlling or/and reducing the overall health

care cost by emphasizing and stimulating prevention of health problems and promotion of healthy lifestyles. Poor knowledge leads to wrong/negative/ unfavorable perception which can also lead to poor preventive practices which can lead to occurrence of diseases or ailments. It is also important to note that the occurrence of a particular disease in a community of certain people depends on their behaviour which is guided by certain antecedent factors classified as disposing, enabling and reinforcing factors.

Health promotion and education generally adopts different strategies at the primary prevention, secondary prevention and tertiary prevention stages in order to ensure high quality life.(Kumar and Preetha,2012) The choice of strategies are guided by evidence based data/ information/research such as this. This will ensure that quality and evidence based information are used to plan, implement and evaluate programs that are aimed at ensuring quality and full health potentials.

The poor knowledge demonstrated by the farmers showed the need to develop a behavioral communication change program that will be aimed at improving the knowledge of farmers as this will help to shape their perception and improve their preventive practices especially in the use of Personal Protection Devices. This can be successfully achieved through the use of different health promotion strategies including training, community development and empowerment, partnership or resource linking, advocacy and social marketing.

Farmers should be subjected to training on how to adopt integrated pest management and the benefit of taken preventive measures on the farm so that they can remain healthy. Public enlightenment should be use to create awareness on all the recommended pesticides and herbicides to be use by farmers, the potential health effects and first-aids options as well as increase the level of knowledge of farmers and their attitude towards pesticides and herbicides usage.

Farmers can be empowered through a loan scheme or subsidizing the prices of the PPDs. This will go a long way in encouraging them to buy and use the PPDs. Advocacy should be done to subject the manufacturer of pesticides and herbicides within the agrochemical industry provide health and safety information on pesticides beyond a label, which reaches pesticide users in the field and ensure that the labels is written in simple and if possible the local language of the farmers (e.g. English, Hausa, Igbo Yoruba, Pidgin English)

Conclusion

The research explored the knowledge and practices related to the use of pesticides and herbicides among farmers in Ayedaade local government area of state of Osun. Farmers have poor knowledge on the use of pesticides and herbicides. Majority of the respondents have never received training relating to pesticides and herbicides usage. Many of the respondents were not used to using personal protective equipments or devices when using or handling these chemicals thereby endangering their lives.

The study shows the need for urgent behavioral communication change interventions that will be aimed at improving the respondents' knowledge about pesticides and herbicides, associated health harzards and to safely apply them. This may be in form of enlightment and training program to educate the farmers on ways and how to use pesticides and herbicides and alternative methods of controlling pests and weed. This will go a long way in shaping their perception positively and improve their preventive practices in order to ensure safe health of the farmers, safe food and safe environment. However, there may also be a need for proper advocacy to subsidize the prices of personal protective equipments

Recommendations

1. There is a need to increase awareness and improve farmers' knowledge on proper use of pesticides and herbicides.
2. Agriculture extension workers should conduct a training of trainer programs for youth farmers on how to use and handle pesticides and herbicides.
3. Governments should encourage farmers by providing Personal protective equipments/devices at subsidized rate to prevent them against health effect of using pesticides and herbicide
4. Since pesticides by their very nature are toxic and can be hazardous to users if not handled properly, their regulation through registration is of great value to users. Governments and companies within the agrochemical industry should provide health and safety information on pesticides beyond a label, which reaches pesticide users in the field. The labels should be written in simple and if possible the local language of the farmers (e.g. English, Hausa, Igbo Yoruba, Pidgin English)

5. Government effort aimed at protecting pesticide users should include appropriate regulations that compel manufacturers or their marketing agents to offer incentive or compensation to users harmed as a result of exposure to pesticides when properly used.

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APPENDIX I

QUESTIONNAIRE

SURVEY OBJECTIVE: To investigate the knowledge and practice towards the use of pesticides and herbicides among farmers in Ayedaade local government area of Osun state.

INFORMATION TO READ TO RESPONDENTS

Dear Respondents,

My name is **AKINLEYE AKINLOLU A**, a post graduate student of the Department Health promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan. The purpose of the study is to investigate **knowledge and practice relating to the use of pesticides and herbicides among farmers in Ayedaade local government area, state of Osun.** The information you provided will be used to raise awareness, give some recommendations and guidelines to decrease diseases related to health issues in your work. Your answers will not be released to anyone and will remain anonymous.

Your participation is voluntary and you may choose to end the interview at any time.

Would you want to participate in the study? YES ☐ **NO** ☐

Office use only (To be completed by interviewer only)

Date of interview----------

Place of interview----------

serial number----------

Section A; Socio demographic characteristic

Instructions: In this section please tick in the appropriate boxes that correspond to your answers or complete the spaces provided below

1 Age as at last Birthday_____

2 Sex: 1 male ☐ 2 female ☐

3. Marital status 1. Single ☐ 2. Married ☐ 3. Divorced ☐ 4. Separated ☐

5. Others (please specify) _____

4 Highest Level of education: 1 No formal Education ☐ 2 Primary ☐ 3. Secondary ☐

4OND ☐ 5 NCE ☐ HND ☐ 7 /Bed/B.A ☐ 8 Oth ☐ lease specify)_____

5. Ethnic group: 1 Yoruba ☐ 2. Igbo ☐ 3 Hausa ☐ 4. Others (please specify)_____

6. Religion: 1. Christainity ☐ 2. Islam ☐ 3. Traditional African Religion ☐

4. Others (please specify) _____

SECTION B: Awareness and knowledge relating to pesticides

Please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

7. Which of the following pesticides have you ever heard of?

S/N	Pesticides	Ever heard	
		Yes	No
7.1	Nopest		
7.2	Perfect killer		
7.3	DD force		
7.4	Pest off		
7.5	Best		
7.6	Blue bold		

