

## **FARMING HAZARDS AND SAFETY IN THE USE OF MECHANIZATION FOR AGRICULTURAL PRODUCTIVITY IN ABIA STATE, NIGERIA**

**Dr. Godson Kelechi Nworgu & Dr. Collins Okechukwu Amadi**

*nworgugodson10@gmail.com, Otukiri63@gmail.com,*

**Department of Sociology, Faculty of Social Sciences,  
University of Port Harcourt, Port Harcourt, Rivers State, Nigeria**

### **ABSTRACT**

*Agriculture workers come in contact with chemical or biological products. They are made to operate several machines for bush clearing, cultivating, harvesting to packaging of agriculture products. Therefore, farming activities may have potential risk on agricultural workers. The paper investigated farming hazards and safety in the use of mechanization for agricultural productivity in Abia State. The objectives of this paper is to explore the hazards and safety awareness level of agricultural workers in Abia State and to ascertain the hazard and safety management strategies adopted to increase productivity of agro products through the use of mechanized farming in Abia State. The descriptive survey research was adopted, in which data were collected after administering 60 questionnaires to agricultural workers to determine the agricultural hazards awareness and safety measures that can improve productivity in agricultural operations within the farming areas. The study found that hazards are prevalent factors in every agricultural production area, and safety measures are necessary to avert a decline in agricultural productivity. Based on the finding, the study recommends that Farm administrators should inspect equipment and machines routinely to uncover problems that may result to workplace accidents or incidents, in order to prevent any occurrence of damage to equipment and harm to agricultural workers operating with the equipment or working within the areas that this equipment is used for farming activities at any work location around the farming environment and management of farm organizations should often discuss safety, hazards or risk management issues and emergency procedures with agricultural workers to keep them alert and ready on how to tackle potential workplace hazards to report near hazard situation to supervisor while carrying out their routine work roles in various farm areas.*

***Keywords: hazards, safety, management, farming, technology, agriculture, productivity***

### **INTRODUCTION**

In several African and European countries as well as the United State, the fatality rate in agriculture sector seems to be on the increase, or may have increased above average in relation with other existing industries (Forastieri, 2001). On the ranking of the riskiest sectors of industries, the agriculture industry is believed to be among the four or five most hazardous sector. However, the tedious variety of roles performed for agriculture productivity makes it difficult to ascertain in totality the associated risks or hazards that are involved in agriculture productivity tasks. Some hazards are specific to a particular aspect of agriculture production, and or even to a particular work environment. The regular use of machinery in farm settlements, presence of some dangerous animals, incidences of falling objects, application

of chemicals or pesticides on crops and the cases of human falls are likely the main causes of agricultural workers' fatalities (Saari, 2001). Moreover, chemicals and dangerous reptiles or animals are key sources of farm or agricultural hazards (Suutarinen, 2003).

In a general context as well as in safety and health perspective, the phenomenon 'agriculture' is widely used to describe all activities or actions related to cultivating of farm land, growing of seeds or crops, harvesting of matured crops for food and processing of agricultural products. In addition, it also directly involves animal and livestock breeding such as animal husbandry, aquaculture, fishery and agroforestry. It also involves all agricultural investments and undertakings by government in partnership with private investors irrespective of location and size. Agriculture activities are mainly carried out in farm settlements and in open air space that exposes farm workers to climatic change conditions. It is a seasonal work that require urgency in certain tasks within specified period of time. Furthermore, individuals in agriculture work perform variety of tasks in different work postures and in a longer period of work tasks duration. Steady contact with dangerous animals and wild plants exposes workers to bites from either reptiles or wild animals, infections from contact with animals, allergies and other potential health issues.

