AGROCHEMICAL SAFETY AND HEALTH INFORMATION USAGE AMONG FARMERS IN NIGERIA.

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ABSTRACT

The need to increase and improve the quantity and quality of farm produce has led to increase use of agrochemical by both small and large scale farmers. However, there are other corresponding cost brought about by an increase dependence on agrochemical among which include harmful effects on human health and environment. Illegal marketing of agrochemical, low illiteracy level and poor understanding of safety and health information are some of the greatest challenges in the use of agrochemical. Information is said to be ''Power'' and as such the adherence to agrochemical safety and health information (product label) will no doubt help to reduce the incidence of agrochemical hazards as meeting the minimum necessities of occupational health standards is viewed as one of the most important components of sustainable agricultural development.

Keywords: Agrochemical, Safety and health information, Farmers

INTRODUCTION

The need to feed the ever increasing population in the world has been one of the major issues especially in the third world countries who are backwards in terms of modern agriculture. The United Nation Population Division (UNPD) (2007) has reported that the World has witnessed population growth over the last 100 years by nearly fourfold and it is projected to increase from 6.7 billion to 9.2 billion by the year 2050. Consequently, the demand for cereal is expected to increase by almost 50 % by 2030 (Food and Agriculture Organization (FAO), 2007). The decrease in food production can be attributed to the effect of flooding, desert encroachment, climate change and increase in conflict which has paralyze food production and has dislocated millions of refuges. However, increase in food production cannot be achieved without the use of improved farm inputs like agrochemical (United Nations, (UN) 2015).

Maize has been regarded as one of the most important cereal in the world as a result of its high economic importance and numerous uses (for domestic consumption in addition to its industrial use by flour mills, breweries, confectioneries and animal feed manufacturers). In the world, it is ranked third after rice and wheat, also in Nigeria it is one of the most important cereal crops especially in the middle belt of Nigeria (Offiah, 2015). As a result of its high demand, maize is gradually becoming less affordable for poor consumers, thus the need for its increase production can never be over emphasized and invariably, the use of agrochemical will also increase (Badmus *et al.*, 2011).

Agrochemical implies all chemical products which are manufactured or processed for use at work in agriculture and agro-allied industries to increase productivity and control pest and diseases (Omari, 2014). It encompasses fertilizers, pesticides (herbicides, insecticides, rodenticides, and fungicides) and plant regulators. In bid to control maize pests such as stem borers, armyworms, silkworm and weevils, weeds and maize diseases

such as downy mildew, maize rust, leaf blight and leaf spot for improvement in productivity, maize farmers have over the years resorted to the use of agrochemical. Mc Acthur and Mc Cord (2014) reported that agrochemical increase crop yield which leads to economic growth. The use of agrochemical for crop production has been on the increase and an estimated 2.5 million tonnes of pesticides are applied to agricultural crops worldwide each year (Nnamonu and Onekutu, 2015). In Nigeria, an estimated amount of 125,000-130,000 metric tonnes of pesticides is applied each year (Aderonke, *et al.* (2017) and Asokwa and Galvin, 2009).

However, FAO has caution farmers on the excessive application of agrochemical as these can increase the risk of having residue in crops and farm environment.Zia, *et al.* (2010)in Ajmer, *et al.* (2017)) reported that residue of cereals showed that wheat contained the highest concentration of tested agrochemical than maize and rice while maize contained a much higher concentration of agrochemical than rice. According to World Health Organization, each year, about 3,000,000 cases of agrochemical poisoning and 220, 000 deaths are reported in developing countries (Lah, 2011). Furthermore, about 2.2 million people, mainly belonging to developing countries are at increased risk of exposure to pesticides (Hicks, 2013). Children may also be exposed to agrochemical through forms of hazardous child labour involving fieldwork, spraying agrochemical or washing their parents' contaminated work clothes.

Safety refers to the state of being protected from agrochemical related hazards. Safety and health practices and/or information on agrochemical therefore seeks to identify a product and describes how, where and when it should be used. It is then complimented with details of potential hazards, good practices, safety precautions, first aid instructions and advice to health personnel (International Labour Organization, (ILO), 1991). Before using any agrochemical it is always recommended that the user read, understand and comply with the safety and health practices/information.

