**A**

**RESEARCH PROJECT**

**ON THE TOPIC:**

**FARMERS’ PERCEPTION AND PESTICIDE APPLICATION ON SOME VEGETABLES IN ABAK LOCAL GOVERNMENT AREA, AKWA IBOM STATE.**

**BY**

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**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background of the Study**

Agriculture has been the backbone of the nation, and other nations of the world. It is an important economic sector in Nigeria. Over 58% of the rural household depends on agriculture as their principal means of livelihood. Agriculture plays a vital role in the society and the global economy, providing food, raw materials, employment, and contributing to overall development. Agriculture is essential for the production of food to feed the world's growing population. It ensures a stable supply of nutritious food, reducing hunger and malnutrition globally. According to the UN's Food and Agriculture Organization (FAO), agriculture needs to increase production by 50-70% by 2050 to meet the growing demand for food (FAO, 2021). Agriculture remains a significant sector in many countries, particularly in developing nations where it is a major source of employment and income generation. It contributes to the national economy through exports, trade, and agribusiness industries, fostering economic growth and reducing poverty (World Bank, 2017). Agriculture is primarily practiced in rural areas, and its development has a direct impact on rural communities. By improving agricultural practices, infrastructure, and access to markets, rural livelihoods can be enhanced, leading to improved living standards, reduced migration to urban areas, and balanced regional development (Pretty, 2018). Sustainable agriculture focuses on reducing the environmental impact of farming techniques. Proper land management, conservation practices, and agroecological approaches can protect natural resources, prevent soil erosion, conserve water, and maintain biodiversity. Sustainable farming practices are crucial to combat climate change and promote ecosystem health (Prowse *et al.,* 2018). Agriculture also plays a vital role in the bioeconomy by producing biomass for biofuels, bio-based products, and renewable energy. Furthermore, advancements in technology and digitalization are transforming agriculture, leading to precision farming, automation, and data-driven decision-making, increasing productivity, efficiency, and sustainability (Gómez & Rodríguez, 2020; FAO, 2021). To boost agricultural productivity, the use of pesticide has been employed to mitigate losses of crops due to pest attack. This measures have been recorded to promote it set goals but recently, concerns have been raised due to some risk factors. Pesticides are designed to kill or repel pests and can be applied in various forms including sprays, dusts, granules, baits or fumigants. Pesticide are chemicals usually synthetic sometimes biological used to kill or contain the activities of pests (Alhassan *et al.,* 2021). According to world health organization (2020), 500,000 -1,000,000 people per year around the world suffer from health effects due to pesticide poisoning. Poor handling of pesticide is devastating to the environment and indirectly extends to non-target organisms particularly pollinators such as butterflies and birds. Management of pests and vector borne diseases has been highly dependent on pesticide use, which has significantly impacted food production for the increasing population of the world. Evidence from food and agriculture statistics shows the global annual pesticide use of 4.12 m tonnes (FAO, 2021). Farmers are extensively using pesticides for pest control in agriculture. Their precarious handling practices may lead to higher exposure resulting in adverse health effects. Some farmers, agree that pesticide use poses some potential risk while some agree that it poses risk also to the environment. However, pesticides have been reported to have negative environmental impacts through contamination of soil, water and non-target plants and animals that can decrease biodiversity and in some cases, reduce crop yield (WHO, 2018). Farmers perception can vary depending on various factors such as their knowledge, experience, cultural background, access to information, economic constraints and environmental concern. Some common perception that farmers may have regarding pesticide application are as follows: increase yield, pest control, crop protection, lack of alternatives, health and safety concerns environmental impacts economic considerations (Alhassan *et al.,* 2021). It is important to note that farmers’ perceptions on pesticide application can vary widely depending on their individual circumstances, local agricultural practices and cultural factors. Increasingly, efforts are being made to promote sustainable agriculture practices, reduce pesticide use, and provide farmers with information and training on alternative pest management strategies. Consequently, there's an urgent need to evaluate the use of pesticides by farmers, especially among small holder who have low literacy levels, small investment, weak extension services and lack training and access to awareness programs on the safe use of pesticide but handle large volume of pesticide.