Agriculture workers come in contact with chemical or biological products. They are made to operate several machines for bush clearing, cultivating, harvesting to packaging of agriculture products. However, the use of machines to work is often done in isolation and out of sight of some workers. Furthermore, in the case of accidents, emergency services are usually delayed due to the remoteness of the farm settlements. Some farm workers reside in the farm areas increasing the risk of farm-related accidents to children in high percentage. However, some farm owners employ seasonal workers, mainly for harvesting vegies and fruits. Hence, industrialized farms engages permanent workers together with seasonal workers (Hoppe and Korb, 2005). There are variety of farm sizes today in Africa, Europe and the United States, from the mega capital-intensive aspects that depends majorly on the scale of size to use input resources more efficiently in relation to small farms that focuses on key production of high-value crops or commodities (Midwest Center for Agricultural Research, Education, and Disease and Injury Prevention, 2002).

Agricultural workers in some places are not provided the similar protection under Occupational Safety and Health Administration (OSHA) regulations or laws as in the case of workers in other industries (U.S. Department of Labor, 1989). The unique features in agriculture makes it deserve more creative assessment techniques, risk protective and related injury prevention strategies as to reduce potential illnesses. Furthermore, occupational health nurses are perceived to occupy a strategic position to aid in identifying farm settlement related illnesses and provide medical care expertise in the prevention of injuries and illnesses for workers in their agriculture-oriented companies either as full or part time farmers. Farmers are viewed to have some levels of independence as operators who may decide to adhere or bypass safety rules in work practices as well as ignoring engineering controls, such as in the use agriculture machines, for perceived work safety issues (Ehlers et. al., 1993). Farming is a hazardous agricultural occupation with complexity in exposure to injuries and psychosocial factors that usually vary with the peculiarity of operation (Novello,1991).

Nag & Gite, (2020) found that farm workers experienced health hazards like injuries, musculoskeletal disorders, hearing impairment, dermatological infections, respiratory illness, climate stress and agrochemical poisoning. Sharma et. al., (2021) found also that several

hazardous toxics like organic pollutants and xenoestrogens persist in agriculture environment and accumulates in agriculture workers. Furthermore, that farmers are largely exposed to chemical, biological and environmental hazards. In which case, for farmers to sustain their life, they need to take certain remedies such as breathing fresh air emitting from plants and to avoid heat, chemicals, xenoestrogens and pollutants that are persisting in the farm environment. Sharma et. al., (2021) also opines that farmers are to be cared for and reoriented on new concepts and improved strategies of farming and handling the experiences they gain in the agriculture sector, by also providing health and safety education to improve farmers' quality and standards of living. In another dimension, Vastrad, et. al., (2014) found that during harvesting of stalks of cereal, farmers found it difficult to harvest cereal crops that are completely dry and have become very hard as well, this situation result to cuts in hand or arm. However, Kumari and John, (2018) found that most farmers lack safe operational practices and that they handle pesticides without proper awareness and training of the spraying of the toxic substance. Furthermore, Neitzel et. al., (2014) found that agricultural workers incur illnesses, injuries and fatalities due to the use of sharp objects, bending at the back, awkward postures, lifting of heavy loads and repetitive body movements. In addition, some farmers ignore the use of personal protective equipment. Therefore, against these backdrops, the study seeks to investigate the hazards and safety awareness level of agricultural workers and the hazard management strategies adopted to improve productivity of agro products through the use of mechanize farming.

### **Objectives of the study are**

- i. To explore the hazards and safety awareness level of agricultural workers in Abia State.
- ii. To ascertain the hazard management strategies adopted to increase productivity of agro products through the use of mechanized farming in Abia State.

### **Research questions include**

- i. What level of hazards and safety awareness exist among agricultural workers in Abia State?
- ii. What hazard management strategies are adopted to increase productivity of agro products through the use of mechanized farming in Abia State?