8. What are your sources of information on pesticides?

S/N	Sources of information	Yes	No
8.1	Radio		
8.2	Television		

8.3 Test message

8.4 Local government

8.5 Farmers association

8.6 Relatives

8.7 Internet

8.8 Others (please specify) _____

9.Have you ever received any training or lecture relating to use of pesticides1.Yes ☐ 2No

10. ☐If yes to question (9) who provided the training/lecture?_____

11. If yes to question(9)what were you taught?

_____

12. What are the general precautionary measures that must be taken while using pesticides?

S/N	Precautionary measures	True	False	Don't know
12.1	Avoid contact with eye			
12.2	Avoid contact with skin			
12.3	Do not eat while handling pesticides			
12.4	Do not drink while handling pesticides			
12.5	Do not smoke while handling pesticides			
12.6	Wash your hands with soap and water after handling pesticides			
12.7	Wash used equipments immediately after use			

13. What are the possible risks associated with the use of pesticides?

S/N	Possible risks with use of Pesticides	True	False	Don't know
13.1	Damage health risk			
13.2	Water pollution			

13.3 Air pollution

13.4 Crop contamination

13.5 Soil pollution

14. Please tick (√) the appropriate answer to indicate the chemical constituent of the following pesticides

S/N	Pesticides name and the chemicals constituents	True	False	Don't know
14.1	**Perfect killer**			
	Emulsifier			
	Solvent			
	Chlorpyriphos			
14.2	**DD Force**			
	Organo phosphate			
	Chinomethionat			
	Dichlorfluanid			
14.3	**Nopest**			
	Cholinesterase			
	Solvent			
14.4	**Pest off**			
	Chinomethionat			
	Dichlorfluanid			
14.5	**Best**			
	Emulsifier			
	Solvent			
14.6	**Blue bold**			
	Chlorpyriphos			

Solvent

SECTION C: Awareness and knowledge relating to Herbicides

Please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

15. Which of the following Herbicides have you ever heard of

S/N	Herbicides	Ever heard	
		Yes	No
15.1	Tackle		
15.2	Paraeforce		
15.3	Force up		
15.4	Sunparaquat		
15.5	Ultimax plus		
15.6	Force ss		
15.7	Weed off		
15.8	Dime force		
15.9	Act force		
15.10	Lestamine		

16. What are your sources of information on Herbicides?

S/N	Sources of information	Yes	No
16.1	Radio		
16.2	Television		
16.3	Test message		
16.4	Local government		
16.5	Farmers association		
16.6	Relatives		
16.7	Internet		
16.8	Others (please specify) _____		

17Have you ever received any training or lecture relating to use of Herbicides 1.Yes ☐

2.No ☐

18. If yes to question (17) who provided the training/lecture?_____

19. If yes to question(17)what were you taught?

_____

20. What are the general precautionary measures that must be taken while using Herbicides?

S/N	Precautionary measures	True	False	Don't know
20.1	Avoid contact with eye			
20.2	Avoid contact with skin			
20.3	Do not eat while handling pesticides			
20.4	Do not drink while handling pesticides			
20.5	Do not smoke while handling pesticides			
20.6	Wash your hands with soap and water after handling pesticides			
20.7	Wash used equipments immediately after use			

21. What are the possible risks associated with the use of Herbicides?

S/N	Possible risks with use of Pesticides	True	False	Don't know
21.1	Damage health risk			
21.2	Water pollution			
21.3	Air pollution			
21.4	Crop contamination			
21.5	Soil pollution			

22. Please tick (√) the appropriate answer to indicate the chemical constituent of the following herbicides

S/N	Herbicides name and the chemicals constituents	True	False	Don't know
22.1	**Tackle**			
	Glyphosate			
	Solvent			
22.2	**Parae force**			
	Paraquat dichloride			
	Bipyridyllum			
	Solvent			
22.3	**Force up**			
	Phoshonoglycine			
	Glyphosate			
	Isopropylamine			
22.4	**Sunparaquat**			
	Paraquat dichloride			
	Solvent			
22.5	**Ultimax plus**			
	Phoshonoglycine			
	Glyphosate			
22.6	**Force ss**			
	Paraquat dichloride			
22.7	**Weed off**			
	Glyphosate			
	Solvent			
22.8	**Dime force**			
	Phoshonoglycine			
	Glyphosate			
22.9	**Act force**			
	Glyphosate			
	Solvent			
22.10	**Lestamine**			

Isopropylamine

glyphosate

Section D: Dangers /hazards or Health related effect involved in using Pesticides and Herbicides

Please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

23a. Have you been ill within the last one month? Yes ☐ No ☐

23b. If yes to question 23a, what illnesses has affected you?