**1.2 Problem Statement**

Although, pesticides were designed to kill or repel the severity of pest attacks in crop production and these objectives has been achieved over the last decades, but it effect has also been recorded to stirred overwhelmed concern and controversies as WHO (2020) noted that more than 500,000 people suffered health challenges ranging from respiratory, neurological, consumer bioaccumulation effect to death in severe cases which is due to pesticide poisoning. WHO (2020) has also reported that pesticide use also have negative environmental impacts through contamination of the soil, water and non-target plants and animal destruction which decreases biodiversity and in some cases reduces crop yield. Due to this constraints, several studies raised but limited to evaluate and affirm this impacts on human health and agricutura productivity (Rubenstein *et al.,* 2020). However, recently researchers have also reported that the decision of farmers on the pesticide use has been influenced by the health risk negative environmental impact, social factors, economic factor, level of knowledge and level of awareness (Abang *et al.,* 2019; Alhassan *et al.,* 2021). In Akwa Ibom State, the decision of arable crop farmers on adopting new agricultural practices which has also been reported to been due to health risk and lack of awareness (Ekanem *et al.,* 2020). Recently, there has been a discussion on the need to improve crop production in the Nigeria and other region of the country as food security has been declared state of emergency by the recent administration and new policies could not function without understanding the perception of vegetable farmers (who found a large integral part in food chain). Hence, this study seeks to evaluate perception on pesticide application among vegetable farmers in Abak Local Governement Area of Akwa Ibom State, Nigeria.

**1.3 Significance of Study**

The findings from this study was of great relevance to a wide group of stakeholders in the agriculture sector including; policy makers at the government level, the local farmers, extension officers and Research institutions. The recommendations would be an initial stage for other researchers interested in this field and builds on the global knowledge on matters of pesticide usage with focus to knowledge level, awareness, adoption and general perception on the subject matter. The study will provide an in-depth understanding to the policy makers on the best way to promote pesticide usage in order to increase levels of adoption in the State and country. It will also be beneficial to the Local Government during preparation of development plan in order to mainstream pesticide usage for vegetables productivity into the zone planning. The study will also provide insights and encouragement to the farmers interested in adopting pesticide usage which is anticipated to increase adoption hence achieving sustainable crop production which in return will improve food security and agricultural productivity.

**1.4 Objective of the Study**

The major objective of this study is to evaluate farmers’ perception and pesticide application on selected vegetables in Abak Local Government Area, Akwa Ibom State.

The specific objectives of this study is to;

1. describe the socio-economic characteristics of vegetable farmers in the study area
2. examine the level of awareness of pesticides usage among farmers.
3. Examine farmers’ perception and pesticide application on selected vegetables
4. evaluate the effectiveness of farmer’s information sources on pesticides application.
5. identify constraints to pesticides usage by farmers.
6. Examine farmer’s perception on increased pesticide use on vegetables

**1.5 Research Questions**

Based on the problems which this research work is aimed at finding solution to, the following questions are put forward;

1. What is the socio-economic characteristics of vegetable farmers in the study area?
2. What is the level of awareness among vegetable farmers on pesticide usage in Abak Local Government Area?
3. What is the perception of farmers on pesticide application on selected vegetables?
4. What is the effectiveness of farmer’s information sources on pesticides application?
5. What are the constraints to pesticides usage by farmers?
6. What is perception of farmers on increased pesticide use on vegetables
7. **1.7 Research Hypotheses of the study**

**H0**: There is no significant relationship between level of awareness and perception of farmers on pesticide usage among vegetable farmers in Abak Local Government Area, Akwa Ibom State.

**H1**: There is significant relationship between level of awareness and perception of farmers on pesticide usage among vegetable farmers in Abak Local Government Area, Akwa Ibom State.

**1.8 Scope of Study**

This study concerned with perception on the pesticide application among vegetable farmers will make use of primary data. The primary data was collected by using a well-structured, pre-tested questionnaire which was given to the respondents. It was divided into sections to reflect the specific objectives of the study.

**1.9 Conceptual Definition of Terms**

**Farmers:** this are set of people who are engaged in agriculture, raising living organisms (either plants or animals) to provide food, raw material and income invariably.

**Perception:** this refers to the way in which something is regarded, understood or interpreted

**Pesticide:** this are chemicals usually synthetic sometimes biological used to kill or contain the activities of pests (Alhassan *et al.,* 2021).