### **Farming Hazards and Safety**

In the U.S. it is estimated that 10% of full-time agricultural workers are exposed to daily noise levels above 85 database administrator dB(A) "action" or activity level at which hearing conservation programmes are mandated or required for U.S. industrial workers. In commercial farms, hazardous sound usually occurs during various farm activities. The noise of a Tractor can exceed 100 dB(A) levels, particularly on old models of tractors designed without sound insulated proofs (Plakke, 1990). The noise daily generated by agricultural machines and equipment during routine farming is considered as one of the major ergonomic factors harmful to the workers close to the noise area which affect not only hearing, but the health and performance of individuals carrying out work within the noise range (Moraes et. al, 2023). Therefore, steady exposure to intermittent and continuous noise by farming machinery emit negative impacts on the health of farmers irrespective of modernization by

technology, the noise has not been reduced to safer levels in the absence of hearing protectors. The agriculture tractor operators are vulnerable and suffer hearing impairment as a result of high noise and it develops pathologies resulting from hearing injuries (Marques-Filho and Lanca, 2022). Farmers are perceived to have little or no information regarding the impact of noise hazards, nor warning signs of hearing impairment, as well as the appropriate preventive and safety measures required.

Agricultural workers are also exposed to a variety of substances or chemicals that can be a threat to their lives, health and well-being. These chemicals comprise pesticides, fertilizers, solvents, diesel fumes from tractors, metal fumes, sanitizing solutions, and untreated well water as well as contaminants like nitrates. However, the pesticides include herbicides, insecticides, molluscicides, fungicides, nematicides, anhydrous ammonia as well as rodenticides. They are used to ensure maximal production and protection of crops. These chemicals are classified as agrochemicals or agrichemicals. The chemicals are used to increase crop productivity and it is a source to public health, soil pollution, and can contaminate water bodies. Therefore, exposure to these chemicals is always through breathing, touching the substance, drinking and eating with contaminated hands. Agricultural workers are more vulnerable to the impacts of these chemicals than other living organisms. The chemical toxic effects cause chronicity in farm workers, which in effect results to birth defects, reproductive disorders, disruption of the endocrine system, cancers, immunotoxicity, and neurological disorders among others (Kumar, Karn and Hung, 2023).

The chemicals used in agricultural activities can have several effects on farm workers (Shaver, 1991). Exposure to these chemicals can be severe, moderate, and mild. The symptoms of chemicals on vulnerable workers can include burning of the lips, nose and mouth. It also results to watery eyes, coughing, nausea, disorientation, abdominal pain, shortness of breath, chest pain, painful breathing, dizziness, headache, heavy sweating, fever and swelling. Furthermore, the effects of agrochemicals can be chronic or acute. The acute effect is immediate or after a short period of time after being exposed to the substance, while the chronic effect takes a long time to show up and can become permanent. Precisely, the effects of agrochemical exposure can include burns, liver damage, lung cancer, poisoning, recurrent pneumonia, lung cancer, Parkinson, lung damage, diseases and death (Winingham, 2019).

### **Safety and Prevention**

All agricultural workers, whether employees in commercial or government owned farms or self-employed in either permanent and seasonal farming, should be made to have adequate knowledge and compliance with modern safety and health protection on regular basis to ensure that such farm workers are alive to work for greater productivity in systemic farming. The well-being of agriculture workers' safety is a priority to government, states and community's economy. Safety training provides farmers the awareness and enlightenment to manage or reduce farming hazards, which also enable the avoidance of severe and fatal accidents, and it enables farmers acquire knowledge on the use of agrochemical, prevent low income or reduce income loss through agro accidents and minimize incidences of agrochemical related cancers (United States Department of Agriculture, 2024).

Agriculture involves the tillage of the soil, cultivation, harvesting, livestock rearing, fish farming, apiculture, poultry, manufacturing of animal husbandry products, seeds and plants production, forestry work, forest conservation, and processing of agricultural products. This

implies that in all of agricultural activities safety is paramount. Therefore, there is urgent need for state level legislation for safety and health of agricultural workers (Safe work, 2000). In addition, as farming environment is beclouded with diverse range of hazards and fatalities, the physical well-being of agro workers becomes a priority to all stakeholders in agriculture economy. There is need for utmost consciousness for safety in the use of equipment and machineries, chemicals, and other environmental factors. It becomes obvious for effective implementation of safety rules and practices in consideration of certain major factors. In mitigating farming risks, there is need to shield workers from potential farming hazards (Safety Culture, 2024).