_____

24. Please tick (√) the appropriate answer to indicate the hazard or health related effect of using Pesticides

S/N	Health related effect	Yes	No	Don't know
25.1	Headaches			
25.2	Nausea			
25.3	Skin irritation			
25.4	Eye irritation			
25.5	Dizziness			
25.6	Fatigue			
25.7	Lung cancer			
25.8	Postrate cancer			
25.9	Testicular cancer			
25.10	Leukemia			
25.11	Asthma			
25.12	Allergies			

26. Please tick (√) the appropriate answer to indicate the Harzard or health related effect of using Herbicides

S/N	Health related effect of using Herbicides	Yes	No	Don't

know

26.1 Headaches

26.2 Nausea

26.3 Skin irritation

26.4 Eye irritation

26.5 Dizziness

26.6 Fatigue

26.7 Lung cancer

26.8 Postrate cancer

26.9 Testicular cancer

26.10 Leukemia

26.11 Asthma

26.12 Allergies

Section E: Practices relating to Pesticides and Herbicides usage

Please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

27. For the use of pesticides, Please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

S/N	Pesticides	Ever used	
		Yes	No
27.1	Nopest		
27.2	Perfect killer		
27.3	DD force		
27.4	Pest off		
27.5	Best		
27.6	Blue bold		

S/N	Pesticides	commonly

		used	
		Yes	**No**
27.7	Nopest		
27.8	Perfect killer		
27.9	DD force		
27.10	Pest off		
27.11	Best		
27.12	Blue bold		

S/N	**Pesticides**	**Frequency of use of pesticides**			
		Always	**Occasionally**	**Rarely**	**Never**
27.13	Nopest				
27.14	Perfect killer				
27.15	DD force				
27.16	Pest off				
27.17	Best				
27.18	Blue bold				

28. For the use of herbicides, Please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

S/N	**Herbicides**	**Ever used**	
		Yes	**No**
28.1	Tackle		
28.2	Parae force		
28.3	Force up		
28.4	Sunparaquat		
28.5	Ultimax plus		
28.6	Force ss		
28.7	Weed off		
28.8	Dime force		

28.9 Act force

28.10 Lestamine

S/N	Herbicides	commonly used	
		Yes	No
28.5	Tackle		
28.6	Parae force		
28.7	Force up		
28.8	Sunparaquat		
28.9	Ultimax plus		
28.10	Force ss		
28.11	Weed off		
28.12	Dime force		
28.13	Act force		
28.14	Lestamine		

S/N	Herbicides	Frequency of use of pesticides			
		Always	Occasionally	Rarely	Never
28.9	Tackle				
28.10	Paraeforce				
28.11	Force up				
28.12	Sunparaquat				
28.13	Ultimax plus				
28.14	Force ss				
28.15	Weed off				
28.16	Dime force				
28.17	Act force				
28.18	Lestamine				

29. For the use of personal protective equipment/devices (PPE) for Pesticides, Please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

S/N	Personal protective equipment/devices (PPE) for Pesticides	Ever used	
		Yes	No
29.1	Overall		
29.2	Face mask		
29.3	Nose cover		
29.4	Eye google		
29.5	Cover boot		
29.6	Hand gloves		

S/N	Personal protective equipment/devices(PPE) for Pesticides	commonly used	
		Yes	No
29.7	Overall		
29.8	Face mask		
29.9	Nose cover		
29.10	Eye google		
29.11	Cover boot		
29.12	Hand gloves		

S/N	Personal protective equipment/devices(PPE) for pesticides	Frequency of use of PPE			
		Always	Occasionally	Rarely	Never
29.13	Overall				
29.14	Facemask				
29.15	Nose cover				
29.16	Eye google				

29.17 Cover boot

29.18 Hand gloves

30 For the use of personal protective equipment/devices for herbicides, please tick (√) any of the response that apply to you in the boxes provided or complete the blank spaces provided as applicable

S/N	Personal protective equipment/devices(PPE) for Herbicides	Ever used	
		Yes	No
30.1	Overall		
30.2	Face mask		
30.3	Nose cover		
30.4	Eye google		
30.5	Cover boot		
30.6	Hand gloves		

S/N	Personal protective equipment/devices(PPE) for Herbicides	commonly used	
		Yes	No
30.7	Overall		
30.8	Face mask		
30.9	Nose cover		
30.10	Eye google		
30.11	Cover boot		
30.12	Hand gloves		

S/N	Personal protective equipment/devices (PPE) for Herbicides	Frequency of use of PPE			
		Always	Occasionally	Rarely	Never
30.13	Overall				
30.14	Facemask				
30.15	Nose cover				

30.16 Eye google

30.17 Cover boot

30.18 Hand gloves

APPENDIX II

YORUBA

Office use only (To be completed by interviewer only)

Date of interview----------

Place of interview----------

erial number----------

Abala A; Socio demographic characteristic

Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

1 omo odun melo niyin ----------

2 Oknrin tabi obinrin: 1 okunrin ☐ 2 obinrin ☐

3. seni iyawo tabi oko 1. Apon/omidan ☐ 2. Mofe iyawo/oko ☐ 3.ikosile ☐ 4. ipinya ☐

5. Awon miran(jowo pata) _____

4 Ipele eko te ka: 1 nko lo ile iwe ☐ 2Ile iwe aloko bere ☐ 3.Ile iwe girama ☐

4OND ☐ 5. NCE ☐ 6. HND ☐ 7. B.Sc ☐ 8.Awon miran(jowo pata)_____

5. Eya/iran:1 Yoruba ☐ 2. Igbo ☐ 3 Hausa ☐ 4. Awon miran(jowo pata)_____

6. Esin: 1.kristaini ☐ 2.musulim ☐ 3.esin abalaye ☐ 4. Awon miran(jowo pata) _____

Abala B: Imo to jomo si nkan ta fi n pa kokoro

Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

7. Ewo ninu awon ogun ipakokoro wonyi ni e ti gbo ri?

S/N	**Ogun ipakokoro**	**Moti gbo ri**	
		Beeni	**Beeko**
7.1	Nopest		
7.2	Perfect killer		
7.3	DD force		
7.4	Pest off		
7.5	Best		
7.6	Blue bold		