**Vegetables:** this is an herbaceous plant grown for the edible part that is usually eaten as part of a meal and this could include; cabbage, cucumber, fluted pumpkin, tomatoes, etc.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 Theoretical framework**

Several theories and frameworks in the field of agricultural and environmental studies support the topic of farmers’ perception on pesticides applications on selected vegetables. Here are some relevant theories:

**2.1.1 Technology Adoption Theory**

This theory focuses on understanding the factors influencing famers’ decisions to adopt or reject new agricultural technologies, including pesticides use. It explores aspects such as perceived benefits, perceived risks, compatibility with existing practices, complexity and observability of the technology. Farmers’ perceptions of the advantages and disadvantages of pesticides use can be analyzed through his lens.

**2.1.2 Risk Perception Theory**

This theory examines how individuals perceive and assess risks associated with specific actions or technologies. In the context of pesticides, farmers risk perceptions are essential in determining whether they consider the potential hazards of pesticides use, both to their health and the environment, as significant enough to warrant adopting alternative practices.

**2.1.3 Theory of Planned Behavior**

This theory suggests that individual behavior is influenced by three key factors: attitudes, subjective norms and perceived behavioral control. When applied to pesticides use, this theory can help understand how farmers’ attitudes towards pesticides, social pressures from their peers and community and their perceived control over pesticide application practices influence their decision-making.

**2.1.4 Health Belief Model**

This theory is often used in health-related research, but it can be relevant when studying farmers’ perceptions of pesticides use on selected vegetables. The model suggests that an individual’s decision to adopt a health-related behavior depends on perceived susceptibility to health risks, perceived severity of the health threat, perceived benefits of taking preventive action and barriers to adopting the behavior.

**2.1.5 Diffusion of Innovation Theory**

This theory explains the process by which new ideas or practices spread through a social system. In the context of agricultural practices, including pesticide use, it can shed light on the factors that influence the rate of adoption of sustainable pest management practices and how innovations are communicated and accepted among farmers.

**2.1.6 Cognitive Dissonance Theory**

This theory addresses the discomfort that arises when individuals hold conflicting beliefs or attitudes. In the context of farmers and pesticides, cognitive dissonance may occur when farmers are presented with information about the potential negative impacts of pesticides use that contradict their existing beliefs and practices.

**2.1.7 Social Learning Theory**

This theory emphasizes the role of observation and imitation in shaping behavior. Farmers’ perceptions of pesticide use can be influenced by observing the practices of other farmers, receiving advice from agricultural extension services or participating in community networks.

**2.2 Conceptual framework**

**2.2.1 Pesticides and Classes**

Pesticides are chemical substances or biological agents used to control, repel, or eliminate pests that can harm crops, livestock, humans, or the environment (USEPA, 2019). These substances are classified into several categories based on their chemical composition and mode of action but majorly classified into; synthetic and non-synthetic pesticides. Here are the major classes of pesticides:

* **Organochlorines**: Organochlorine pesticides were widely used in the past but are now mostly banned due to their persistence in the environment and potential for bioaccumulation. Some well-known examples include DDT, lindane, and endosulfan (USEPA, 2019).
* **Organophosphates**: Organophosphates are widely used insecticides that target the nervous system of pests. They are highly toxic to insects and can also be harmful to humans and other non-target organisms. Malathion and chlorpyrifos are commonly used organophosphate pesticides (USEPA, 2021).
* **Carbamates**: Carbamate pesticides also target the nervous system of pests but have a lower persistence in the environment compared to organophosphates. Carbaryl and propoxur are common examples of carbamate pesticides (SARE, 2020; USEPA, 2021).
* **Pyrethroids**: Pyrethroids are synthetic pesticides derived from natural compounds found in chrysanthemum flowers. They are effective against a wide range of pests, including insects and ticks. Permethrin and cypermethrin belong to the pyrethroid class (PAN, 2018; USEPA, 2019).
* **Neonicotinoids**: Neonicotinoids are a newer class of insecticides that act on the nervous system of pests. They are systemic pesticides, meaning they are absorbed by plants and circulate within the plant tissues. These pesticides have faced scrutiny due to their potential impact on pollinators. Common neonicotinoids include imidacloprid, clothianidin, and thiamethoxam (USEPA, 2021).
* **Biopesticides**: Biopesticides are derived from natural materials such as plants, bacteria, or fungi. They include microbial pesticides (e.g., Bacillus thuringiensis-based products), biochemical pesticides (e.g., pheromones), and plant-incorporated protectants (e.g., genetically modified crops). Biopesticides are often considered environmentally friendly alternatives to synthetic pesticides (SARE, 2020).