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Awareness on Agrochemical Safety and Health Practices/Information among Farmers

Gobusamng *et al.* (2012) reported that all of the farmers interviewed (100 percent) said that they read and followed the directions on the pesticide containers. Mustapha *et al.* (2017) reported that Kuwaiti farmers' level of understanding of agrochemical safety practices is insufficient as over 70 percent of them did not read or follow pesticide safety and health information. Clyde *et al.* (2012) recommended that before handling, compounding, packing or applying any pesticides, uses should read the product safety and health instructions carefully. Reading and adhering to instruction among farmers usually help to reduce hazards associated with the use of agrochemical.

Methods use to Disseminate Safety and Health Practices/Information

Methods used to relay agrochemical safety and health information changes with change in farmers socio-economic characteristics. Educational resources usually save as an important guide in encouraging farmers and their families to compile with safety instruction and practice which will help change their attitude when handing agrochemical (Shari *et al.*, 2017). Over the years, researchers had cometo find out that various farmer characteristics are in line with preferred information sources. A study on the preferred information sources of cotton farmers who use agrochemical revealed that majority of the

farmers rely on extension resources and they tend to be younger, have big farms, higher incomes, and rent larger proportions of land as compared to other groups (Velandia *et al*., 2010). Shari *et al*. (2017) reported that internet, social media, and e-mail messaging are the most preferred sources of information for farmers that are less than 35 years of age as compared to the older farmers. Farmers with ages greater than 56 years prefer local papers as a source of farm safety and health practices/information while farmers with age less than 35 years attend kids' safety events and school programs more than older farmers. The authors also reported that younger and middle aged farmers prefer using informational websites significantly more than older farmers.

Furthermore, farmers who received 76–100 percent of their incomes from farming were more likely not to use information from the educational materials as oppose to farmers who received 26–75percent of their incomes from farming.Materials that encompassed general or simple languages were mostly preferred over those that have technical terms. Photographs or a combination of photos, drawings, and cartoons were preferred visual images. Materials signifyinglifelike, easy-to-use approaches and materials directed at youths and children were favorite over materials listing applicable protective equipment. Images showing familiar farming practices and useful prevention strategies inspire use of resources.

Training on Use/Handling of Agrochemical

Franklin *et al*. (2017) reported that there have been cases where farmers over apply agrochemical than the recommended quantities or repeatedly application per season as a result of the fact that a good number of the farmers in the country cannot read, lack basic and formal training on agrochemical handling and recommended personal protective equipment. Chemicals that have been washed from sprayed farms usually contaminate food crops and even spread to affect water bodies. The problem usually becomes more serious when farmers wash their knapsack sprayer and clothes in water bodies during and after spraying. .Gitahi (2014), reported thattraining of farmers on proper handling of agrochemical handling was low with only 17 percent having been trained on pest control, 3 percent each for agrochemical hazards on environment and human health, 0.2 percent on fertilizer use knowledge and 69 percent having had no training

Entry route of Agrochemical into Human Body

Wolfe (1973) and Iyagbe (2013) indicated that over 97 percent of agrochemical to which the body is subjected to during possible exposure situations is deposited on the skin Requena, (2009) and Kasser *et al*. (2015) on the other hand reported that dosage, the time and duration of spraying, the route of entry into the body, the chemical composition and genetic properties are the major factors that determine the levels of hazards associated with the use of agrochemical. Clyde *et al*. (2012) reported that agrochemical can get into the body through three major ways;

- Through the mouth (orally),by breathing into lungs (inhalation) and most common and by absorption through the skin or eyes (dermally)

Toxicology Information Brief (1993) reported that a compound, such as chloroform, which dissolves promptly and can be found in drinking water are ways that people can unknowingly consume agrochemical. At the point when this water is utilized for drinking, ingestion becomes the course of exposure. When it is utilized for showering, introduction may happen because of inward breath of the steam or fog and from coordinate contact through the skin. Similarly, agrochemical can easily get into the human system through many ways or through more than one route if precautions are not taken. An agrochemical which is sprinkledcan be breathed in, have direct contact with the skin when mixing or application and be ingested through nourishment if hands are not properly washed before eating. The entry route of agrochemical into human body are discussed categorically below.