8. Kini orison awon alaaye ti e ti gbo tabi ti e mo lori awon ogun tefi n pa kokoro? (ejowo e mu eyi ti e lero pe ohun ni idahun)

S/N	**Orisun alaye**	**Beeni**	**Beeko**
8.1	Radio		
8.2	Telefision		
8.3	Meseji ori fonu		
8.4	Ijoba ibile		
8.5	Egbe agbe		
8.6	Awon ebi		
8.7	Ero aye lu kara		
8.8	Awon osise inu oko		
8.9	Awon miran(jowo pata) _____		

9Have you ever received any training or lecture relating to use of pesticides.Yes☐.No☐

10.If yes to question (9) who provided the training/lecture?_____

11.If yes to question(9)what were you taught?

_____

12. Ki?

S/N	Odiwon idabo bo	Otito	Eke	Mi o mo
12.1	Mase je ki o kan oju re			
12.2	Mase je ki o kan ara re			
12.3	Mase jeun nigba ti e ba n lo apakokoro			
12.4	Mase mu ohun kohun nigba ti e ba n lo pakopako			
12.5	Mase mu ciga nigba ti e ba lo pakopako			
12.6	We owo re pelu ose ati omi nigba ti e ba lo apakokoro tan			
12.7	We nkan elo ni kete ti ba se tan			

13. Kini awon nkan ti o lewu pelu lilo ogun apakokoro ma n fa??

S/N	Awon nkan to lewu	Otito	Eke	Mi o mo
13.1	Ewu ilere bibaje			
13.2	Biba omi je			
13.3	Biba afefe je			
13.4	Biba nkan ogbin je			
13.5	Biba ile je			

14. Jowo fi ami (√) si idahun ti o peye si awon chemical towa ninu awon apakokoro wonyi

S/N	Oruko apakokoro ati awon chemical towa	Otito	Eke	Mi o mo

	ninu re			
14.1	**Perfect killer** Emulsifier Solvent Chlorpyriphos			
14.2	**DD Force** Organo phosphate Chinomethionat Dichlorfluanid			
14.3	**Nopest** Cholinesterase Solvent			
14.4	**Pest off** Organophosphate Solvent			
14.5	**Best** Emulsifier Dichlorfluanid Solvent			
14.6	**Blue bold** Chinomethionat Cholinesterase			

Abala C: Imo to jomo si nkan ta fi n pako

Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi15 Ewo ninu awon ogun pakopako wonyi ni e ti gbo ri?

S/N	**Pakopako**	**Moti gbori**	
		Beeni	**Beeko**
15.1	Tackle		
15.2	Paraeforce		
15.3	Force up		

15.4	Sunparaquat		
15.5	Ultimax plus		
15.6	Force SS		
15.7	Weed off		
15.8	Dime force		
15.9	Act force		
15.10	Lestamine		

16. Kini orison awon alaaye ti e ti gbo tabi ti e mo lori awon ogun tefi n pa kokoro? (ejowo e mu eyi ti e lero pe ohun ni idahun)

S/N	Orisun alaye	Beeni	Beeko
16.1	Radio		
16.2	Telefision		
16.3	Meseji ori fonu		
16.4	Ijobo ibile		
16.5	Egbe agbe		
16.6	Awon ebi		
16.7	Ero aye lu kara		
16.8	Awon osise inu oko		
16.9	Awon miran(jowo pata) _____		

17.Nje e ti gba idanileko lori nkan to jomo ogun te fi n pako? 1.Beeni ☐ 2.Beeko ☐

18.Toba je pe beeni si ibeere kesan(9) talo dayin leko?_____

19.Tobaje pe beni si ibeere kesan(9) nibo leti gba idani leko?

_____

_____

20. Kini awon odiwon idabo bo ti e gbudo mulo ti e ba n lo ogun pakopako?

S/N	Odiwon idabo bo	Otito	Eke	Mio

				mo
20.1	Mase je ki o kan oju re			
20.2	Mase je ki o kan ara re			
20.3	Mase jeun nigba ti e ba n lo apakokoro			
20.4	Mase mu ohun kohun nigba ti e ba n lo pakopako			
20.5	Mase mu ciga nigba ti e ba lo pakopako			
20.6	We owo re pelu ose ati omi nigba ti e ba lo apakokoro tan			

21. Kini awon nkan ti o lewu pelu lilo ogun apako ma n fa?

S/N	**Awon nkan tolewu**	**Otito**	**Eke**	**Mi o mo**
21.1	Ewu ilere bibaje			
21.2	Biba omi je			
21.3	Biba afefe je			
21.4	Biba nkan ogbin je			
21.5	Biba ile je			

22. Jowo fi ami (√) si idahun ti o peye si awon eroja chemical towa ninu awon apako wonyi

S/N	**Oruko apakokoro ati awon chemical towa ninu re**	**Otito**	**Eke**	**Mi o mo**
22.1	**Tackle** Glyphosate Solvent			
22.2	**Parae force** Paraquat dichloride Bipyridyllum Solvent			
22.3	**Force up**			