**2.2.2 Importance of pesticides**

Pesticides play a crucial role in modern agriculture by protecting crops from pests, diseases, and weeds. They offer several benefits that contribute to increased yields, improved food quality, reduced post-harvest losses, and enhanced overall agricultural productivity. However, it's important to note that the use of pesticides should be accompanied by responsible and sustainable practices to minimize potential risks to human health and the environment. Here are some key benefits of pesticides:

* **Increased Crop Yields:** Pesticides help control pests and diseases that can severely damage or destroy crops. By reducing the impact of these threats, pesticides ensure higher crop yields, leading to increased food production. This is especially important to meet the growing global demand for food as the world's population continues to expand (SARE, 2020).
* **Disease Prevention:** Pesticides effectively control and prevent the spread of plant diseases caused by pathogens such as fungi, bacteria, and viruses. This protection helps maintain plant health, allowing for optimal growth and development. Healthy plants are more resistant to stress factors and can better utilize nutrients and water resources (NPIC, 2021).
* **Weed Control**: Weeds compete with crops for resources like sunlight, water, and nutrients. Pesticides help manage weed populations, preventing them from outcompeting crops and reducing yield losses. Successful weed control also reduces the need for excessive mechanical cultivation and manual labor, leading to increased productivity and reduced production costs (NPIC, 2021).
* **Reduced Post-Harvest Losses:** Pests and diseases can continue to damage crops even after harvest. Proper use of pesticides can help protect harvested crops during storage, transportation, and distribution, reducing losses due to deterioration, spoilage, or attacks by pests (Pimentel, 2005; SARE, 2020).
* **Enhanced Food Quality:** Pesticides contribute to improved food quality and safety by preventing or reducing infestations, diseases, and post-harvest damage. By protecting crops from pests and diseases, pesticides help produce healthier, visually attractive, and marketable products (SARE, 2020).
* **Cost-Effectiveness:** Timely and appropriate use of pesticides can significantly reduce the economic impact of crop damage caused by pests. By preventing or minimizing losses, farmers can maximize their return on investment and maintain profitability. Moreover, successful pest management reduces the need for excessive use of resources, such as water and fertilizer (Baidu *et al.,* 2019).
* **Environmental Sustainability:** While there are concerns about the environmental impact of pesticide use, modern pesticides are designed to be more targeted and effective, requiring lower application rates. In certain situations, pesticide use may help reduce soil erosion caused by weed competition and protect biodiversity by preventing the spread of invasive species (SARE, 2020; Akhtar *et al.,* 2020).

**2.2.3 Factors affecting Pesticide utilization**

Pesticides have long been used in agriculture and public health programs to control pests and protect crops and human health. However, the use of pesticides also comes with several disadvantages and potential risks, which have raised concerns among environmentalists, public health experts, and consumers worldwide.