Through the mouth (Orally)

Lack of proper personal hygiene (washing of hands) can causeimpurity on the lips and mouth or accidental swallowing of agrochemical. Also, it is dangerous to blow blocked sprayer nozzles in an attempt to clean it (ILO, 1991). Chemicals that mistakenly get into the mouth and are gulped don't generally harm the gastrointestinal tract itself except if they are chafing or destructive (ILO, 1991). Shetty

et al. (2011) also opined that consumers may be affected by relatively low amounts of agrochemical residues in drinking water and through food products (long-term effects) or acutely through high doses caused by misuse, wrong application or overdose at the farm level.

Inhalation (By breathing into lungs)

Agrochemical that are in form gases, fine spray droplets, dust, fumes and smoke are often been breathed into the lungs while gases mixed with the air tend to remain suspended in the air for some time after release this is because these particles are so small or well dispersed that they cannot be seen International Labour Organization, (ILO), (1991). Spraying agrochemical without adequate precautions is noted to be a common cause of poisoning by inhalation.

Toxicology Information Brief (1993) reported that inhalation is the major route of entry of agrochemical that are in form of vapors, gases, mists or particulates. Once inhaled, agrochemical are either exhaled or deposited in the respiratory tract. If deposited, damage can occur through direct contact with tissue or the chemical may diffuse into the blood through the lung-blood interface. Upon contact with tissue in the upper respiratory tract or lungs, agrochemical may cause serious health impairment ranging from simple irritation to severe tissue destruction. Substances absorbed into the blood are circulated and distributed to organs that have an attraction forthat particular chemical. Health effects can then occur in the organs, which are sensitive to the toxicant.

Skin absorption (or eye)

grochemical absorbing through the skin is one of e most common poisoning routes. Pesticides ually kill pest by penetrating the insect's skin or faces of plants considered to be weeds. Therefore, se substances can easily penetrate the intact nan skin, if allowed to do so. Some formulations are toxic and contain penetrative solvent like oleum products, xylene or kerosene are usually hazardous to human. These substance can trate through the farmers cloth ticed(ILO,1991).

Injection

Injection which is another way agrochemical gets into the body occurs when a substances enter the body when the skin is penetrated or punctured by contaminated objects. Impacts would then be able to happen as the substance is coursed in the blood and saved in the objective organs.

Perceived Health Hazards Associated with the use of Agrochemical

As a result of about 2 million tonnes of waste (industrial wastes, chemicals, human waste and agricultural wastes such as fertilizers, pesticides and pesticide residues) that are been dumped into water bodies each day, several water bodies have been rendered unfit for both primary and/or secondary usage (United Nations Educational, Scientific and Cultural Organization (UNESCO) (2003)). Almaszabeen *et al.* (2018) reported that about 9.16 percent of cocoa farmers strongly agreed and 81.16 percent agreed that the pesticide use cause effects on human health. Also, Mustapha *et al.* (2017) reported that a significant number (82 percent) of Kuwaiti farmers reported at least one symptom of acute poisoning immediately after applying or handling agrochemical, while 18 percent of respondents did not attribute any health problem encountered to agrochemical exposure. The most frequently reported symptoms were headaches (82 percent), skin irritation (58 percent), nausea (49 percent), itchy eyes (79 percent), dizziness (41percent), fatigue (50percent), and coughing (22percent). Other symptoms reported by respondents were poor vision, stomach ache, excessive sweating, shortness of breath and vomiting. When respondents were asked what action they took following an incident of poisoning, about 75percent reported taking no action as the incident was minor or required only self-medication (chewing of cola nut). Only 5percent of respondents reported a serious poisoning incident that required medical attention in a hospital.