Safety enforcement in farm settlements may not only be seen as the best way of improving safety for individuals in agricultural works. Occupational health and safety among agricultural workers should not only be determined by the number of safety inspectors that are assigned to enforce safety laws and regulations in the farms, but a more ardent orientation of agricultural workers. The enforcement of safety and protection of agricultural workers is based by legislation and it is also limited to employees, while there might not be protective provisions for individuals that are self-employed in their private or personal farms.

### **Farming Hazards Management**

Hazard management principles are not generally in use in agriculture activities across the globe. Scientific researches on the utilization of formal safety management theories or practices in agricultural activities are also not commonly available (Suutarinen, 2003). There is need to afford farmers a practical approach toward hazard management through ensuring the implementation of hazard management policies and regulations. Therefore, the management methods used in managing or controlling hazards should be practical, workable and economically feasible to achieve a wider acceptance among farmers for elated productivity in agricultural activities in the farming environment. Furthermore, agricultural activities are rewarding in the production of food to the society despite the toughness of the jobs, harsh conditions and the use of heavy machines. In New Zealand, there were reported incidences of accidents and injuries every month in 2022 involving 170 farmers. This was a case of safety in which management of hazards was seen as being essential. However, such concerns were not unique to New Zealand, therefore it relays a global concern and call to initiate appropriate hazard management techniques that reduce hazard fatalities in the agro environment (Onside, 2024).

To manage and keep the farm safe, the reduction or elimination of farm hazards can make farms safer. The use of modern technology and maintaining of safety steps can lower the fatalities and keep every farmer safe in the farm. In managing hazards, farm workers that see potential threats can quickly use their mobile phones to report such incidence, have the knowledge of individuals that are present in the farm environment by using visitors management tools to improve overall safety awareness, provide training and safety gadgets to workers in the farm, create safety perimeter alongside fences and guardrails, provide regular information to workers as soon anything happens to individual workers, create an emergency plan that every individual in the farm can access, centralize incident management in platform, simplify hazard and incidence logging, record hazards on the outside and attach photos taken on the farm map, complete prestart checklists, get incident reports to assess

response to situations and remain confident that you are reducing the risk of hazards on the farm workers with updated incident registers (Onside, 2024).

The strategies for managing hazard in agriculture are dynamic or changes overtime. Therefore, farmers who are contracted may have more opportunities for yield. To further ensure that hazards are managed in farms, the adoption of certain management strategies are crucial and these include avoidance, which involves the process of planning and restructuring the farm activities in such a way that that can avoid and reduce risk as well as to discontinue a particular operation pattern and reposition for new or modern approaches to farming (Purdue University, 2020). According to (Agsafe Alberta, 2021) there are several ways that energies on the farm environment can cause injury or result to damage to farm workers and family as well as to visitors. However, to assess and controls farm hazards is a major challenge to farmers. Furthermore, to manage farm hazards the identification of farm jobs peculiarities, hazards nature, hazards control and provision of training and education to agricultural workers are the critical steps in managing farm hazards.

### **Importance of Mechanized Farming for Productivity in Agriculture**

The main source of productivity in agriculture is through full scale mechanization. Machines and equipment in farms are used to chop, till, plant, treat, harvest, separate, grind, and bind the essential crops and farm produce for a larger scale or volume of production that can allow each farmer to participate in feeding lots of people in the state and beyond. In general, the equipment is expensive, and being repaired by trained farmers who manage and use them frequently. Whenever they wear out or are damaged beyond the level of repair, they are replaced for safety and production reasons. In addition, the safety devices in the machines are disabled, removed, and kept unused, or they may be removed from among the machinery fleet. However, the keeping of machines and equipment for several years without being used might affect their safety devices.