	Phoshonoglycine Glyphosate Isopropylamine			
22.4	Sunparaquat Paraquat dichloride Solvent			
22.5	**Ultimax plus** Glypphosate Solvent			
22.6	**Force ss** **Paraquat dichloride** **Solvent**			
22.7	**Weed off**			
22.8	**Dime force**			
22.9	**Act force**			
22.10	**Lestamine**			

Abala D:Afiyesi ewu tabi ti akoba ti o romo ilera ni lilo ogun apakokoro ati pakopako

Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

23a. Nje o ti se aisan larin osun kan to koja seyin? Beeni ☐ Beeko ☐

23bTi o baje pe beeni si ibeere 23,iru aisan wo lo se o seyin?_____

24.Jowo ko ami (√) si idahun ti o ye lati fihan awon ewu tabi ti akoba ti o romo ilera nipa lilo ogun apa kokoro

S/N	Afiyesi akoba ti romo ilera	Beeni	Beeko	Mio o mo
24.1	Efori			
24.2	Riru			
24.3	Ara hihun			
24.4	Oju hihun			
24.5	Oju pipoyi			
24.6	Rire			
24.7	Leukemia			
24.8	Asthma			
24.9	Ehun			

25. .Jowo ko ami (√) si idahun ti o ye lati fihan awon ewu tabi ti akoba ti o romo ilera nipa lilo ogun pakopako

S/N	Afiyesi akoba ti romo ilera	Beeni	Beeko	Mio o mo
25.1	Efori			
25.2	Riru			
25.3	Ara hihun			
25.4	Oju hihun			
25.5	Oju pipoyi			
25.6	Rire			
25.7	Leukemia			
25.8	Asthma			

Abala E:Awon ise ti o jomo lilo ogun apakokoro ati pakopako

Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

26 Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

S/N	Apakokoro	Lailai lo	
		Beeni	Beeko
26.1	Nopest		
26.2	Perfect killer		
26.3	DD force		
26.4	Pest off		
26.5	Best		
26.6	Blue bold		
26.7	Awon miran(jowo pata) _____		

S/N	Apakokoro	Wopo fun lilo	
		Beeni	Beeko
26.5	Nopest		
26.6	Perfect killer		
26.7	DD force		
26.8	Pest off		
26.9	Best		
26.10	Blue bold		
26.11	Awon miran(jowo pata) _____		

S/N	Awon pakopako	Nwon igba lilo apakokoro			
		Gbogbo igba	Le kokan	Sowon	Rara/lailai
26.12	Nopest				
26.13	Perfect killer				
26.14	DD force				
26.15	Pest off				
26.16	Best				
26.17	Blue bold				
26.18	Awon miran(jowo pata)_____				

27.Fun lilo pakopako, ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

S/N	Pakopako	Lailai lo	
		Beeni	Beeko
27.1	Tackle		
27.2	Parae force		
27.3	Force up		
27.4	Sunparaquat		
27.5	Ultimax plus		
27.6	Force ss		
27.7	Weed off		
27.8	Dime force		
27.9	Act force		
27.10	Lestamine		
27.11	Awon miran(jowo pata)_____		

S/N	Pakopako	Wopo fun lilo	
		Beeni	Beeko
28.1	Tackle		
28.2	Parae force		
28.3	Force up		
28.4	Sunparaquat		
28.5	Ultimax plus		
28.6	Force ss		
28.7	Weed off		
28.8	Dime force		
28.9	Act force		
28.10	Lestamine		
28.11	Awon miran(jowo pata)_____		

S/N	Pakopako	Nwon igba lilo apakokoro			
		Gbogbo igba	Le kokan	Sowon	Rara/lailai
29.10	Tackle				
29.11	Paraeforce				
29.12	Force up				
29.13	Sunparaquat				
29.14	Ultimax plus				
29.15	Force ss				
29.16	Weed off				
29.17	Dime force				
29.18	Act force				
29.19	Lestamine				
29.20	Awon miran(jowo pata)_____				

30.Fun awon ohun elo idabo bo fun lilo ogun apakoko , Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

S/N	Ohun elo fun idabobo ti apakokoro	Lailai lilo	
		Beeni	Beeko
30.1	Aso wiwo		
30.2	Iboju		
30.3	Ibomu		
30.4	Gogulu		
30.5	Bata		
30.6	Ibowo		

S/N	Ohun elo fun idabobo ti apakokoro	Wopo fun lilo

		Beeni	Beeko
30.7	Aso wiwo		
30.8	Iboju		
30.9	Ibomu		
30.10	Gogulu		
30.11	Bata		
30.12	Ibowo		

S/N	Ohun elo fun idabobo ti apakokoro	Nwon igba lilo ohun idabo bo			
		Gbogbo igba	Le kokan	Sowon	Rara/lailai
30.13	Aso wiwo				
30.14	Iboju				
30.15	Ibomu				
30.16	Gogulu				
30.17	Bata				
30.18	Ibowo				

31 Fun awon ohun elo idabo bo fun lilo ogun pakopako , Itosona:ni abala yi ejowo e mu eyi ti e lero pe ohun ni idahun tabi ki e pese idahun si awon ibeere towa ni isale wonyi

S/N	Ohun elo fun idabobo ti pakopako	Lailai lilo	
		Beeni	Beeko
31.1	Aso wiwo		
31.2	Iboju		
31.3	Ibomu		
31.4	Gogulu		
31.5	Bata		

31.6	Ibowo		

S/N	Ohun elo fun idabobo ti pakopako	Wopo fun lilo	
		Beeeni	Beeko
31.7	Aso wiwo		
31.8	Iboju		
31.9	Ibomu		
23.10	Gogulu		
31.11	Bata		
31.12	Ibowo		