* **Health Risks:** Pesticides can pose significant risks to human health. Exposure to pesticides has been linked to various health problems, including cancer, developmental disorders, reproductive issues, neurological damage, and respiratory problems. Certain pesticides are classified as carcinogens or endocrine disruptors, which can interfere with hormonal balance and lead to severe health issues (Baidu *et al.,* 2019).
* **Ecological Impact**: Pesticides can have detrimental effects on ecosystems and wildlife. They can contaminate soil, water, and air, leading to the pollution of habitats and causing harm to non-targeted organisms. Pesticides can kill beneficial insects like bees, butterflies, and ladybugs, which play crucial roles in pollination and natural pest control. This disruption in the food chain can result in imbalances within ecosystems (Baidu *et al.,* 2019; Alhassan *et al.,* 2021).
* **Resistance and Pest Resurgence**: Pesticides work by targeting specific pests, but prolonged use can lead to the development of resistance among pest populations. Over time, pests can evolve and become less susceptible to the effects of pesticides, rendering them ineffective. This phenomenon requires higher pesticide applications or the introduction of stronger chemicals, leading to a continuous cycle and increased chemical load on the environment (Abbott *et al.,* 2018; SARE, 2020).
* **Contamination of Water Sources**: Pesticides can contaminate water bodies through runoff and leaching. Rainfall can wash pesticides from treated fields into nearby rivers, lakes, and groundwater, leading to water pollution. This contamination poses risks not only to aquatic organisms but also to human beings who consume the contaminated water, potentially causing long-term health problems (Rubenstein *et al.,* 2020; Akhtar *et al.,* 2020).
* **Persistence and Bioaccumulation**: Some pesticides are designed to have a long-lasting effect, known as persistence. This can result in the accumulation of toxic residues in the environment and food chain over time. Certain pesticides have shown the ability to bio accumulate, building up in the tissues of organisms, including humans, as they move up the food chain. This can further increase the potential for health hazards (SARE, 2020).
* **Economic Constraints:** Pesticides can be expensive, especially for small-scale farmers who may lack the financial resources to purchase them. Farmers may be hesitant to adopt pesticides if they do not perceive a substantial increase in crop yields or profits. Limited access to credit can hinder farmers' ability to purchase pesticides and other agricultural inputs (Rubenstein *et al.,* 2020).
* **Social Constraints:** Lack of knowledge and awareness about pesticide use, including their benefits and proper application techniques, can deter farmers from adopting them. Insufficient access to education and training programs on pesticide use and management can limit adoption rates (Akhtar *et al.,* 2020). Concerns about personal health risks, environmental pollution, and potential harm to beneficial organisms can discourage farmers from using pesticides (Abbott *et al.,* 2018).

**2.3 Empirical framework**

**2.3.1 Perception of farmers on pesticides Usage**

Ekeoma (2021) investigated pesticide use among farms and its impact on the environment. 486 farmers in Akwa Ibom state were interviewed and 185 farmers representing the geo political zones of the country were equally interviewed. Field observations were also done and among other things, it revealed some farmers did not receive training on pesticide application. Soil samples were analysed to ascertain their levels of concentrations. It was found that pesticides usage is high as almost every farmer made use of pesticides, the chemicals were mostly misused. Farmers are constantly exposed to chemicals and levels of concentration of the pesticides were generally within the maximum residue levels and below the WHO recommended maximum limits and impliedly did not pose any significant threats. There is also a tendency that the area considered as ‘non-farm’ is not the case as some sections of those areas used to have farms situated in them and may not reflect the current practice, hence reasons for of the concentration levels found therein. The reported concentrations of the metabolites of DDT suggest that it is from either historical usage or the illegal usage of these pesticides or even a case of both factors. The research also showed that most farmers did not receive training on pesticide application and the authorities mandated with carrying out enforcement in this regard by regulating the way it is used, need to do more.

Ekanem *et al.,* (2020) investigated the gender roles in climate change adaptation among arable crop farmers in Abak agricultural zone of Akwa Ibom State. Their findings revealed that female farmers were involved in planting, weeding, application of fertilizer, harvesting, pest management, soil management and conservation, processing procedure and marketing while the male farmers were found to be more proficient in land clearing, land tilling, land stumping and land ridging. The study also showed that climate is changing and has caused increased erosion, excessive flooding and delay in planting time due to fluctuations in rainfall pattern in the study area. Again, female farmers slightly applied adaptation strategies more than the male farmers during crop production. In conclusion, therefore, both men and women farmers had roles in climate change adaptation during crop production. Implications for climate change mitigation and adaptation planning is that, in designing gender-responsive programmes, these roles should be streamlined. Obviously, female arable crop farmers demonstrated greater advocacy for climate change adaptation strategies implying that making gender-responsive programmes more effective towards female farmers and community members in sustainable use of resources could enhance adaptation among households.

Alhassan *et al.,* (2021) examined farmer’s perception on pesticide usage and safety practices in Danko/Wasagu Local Government area of Kebbi State. Structured Questionnaire were used to obtain information from the respondents. The result of the study showed that majority of the respondents (90%) were male while female formed the minority in pesticide usage with only (10%). The study also showed that all the respondents (100%) were married and engaged in agricultural activities. The study further revealed that all the respondents never had any formal training on the use of pesticide from either governmental or non -governmental organizations. The research study also found out that all (100%) of the respondents were not aware of pesticide effects on man and environment. Likert Scale Analysis showed a positive perception by farmers on awareness of pesticide usage and safety practices. On perception of the respondents on the effect of pesticide on man and the environment, the study revealed that Nausea, Dizziness, Diarrhea, Respiratory Difficulty, Skin Irritation, Rashes, Fever, Peeling of the Skin, Vomiting, and Headache were the serious effects of pesticides on man. Majority the farmers (80%) do not employ precautionary measures when using pesticides. It is concluded that respondents had positive perception on pesticide usage and safety practices. They therefore recommended that appropriate authorities should enforce the use of protective clothing, appropriate equipment and correct handling practices when using pesticides. Existing pesticide regulations and monitoring policies enforced. Government should also intensify efforts at registering and controlling distribution of pesticides and banning hazardous ones. It should also enforce the making of less toxic pesticides available to farmers.