Agricultural mechanization provides effective and indispensable support to farming activities for large and efficient productivity. It assures much efficiency and productivity of all operations that involves direct or indirect crop production (Ou et. al., 2002). It has been argued that mechanization in agriculture demands not only the acquisition of machineries, but also a closer cooperation of key related areas like social, environmental, agricultural and economic conditions. Mechanization emerged from technological ideology and innovations which also is dependent on a particular area of need (Sing, 2006). Furthermore, FAO (2014) posited that agricultural mechanization specifically involves aspects like manufacturing, selection and sifting, distribution, packaging, repairing, maintenance of equipment and other mechanical devices such as powered machinery, farming implements, tools and systems in agricultural activities as well as management of crop production, culturing seeds, water, fertilizer, labour and time (Fadavi et. al., 2010). However, this is mostly associated with tractors and all other agricultural machinery.

Mechanization in agricultural operations is an essential aspect that has the capacity to improve rural families' economies and society at large, through the minimization of human work involving agricultural production as was observed by (Adekunle, 2015). Powered machineries, tools and farm implements that are used in agricultural mechanization are crucial for minimizing necessary inputs in farming or agriculture activities (Clarke, 2000). Hence, it has been perceived as one of the critical achievement in engineering in the 20th

century. Clarke (2000) argued that the adoption of machinery in farming activities is on the spread in time and by space across the world economies, and this has contributed in saving of cost of production, and it has also resulted to increase in net income of commercial farmers. Furthermore, one of the main criteria for development of agriculture production is the investment in agricultural mechanization. This was argued that the determination of agricultural mechanization requirement is determined by location in terms of kw per hectare area, hectare area per tractor, number of tractors for 1000 hectare or more, as well as hectare per tractor (Sessiz et. al., 2014).

The choice and preparation of mechanized farming in agriculture operations have direct effect on labour and land use for its efficient productivity, farm profitability, its sustainability and impact on the quality of life of individuals that own or are engaged in commercial agricultural activities. The peak of mechanization in agriculture operations can typically be seen in most developed countries like the US and European countries that make less use of human beings as a source of manpower, but are more given to machine operation, maintenance and control. However, the lowest levels of the use of mechanization are common with the fundamental farming systems in most developing countries. This situation has been profound and comprehensive in a manner that depicts that these countries are yet to harness the benefits of mechanized farming.

In most developing countries, their farm power is determined manually by human beings, animal draft, powered machinery, implements and equipment that are provided by humans for agriculture operations (Adekunle, 2015). In many of these countries, the major problem they have is high population density and low land productivity which is has been attributed to insufficient availability of power on the agricultural production sites and low-level use of agricultural machinery in comparison with developed countries. In Turkey, there is evidence of developed status in terms of agricultural production, even as there is an ever-increasing development effort in the utilization of mechanization in most of their facilities in agriculture operations, and this has contributed to the increasing level in output due to timely operations through effective performance and the increase in precision in relation to input concerns in several agricultural settlements (Adekunle, 2015).

The achievements made in mechanization farming in Turkish agriculture sector was dependent on climate conditions and the availability of agricultural settlements. In addition, it was also as a result of the differences in agricultural settings within each region that are divided into seven main geographical regions such as Black Sea, Marmara, Mediterranean, Aegean, Central Anatolia, East Anatolia, and Southeast Anatolia) (Adekunle, 2015). Among the areas with favourable climate conditions, and agricultural settlements, agricultural mechanization was seen as being helpful to bringing about a greater improvement and efficiency in agricultural productivity. Among other regions, the Mediterranean region played an important role in contributing more agricultural output with concerns on crop production due to its climate condition. As a result of production issues, each of the region, demanded for agricultural machinery in order to increase their various agricultural production systems. Therefore, the increase in the acquisition of agricultural machinery within the region became favourable to areas that are closer to the Mediterranean coast. However, the utilization of farm machinery was observed to be lower in provinces that are far from coastal areas.