S/N	Ohun elo fun idabobo ti pakopako	Nwon igba lilo ohun elo idabo bo			
		Gbogbo igba	Le kokan	Sowon	Rara/lailai
31.13	Aso wiwo				
31.14	Iboju				
31.15	Ibomu				
31.16	Gogulu				
31.17	Bata				
31.18	Ibowo				

APPENDIX III

Coding guide

Section A

S/N	QUESTIONS	RESPONSES	CODE
1	Age as at last birthday		Open ended
2	Gender	Male	1
		female	2
3	Marital status	Single	1
		Married	2
		Divorced	3
		seperated	4
4	Highest level of Education	No formal	1
		Primary	2
		Secondary	3
		OND	4
		NCE	5
		HND	6
		Bsc	7
		Others	
		Technical	8
		NABTEB	9
		TC 11	10
		No option/blank	99
5	Ethnic group	Yoruba	1
		Igbo	2
		Hausa	3
		No option/response	99
6	Religion	Christainity	1
		Islam	2
		Traditional	3

SECTION B

Pesticides ever heard

s/n	QUESTIONS	RESPONSE	CODE
7.1	Nopest	Yes	1
		no	2
7.2	Perfect killer	Yes	1
		no	2
7.3	DD Force	Yes	1
		no	2
7.4	Pest off	Yes	1
		no	2
7.5	Best	Yes	1
		no	2
7.6	Blue bold	Yes	1
		no	2

Source of information of pesticide

8.1	Radio	Yes	1
		no	2
8.2	Television	Yes	1
		no	2
8.3	Phone message	Yes	1
		no	2
8.4	Local government	Yes	1
		no	2
8.5	Farmers association	Yes	1
		no	2
8.6	Family members	Yes	1
		no	2
8.7	Website	Yes	1
		no	2
8.8	Co farmers	Yes	1
		No	2
		No response	99

9	Have you ever received any training or lecture relating to use of pesticides	Yes	1
		no	2
10	If yes to question (9) who provided the training/lecture?	Ministry of Agriculture	11
		Local govt	12
		School	13
		No response	14
			99
11	If yes to question(9)what were you taught?	Oyo	15
		Osun	16
		Farmers association club	17
		No response	
			99

Precautionary measures while using pesticides

S/N	QUESTIONS	RESPONSE	CODE
12.1	Avoid contact with eye	True	1
		False	2
		Don't know	3
		No response	99
12.2	Avoid contact with skin	True	1
		False	2
		Don't know	3
		No response	99
12.3	Do not eat while handling pesticides	True	1
		False	2
		Don't know	3
		No response	99
12.4	Do not drink while handling pesticides	True	1
		False	2
		Don't know	3
		No response	99
12.5	Do not smoke while handling pesticides	True	1
		False	2
		Don't know	3
		No response	99
12.6	Wash your hands with soap and water after handling pesticides	True	1
		False	2
		Don't know	3
		No response	99
12.7	Wash used equipments immediately after use	True	1
		False	2
		Don't know	3
		No response	99

What are the possible risks associated with the use of pesticides?

13.1	Damage health risk	True	1
		False	2
		Don't know	3
		No response	99
13.2	Water pollution	True	1
		False	2
		Don't know	3
		No response	99

Precautionary measures on herbicides use

S/N	QUESTIONS	RESPONSE			CODE
20.1	Avoid contact with eye	13.3	Air pollution	True	1
				False	2
				Don't	3
					99

		know No response	99
13.4	Crop contamination	True False Don't know No response	1 2 3 99
13.5	Soil pollution	True False Don't know No response	1 2 3 99

chemical constituent of the following pesticides

	Perfect killer		
14.1a	Emulsifier	True	1
14.1b	Solvent	False	2
14.1c	Chlorpyriphos	Don't know	3 99
		No response	
	DD force		
14.2a	Organophosphate	True	1
14.2b	Chinomethionat	False	2
14.2c	Dichloro fluanid	Don't know	3 99
		No response	
	Nopest		
14.3a	Cholinesterase	True	1
14.3b	Solvent	False	2
		Don't know	3 99
		No response	
	Pest off		
14.4a	Organophosphate	True	1
14.4b	Solvent	False	2
		Don't know	3 99
		No response	

	Best		
14.5a	Emulsifier	True	1
14.5b	Dichlorofluanid	False	2
14.5c	solvent	Don't	3
		know	99
		No	
		response	
	Blue bold		
14.6a	Chinomethionat	True	1
14.6b	cholinesterase	False	2
		Don't	3
		know	99
		No	
		response	

SECTION C

Herbicides ever heard

s/n	QUESTIONS	RESPONSE	CODE
15.1	Tackle	Yes	1
		no	2
15.2	Paraeforce	Yes	1
		no	2
15.3	Force up	Yes	1
		no	2
15.4	Sunparaquat	Yes	1
		no	2
15.5	Ultimaxplus	Yes	1
		no	2
15.6	Force ss	Yes	1
		no	2
15.7	Weed off	Yes	1
		no	2
15.8	Dimeforce	Yes	1
		no	2
15.9	Act force	Yes	1
		no	2
15.10	Listamine	Yes	1
		no	2