**2.3.2 Vegetable farmers and Pesticide Use**

Ugwu (2018) evaluated the pesticide handling practices among vegetable farmers in Oyo State Nigeria. Random samples of one hundred and fifty (150) vegetable farmers were interviewed using structured questionnaire in ten selected local government areas of Oyo state Nigeria. Majority of the farmers (74%) suffered from at least one health symptom associated with pesticide handling. However, most of them (65.4 %) claimed to have adopted the use of at least one or two safety protective equipment during pesticide application. A good number of the smallholder vegetable farmers (58.7%)do not have access to information on safety tips about pesticide handling or training on pesticide management. Cost of protective equipment and lack of training on pesticide handling seemed to be the most significant factors that influence proper pesticide handling practices among smallholder vegetable farmers in the state. It is therefore recommended that the regulatory agencies for pesticide use in Nigeria should implement the policy that will prohibit injudicious use of pesticide and provide effective training / workshop for the small holder farmers, retailers and all pesticide workers on the safety measures of pesticide application. The study also recommended integrated pest management (IPM) approaches for continued vegetable production to minimize risks associated with pesticide usage.

Abang *et al.,* (2019) further investigated Pesticide use practices of vegetable farmers and the surveys was conducted in major vegetable production zones of the humid tropics of Cameroon. The surveys aimed to elucidate farmers’ crop calendar, pesticide spray schedule and frequency. Farmers’ knowledge was determined on pest targets, quantities and major active ingredients used, and training received in vegetable production. It was found that weekly spray of pesticides was the most common practice; 40% of farmers sprayed insecticide, 28% sprayed fungicides. However, 45 and 59% could not identify the insect pests and diseases respectively they were attempting to control. Farmers applied 0.5-9 liters of pesticide per year, 10-49 kg, and 10 to 49 packets of chemicals depending on farm size. Prices of pesticide range from 5000 to 13000 FCFA per liter of insecticide, 6000 to 8500 FCFA per kg of fungicide and 300 to 12000 F per packet. Ninety percent of farmers used a knapsack sprayer and 20% of farmers noticed that their health was affected by pesticides. About 25% of farmers store chemicals at home. Seventy-five percent receive information about agricultural production from other farmers, and have never received any training on pesticide use practices and health effects. They noted that the absence of farmer training further increases the danger of pesticide misuse and cost of vegetable production. Less expensive pest management options that are less hazardous to the environment and human health need and creation of awareness regarding hazards of mishandling pesticides if the products are to be used by vegetable farmers in Cameroon were recommended.

Victor *et al.,* (2018) study was conducted to assess how much farmers’ know about the safe handling and use of pesticides, and what they perceive to be the hazards around their use*.* In-depth field surveys were undertaken with 437 sampled vegetable producers and complimented with focus group discussions and field observation. The results revealed that knapsack sprayers were the most widely used equipment for spraying pesticides (92.4%), followed by hand-held applicators (4.5%) whereas only 3.1% used motorised sprayers. Only 15.6% of the respondents fully protect themselves during spraying operations; others either wore partial protective clothing (38%) or did not wear any protective clothing at all (46.4%), there by coming into direct contact with pesticides. Over 80 % of the respondents re-entered their farms within 3 days of pesticide application; harvest their produce within 7 days, without observing safe harvest interval protocols. The study also revealed that the farmers were aware of and had experienced pesticide hazards such as headache, dizziness, body weakness, and itching. Three per cent of the farmers also mentioned burning sensation, catarrh, stomach pain, unconsciousness, itching of eyes and body pains as side effects from pesticides application. Females and illiterates were found to be more vulnerable to these hazards than their male and literate counterparts. The study findings show that most farmers dispose of empty pesticide containers (59.8%) and wash water from sprayers (79.2%) by throwing or disposing them on their farms. The study concludes that farmers are misapplying pesticides by disregarding the potential harmful effects of pesticides on human health and the environment.