According to (Anon, 2015), the government of Bangladesh in several forays has encouraged the use of mechanization in agriculture as a means of increasing rice production to the level

of self-sufficiency. To this end, the government facilitated the process by voluntarily reducing the import tariffs on the selected farm machineries, even as it also provided subsidy to enable buyers offset rigid costs. Furthermore, the government was able to introduce tractors and irrigation pumps in the 1960s (Ahmed, 2001). Tractors with four wheels were initially promoted, and it was arguably seen as being inappropriate in Bangladesh given to the fact that there were small farm sizes of about 0.53 hectares on average, which can be divided into multiple areas (Hossain et. al., 2007), thereby showing demand for aggregate tillage services among agriculture workers, as well as making it difficult to transport tractor equipment from field to farm. The government also initially introduced a centralized process of irrigation facilities, thereby established active deep tube wells (DTWs) as well as the supplying of low-lift irrigation pumps (LLPs) to the farmers mainly on rental basis from the services of Bangladesh Agricultural Development Corporation (BADC) (Anon, 2015).

The government of Bangladesh also provided fuel at low and subsidized rate to irrigation pump and farm owners through BADC till late 1970s (Hossain, 2009). However, in 1978, BADC rented a total of 9,000 DTWs and 35,000 LLPs which were earlier managed by the government corporation (Anon, 2012). The irrigation as well as land preparation management were almost completely in government control, and this presented a tough logistical and financial concerns. However, after independence, the government of Bangladesh introduced liberalization policies that enabled the gradually opting of government from state-led support of farm mechanization, and also introduced the privatization of farm irrigation operations to the open markets for land management and preparation for equipment procurement (Gisselquist et. al., 2002). In addition, the BADC initiated the liquidation of DTWs and LLPs to farmers by selling off government quota to cooperatives as well as to individual farmers, of which most of them became key service providers (Hossain, 2009). The privatization efforts only gained more momentum when the existing non-tariff and tariff issues on importation of irrigation, diesel or mechanical engines as well as tractors were completely eliminated, in addition with government actions or efforts toward response to disaster management were also jettisoned by the Bangladeshi government.

## **MATERIALS AND METHOD**

The descriptive survey research was adopted, in which data were collected after administering 60 questionnaires to agricultural workers to determine the agricultural hazards awareness and safety measures that can improve productivity in agricultural operations within the farming areas. In the farms, workers were interviewed one after the other while administering the copies of questionnaire to a sample of 60 farmers who are aware of government plan to use more machines and equipment for agricultural productivity in Umuahia North local government of Abia State. However, some of the communities in which the farms are located include Umukabia, Umuagu, Umuoka, Amaogwugwu and Umuawa Alaocha. The questionnaires included the general information of the farm's hazards, safety measures and operational modalities for productivity in the farming operations. The questionnaire also included the types of machinery that are available for use in the farms for seeding, planting, weeding, fertilizing applications, treatment, harvesting and post harvesting operations, storage and haulage. The questionnaire also surveyed data on the socio-economic characteristics of farmers who are found in farms such as their age, sex, and years of experience in determining farming hazards and safety measures awareness in agriculture

activities. The study also relied on secondary sources of data such as relevant academic journals, newspapers and books.

## RESULTS AND DISCUSSION

The table 1.0 below shows the analysis of the returned questionnaires, the outcome indicated that of the 60 questionnaires administered, all the copies were returned and they were analyzed. The majority of the respondents were 32 (53.3%) females, and males were 28 (46.7%) implying that farming production is gender specific.

**Tables 1.0 Respondents Gender**

Sex	Frequency	Percentage
Males	28	46.7
Females	32	53.3
<b>Total</b>	<b>60</b>	<b>100</b>

Source: Field Survey (2024)