Source of information on herbicides

16.1	Radio	Yes	1
		no	2
16.2	Television	Yes	1
		no	2
16.3	Phone message	Yes	1
		no	2
16.4	Local	Yes	1

		government	no 2
		16.5 Farmers association	Yes 1 no 2
		16.6 Family members	Yes 1 no 2
		16.7 Website	Yes 1 no 2
		16.8 Co farmers	Yes 1 No 2 No response 99
		17 Have you ever received any training or lecture relating to use of herbicides	Yes 1 no 2
		18 If yes to question (17) who provided the training/lecture?	Ministry of Agriculture 11 Local govt 12 School 13 No response 99
		19 If yes to question(17)what were you taught?	Oyo 14 Osun 15 Farmers association 19 club 99 No response
		True False Don't know No response	
20.2	Avoid contact with skin	True False Don't know No response	1 2 3 99
20.3	Do not eat while handling pesticides	True False Don't know No response	1 2 3 99
20.4	Do not drink while handling pesticides	True False Don't know No response	1 2 3 99
20.5	Do not smoke while handling pesticides	True False	1 2

		Don't know	3
		No response	99
20.6	Wash your hands with soap and water after handling pesticides	True	1
		False	2
		Don't know	3
		No response	99

What are the possible risks associated with the use of Herbicides

21.1	Damage health risk	True	1
		False	2
		Don't know	3
		No response	99
21.2	Water pollution	True	1
		False	2
		Don't know	3
		No response	99
21.3	Air pollution	True	1
		False	2
		Don't know	3
		No response	99
21.4	Crop contamination	True	1
		False	2
		Don't know	3
		No response	99
21.5	Soil pollution	True	1
		False	2
		Don't know	3
		No response	99

chemical constituent of the following herbicides

	Tackle		
22.1a	Glyphosate	True	1
22.1b	Solvent	False	2
		Don't know	3
		No response	99
	parae force		
22.2a	paraquat dichloride	True	1
22.2b	Bipyridllum	False	2
22.2c	Solvent	Don't know	3
		No response	99
	Force up		
22.3a	phoshonoglycine	True	1
22.3b	glyphosate	False	2
	isopropylamine	Don't know	3
		No response	99
	Sunparaquat		
22.4a	Paraquat dichloride	True	1
22.4b	Solvent	False	2

		Don't know	3
		No response	99
	Ultimax plus		
22.5a	glyphosate	True	1
22.5b	solvent	False	2
		Don't know	3
		No response	99
	Force ss		
22.6a		True	1
22.6b	Paraquat dichloride	False	2
	Solvent	Don't know	3
		No response	99
	Weed off		
22.7a	glyphosate		
22.7b	solvent		
	Dime force		
22.8a	glyphosate		
22.8b	isopropylamine		
	Act force		
22.9a	glyphosate		
22.9b	solvent		
	Lestamine		
22.10a	glyphosate		
22.10b	isopropylamine		

SECTION D

23a	Have you been ill within the last one month?	Yes	1
		no	2
23b	If yes to question 23a, what illnesses has affected you?	typhod	25
		malaria	26
		headache	27
		No response	99

Health related effect of using pesticides

S/N	QUESTIONS	RESPONSE	CODE
24.1	Headaches		
		True	1
		False	2
		Don't know	3
		No response	99

24.2	Nausea		
		True	1
		False	2
		Don't know	3
		No response	99
24.3	Skin irritation		
		True	1
		False	2
		Don't know	3
		No response	99
24.4	Eye irritation		
		True	1
		False	2
		Don't know	3
		No response	99
24.5	Dizziness		
		True	1
		False	2
		Don't know	3
		No response	99
24.6	Fatigue		
		True	1
		False	2
		Don't know	3
		No response	99
24.7	Leukemia		
		True	1
		False	2
		Don't know	3
		No response	99
24.8	Asthma		
		True	1
		False	2
		Don't know	3
		No response	99
24.9	Allergies		
		True	1
		False	2
		Don't know	3
		No response	99

Health related effect of using herbicides

S/N	QUESTIONS	RESPONSE	CODE
25.1	Headaches		
		True	1
		False	2

		Don't know	3
		No response	99
25.2	Nausea		
		True	1
		False	2
		Don't know	3
		No response	99
25.3	Skin irritation		
		True	1
		False	2
		Don't know	3
		No response	99
25.4	Eye irritation		
		True	1
		False	2
		Don't know	3
		No response	99
25.5	Dizziness		
		True	1
		False	2
		Don't know	3
		No response	99
25.6	Fatigue		
		True	1
		False	2
		Don't know	3
		No response	99
25.7	Leukemia		
		True	1
		False	2
		Don't know	3
		No response	99
25.8	Asthma		
		True	1
		False	2
		Don't know	3
		No response	99
25.9	Allergies		
		True	1
		False	2
		Don't know	3
		No response	99

SECTION E

Pesticides ever used

26.1	Nopest	Yes	1
		no	2

26.2	Perfect killer	Yes no	1 2
26.3	DD force	Yes no	1 2
26.4	Pest off	Yes no	1 2
26.5	Best	Yes no	1 2
26.6	Blue bold	Yes no	1 2
26.7	Others	No response	99

Pesticides commonly used

27.1	Nopest	Yes no	1 2
27.2	Perfect killer	Yes no	1 2
27.3	DD force	Yes No	1 2
27.4 Pest off		Yes No	1 2
27.5 Best		Yes No	1 2
27.6 Blue bold		Yes No	1 2
27.7 Others		No response	99