Agrochemical pollute water bodies thus making it unsafe for human use e.g. drinking, washing of farm produce, etc.The negative impact on human health and the environment by the use of agrochemical has not been known, especially, by farmers. The excessive use of agrochemical more than the

recommended quantity by farmers was as a result of advertisement from chemical sale agents. Many of the agrochemical used are persistent soil contaminants,which can stay for decades in the soil without decaying and in the longrun affect soil conservation (Van der Werf 1996). Death as a result of agrochemical related poisoning are often caused by using agrochemical packages or containers after they are emptied of contents. Low literacy level, poor reading culture of agrochemical labels and sometimes lack of understanding of the agrochemical label are some of the reason why people still use empty container of agrochemical to store food and water.

Agrochemical that are applied to crops can volatilize and may be blown by winds into nearby areas, potentially posing a threat to wildlife (Sequoia and Kings, 2007). More importantly, the remains of these agrochemicalare washed into streams which might serve as a source of drinking water for human and animals thus resulting to one ailment or the other depending on the concentration. The use of agrochemical without wearing personal protective equipment creates substantial health impacts in all parts of the World. Agrochemical effects can be divided broadly into two categories:Acute effects, which appear immediately or very soon after exposure andChronic effects, which may manifest themselves many years later and whose origins are often difficult to trace.

Safety Measure employed in the use/ Handling of Agrochemical

Agrochemical popularity has led to its extensive use and as such, there are serious concerns about health risks arising from the exposure of farmers when mixing and applying agrochemical or working in treated fields and from residues on food and in drinking water for the generalpopulation. The place and time of application to some extent influences the type of health symptom that manifests. The exposure of workers increases in the case of not paying attention to the instructions on how to use the agrochemical and particularly when they ignore basic safety guidelines on the use of personal protective equipment and fundamental sanitation practices such as washing hands after agrochemical handling or before eating (Damalas *et al*., 2011).

In general, the way in which agrochemical are applied has a strong bearing on the extent of agrochemical hazard on farmers. For example, leaks from joints in the application equipment may often cause farmers to come into direct skin contact with large amounts of agrochemical. Similarly, blocked or unsuitable nozzles of the spraying equipment affect the quality of application and increase the degree of exposure. Damalas *et al.* (2011) further stressed that agrochemical absorption through the respiratory tract is largely supported by changes in wind speed and direction during spraying. Also application on extremely hot and dry days promotes agrochemical drift and increases exposure while, spraying in poorly ventilated spaces, such as greenhouses, expose farmers to inhalation and absorption by skin of high concentrations of agrochemical. Spraying from the air can create a risk for farmers who are not involved in the operation, the population at large, food products left in the open and the environment as a whole. All the listed situations, which are common during agrochemical application, may result in direct and prolonged exposure of farmers to pesticides and may affect their health.

Mustapha *et al.* (2017) reported that protective measures during and after agrochemical application are important to reduce exposure to them. The author further reported that 58 percent of the farmers did not use any PPE when mixing or spraying pesticides. When respondents were asked to indicate the main reasons for not using PPE, lack of availability when needed (35 percent) and PPE being uncomfortable in the local hot and humid climate (90 percent), too expensive (65 percent) and slowing you down (29 percent) were the most reasons cited. Respondents (6 percent) also cited not experiencing any health problems from using pesticides as reason for not using PPE. Among respondents who reported using PPE, less that 5 percent wore all the recommended six key PPE items (coveralls, protective boots, glasses/goggles, gloves, respirator, and hat) as recommended by ILO (1991).

CONCLUSION

Although agrochemical has alot of benefit in terms of increasing output and protecting crop, but the benefit are far been outweighed by several health and environmental challenges due to their indiscriminate use. Literatures have shown that farmers even when literate do not usually read and follow manufactures instruction that are on the label hence the high

incidence of agrochemical poisoning Morealso, accumulation of agrochemical residues in food grains and vegetables is as a result of their excessive use. However, the impact of agrochemical hazards on human /environment and residues on crop can be minimized by adhering to manufactures instruction and observing personal hygiene.

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