**Tables 2.0: Hazard and Safety Awareness Among Agricultural Workers**

Variables	Frequency	Percentage
<b>Tractor Hazards Awareness</b>		
Tractor noise	28	46.7
Tractor injury/accidents	12	20
Diesel fumes	20	33.3
<b>Total</b>	<b>60</b>	<b>100</b>
<b>Chemical Hazards Awareness</b>		
Pesticides	22	36.7
Fertilizers	24	40
Solvents	8	13.3
Nitrates	6	10
<b>Total</b>	<b>60</b>	<b>100</b>
<b>Animal Hazards Awareness</b>		
Snakes bites	46	76.7
Wild animals' attacks	14	23.3
<b>Total</b>	<b>60</b>	<b>100</b>
<b>Ergonomic Hazards</b>		
Back pain	40	66.7
Neck pain	14	23.3
Arms pain	6	10
<b>Total</b>	<b>60</b>	<b>100</b>
<b>Safety Measures Awareness</b>		
Use of personal protective equipment	44	73.3
Enforcement of safety policy	16	26.7
<b>Total</b>	<b>60</b>	<b>100</b>

Source: Field Survey (2024)

Table 2.0 revealed the outcome of analysis on the basis of the objectives of the study. On tractor hazards 28 (46.7%) respondents indicated the awareness of tractor noise, 12 (20%)

on tractor injury/accidents and 20 (33.3%) on tractor diesel fumes hazards. From the analysis, it was further revealed that respondents showed awareness on chemical hazards, of which pesticide was 22 (36.7%), fertilizers 24 (40%), solvent 8 (13.3%), and nitrates was 6 (10%). Animals hazard awareness among the agricultural workers was 46 (76.7%) on snake bites and wild animal attacks was 14 (23.3%). On ergonomics hazards respondents reported having awareness as 40 (66.7%) had back pain, 14 (23.3%) had neck pain and 6 (10%) experienced arms pain respectively. Furthermore, some respondents indicated their awareness of required safety measures that can aid agricultural productivity as 44 (73.3%) were aware of the use of personal protective equipment and 16 (26.7%) indicated awareness on the enforcement of safety measures in the farm areas. Finally, the study showed that hazards are prevalent factors in every agricultural production area, and safety measures are necessary to avert decline in farming productivity. This assertion agrees with the findings of (Pyykkonen & Aherin, 2024) that farmers who identified farm risks prioritized strategies or measures that can be developed in eliminating hazards. In addition, farmers that make use of machinery adopted adequate guards and the use of personal protection equipment that are available for essential hazards reduction activities like exposure to noise and dust pollution.

## **CONCLUSION**

Safety awareness in agriculture work needs to be recognized in diverse farm types, such as small, medium and large farms with part-time and permanent or seasonal agricultural workers. Commercial farms usually have larger and more sophisticated or modern fleet of machines and with less machinery injuries. Furthermore, the increase in farm size can bring longer work hazard exposure times as well as increases the risk of experiencing chronic diseases. The enforcement of safety measures is dependent on the economic, technical, infrastructural and social development of the agricultural productive industry. There is a great challenge for all stakeholders, such as farmers, safety organizations, professional institutions, extension services and key farm administrators. Therefore, this challenge must be met in order to safeguard lives of farmers which is the most important asset in the agricultural industry.

## **RECOMMENDATIONS**

Based on the findings of this study, the following are recommended:

- i. Farm administrators should inspect equipment and machines routinely for problems that may result to workplace accidents or incidents, in order to prevent any occurrence of damage to equipment and harm to agricultural workers operating with the equipment or working within the areas that this equipment are used for farming activities at any work location around the farming environment.
- ii. Management of farm organizations should often discuss safety, hazards or risk management issues and emergency procedures with agricultural workers to keep them alert and ready on how to tackle potential workplace hazards and to report near hazard situation to supervisor while carrying out their routine work roles in various farm areas.

- iii. Management should install approved rollover protection system, structures and protective frames on all farming tractors and that there should be protective guards on each farm equipment, and that the used protective guards should be replaced, maintained and inspected to determine its usefulness in any further farming operations.
- iv. Management should routinely review safety procedures in handling of agrochemical products and communicate useful information on these chemical hazards to workers in order to create the awareness of substances like methane gas, carbon dioxide, nitrates, ammonia gas and hydrogen sulphide in unventilated grain silos and manure pits to prevent suffocation or poisoning of agriculture workers.

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