**2.4 Gap of literature review**

In this empirical analysis, quite several scholarly works have given consistent results of inverse relationship on results of study autonomous variables in regards to pesticides usage and acceptance by small-holde farmers others have also shown positive relationship on same phenomenon. The impact of pesticides has been established by quite several studies. However, few studies exist on how socio-economic aspects influence farmers’ adoption of pesticides application, exclusive of vegetable farmers. Small farmers are the integral aspects of food production in any economy and the need for their productivity is paramount. It is therefore important for policymakers to put in place mechanisms to ensure equal access to resources and opportunities for vegetable farmers on the application of pesticides, hence the need to evaluate their perception among cucumber *(Cucumis sativus)* and fluted pumpkin *(Telferia occidentalis)* producers in Abak Local Government Area, Akwa Ibom State, Nigeria. This research will provide further information on their thought about pesticides application on these vegetables for increased productivity.

**CHAPTER THREE**

**METHODOLOGY**

**3.1 Study Area and Population**

The study was conducted in Abak Local Government Area of Akwa Ibom State, Nigeria. The main economic activities of the people are farming, trading, fishing for riverine and coastal dwellers and white-collar services. The state lies between latitudes 4o32’ and 5o53’Nand longitudes 7o25’ and 8o25’Eand its 2016 projected population stood at 5.45 million people. (akwaibomstate.gov.ng/about-akwa-ibom/). Most of the inhabitants of the study area are farmers dwelling especially in the peri-urban and rural communities and the most commonly cultivated crops grown in the area include: Yam, Cassava, Cocoyam, Plantain, Maize, Oil Palm, Banana, Coconut, Citrus and vegetables.

**3.2 Sampling procedures for the study**

A two-stage sampling technique was used to generate data for the study. In the first stage, simple random sampling (by balloting) was used to randomly select five (5) wards from 11 wards in the study area. 100 respondents who are predominately cucumber *(Cucumis sativus)* and fluted pumpkin *(Telferia occidentalis)* farmers was selected from the 5 wards selected in the study area.

**3.3 Sources of Data**

The basic instruments used for data collection for this research study was structured questionnaire. A structure questionnaire containing both open and close ended questions, was used to collect primary data from the respondents. Oral interview was however used to collect data from those who cannot read and write.

**3.4 Analytical Techniques**

The data collected from the administered questionnaire was coded, tabulated and analyzed using descriptive Statistic. Descriptive statistic such as frequency distribution tables, percentages, mean and Ranking was used to analyze the data. Likert scale was used to analyze the level of awareness and perception of farmers on pesticide application on the crops.

The level of awareness of pesticides was established with a 4–point rating scale of 1- 4 with numerical values of 4, 3, 2, and 1. This was done to determine the level of awareness of pesticides used by the farmers. To obtain information on farmer’s perception and pesticide application, a four points Likert-type scale of strongly Agreed=4, Agreed=3, Disagreed=2 and Strongly Agreed=1 and a mean of 2.5 was used. Variables with mean scores of 2.5 and above was adjudged to be significant and scores below 2.5 was adjudged as not significant. To obtain information on how effective their sources of information on pesticide application on vegetables, a three points Likert-type scale of Not Effective=3, Effective=2, Very Effective=1 and a mean of 2.0 was used. Variables with mean scores of 2.0 and above was adjudged to be significant and scores below 2.0 was adjudged as not significant. Additionally, to obtain information on the constraints to the use of pesticide on vegetables, a three points Likert-type scale of Severe=3, Constraint=2, Not a constraint=1 and a mean of 2.0 was used. Variables with mean scores of 2.0 and above was adjudged to be significant and scores below 2.0 was adjudged as not significant.

Furthermore, to obtain information on farmer’s perception of increased use of pesticide on vegetables, a four points Likert-type scale of strongly Agreed=4, Agreed=3, Disagreed=2 and Strongly Agreed=1 and a mean of 2.5 was used. Variables with mean scores of 2.5 and above was adjudged to be significant and scores below 2.5 was adjudged as not significant.

Mean score was calculated using the formula below;

Where; Average mean score= Total sum of attitude score

Total number of respondents

The mean score = Σfxi

N

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