Pesticides frequently used

28.1	Nopest	Always Occationally Rarely Never No response	1 2 3 4 99
28.2	Perfect killer	Always Occationally Rarely Never No response	1 2 3 4 99
28.3	DD force	Always Occationally Rarely Never No response	1 2 3 4 99
28.4	Pest off	Always Occationally Rarely	1 2 3

		Never	4
		No response	99
28.5	Best	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
28.6	Blue bold	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
28.7	others	No response	99

Herbicides ever used

29.1	Tackle	Yes	1
		No	2
29.2	Paraeforce	Yes	1
		No	2
29.3	Force up	Yes	1
		No	2
29.4	Sunparaquat	Yes	1
		No	2
29.5	Ultimaxplus	Yes	1
		No	2
29.6	Force ss	Yes	1
		No	2
29.7	Weed off	Yes	1
		No	2
29.8	Dime force	Yes	1
		No	2
29.9	Act force	Yes	1
		No	2
29.10	Lestamine	Yes	1
		No	2
29.11	Others please specify	No response	99

Herbicides commonly used

30.1	Tackle	Yes	1
		no	2
30.2	Paraeforce	Yes	1
		no	2
30.3	Force up	Yes	1
		no	2
30.4	Sunparaquat	Yes	1
		no	2
30.5	Ultimaxplus	Yes	1

		no	2
30.6	Force ss	Yes	1
		no	2
30.7	Weed off	Yes	1
		no	2
30.8	Dime force	Yes	1
		no	2
30.9	Act force	Yes	1
		no	2
30.10	Lestamine	Yes	1
		no	2
30.11	Others please specify	Yes	1
		no	2

Herbicides frequently used

31.1	Tackle	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.2	Paraeforce	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.3	Force up	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.4	Sunparaquat	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.5	Ultimaxplus	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.6	Force ss	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99

31.7	Weed off	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.8	Dime force	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.9	Act force	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.10	Lestamine	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
31.11	Others please specify	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99

Personal protective equipments ever used when using pesticides

32.1	Overall	Yes	1
		No	2
		No response	99
32.2	Face mask	Yes	1
		No	2
		No response	99
32.3	Nose cover	Yes	1
		No	2
		No response	99
32.4	Eye google	Yes	1
		No	2
		No response	99
32.5	Cover boot	Yes	1
		No	2
		No response	99
32.6	Hand gloves	Yes	1
		No	2
		No response	99

Personal protective equipments commonly used when using pesticides

33.1	Overall	Yes	1
		No	2
		No response	99
33.2	Face mask	Yes	1
		No	2
		No response	99
33.3	Nose cover	Yes	1
		No	2
		No response	99
33.4	Eye google	Yes	1
		No	2
		No response	99
33.5	Cover boot	Yes	1
		No	2
		No response	99
33.6	Hand gloves	Yes	1
		No	2
		No response	99

Personal protective equipments frequently used when using pesticides

34.1	Overall	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
34.2	Face mask	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
34.3	Nose cover	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
34.4	Eye google	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
34.5	Cover boot	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99

34.6	Hand gloves	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99

Personal protective equipments ever used when using herbicides

35.1	Overall	Yes	1
		No	2
		No response	99
35.2	Face mask	Yes	1
		No	2
		No response	99
35.3	Nose cover	Yes	1
		No	2
		No response	99
35.4	Eye google	Yes	1
		No	2
		No response	99
35.5	Cover boot	Yes	1
		No	2
		No response	99
35.6	Hand gloves	Yes	1
		No	2
		No response	99

Personal protective equipment commonly used when using herbicides

36.1	Overall	Yes	1
		No	2
		No response	99
36.2	Face mask	Yes	1
		No	2
		No response	99
36.3	Nose cover	Yes	1
		No	2
		No response	99
36.4	Eye google	Yes	1
		No	2
		No response	99
36.5	Cover boot	Yes	1
		No	2
		No response	99
36.6	Hand gloves	Yes	1
		No	2
		No response	99

Personal protective equipments frequently used when using Herbicidess

37.1	Overall	Always	1

		Occationally	2
		Rarely	3
		Never	4
		No response	99
37.2	Face mask	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
37.3	Nose cover	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
37.4	Eye google	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
37.5	Cover boot	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99
37.6	Hand gloves	Always	1
		Occationally	2
		Rarely	3
		Never	4
		No response	99

MINISTRY OF HEALTH, OSOGBO

HEALTH PLANNING RESEARCH AND STATISTICS DEPARTMENT

PRIVATE MAIL BAG NO. 4421, OSOGBO, OSUN STATE OF NIGERIA

Your Ref. No.....
All communication should be addressed to the
Permanent Secretary quoting

11th September, 2015

OSHREC/PRS/569T/49

Akinleye Akinlolu Olaoluwa,
Department of Health Promotion Educator,
Faculty of Public Health,
U. C. H
Ibadan.

KNOWLEDGE OF HEALTH IMPLICATIONS AND ATTITUDE TOWARDS FUMIGATION (PESTICIDES AND HERBICIDES) AMONG FARMERS IN AYEDAADE LGA OF OSUN STATE

I wish to inform you that the Osun State Health Research Ethics Committee (OSHREC) has granted you an approval to proceed on the above exercise.

The approval lasts one (1) year spanning September 7, 2015 and 6th September 2016. You are to inform the committee the starting date of the exercise. If there is any delay in starting, kindly inform the Committee to enable it adjust the date accordingly. This will equally allow for monitoring by designated representative of the Committee.

Regard this letter as Certificate of OSHREC approval.

Thank you.

Dr. Tope Oladele
Chairman
(OSHREC)