



UNIVERSITI PUTRA MALAYSIA

***KNOWLEDGE, ATTITUDE AND PRACTICE OF PESTICIDE USAGE
AND THE HEALTH EFFECTS AMONG THE ESTATE WORKERS IN
OIL PALM PLANTATIONS AT KUALA LIPIS, PAHANG***

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**KNOWLEDGE, ATTITUDE AND PRACTICE OF PESTICIDE USAGE AND
THE HEALTH EFFECTS AMONG THE ESTATE WORKERS IN OIL
PALM PLANTATIONS AT KUALA LIPIS, PAHANG**



BY

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Science (Environmental and Occupational Health) from the Faculty of Medicine
and Health Sciences, Universiti Putra Malaysia**

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ABSTRACT

KNOWLEDGE, ATTITUDE AND PRACTICE OF PESTICIDE USAGE AND THE HEALTH EFFECTS AMONG THE ESTATE WORKERS IN OIL PALM PLANTATIONS AT KUALA LIPIS, PAHANG

SITI MARIAM MAZLAN

Introduction: Pesticides are commonly used for pest control in agriculture sector. The practices of pesticides usage and handling may potentially result in adverse health effects among the estate workers at the oil palm plantations. **Objectives:** The aims of this study were to determine the knowledge, attitudes and practices of pesticides used and their association with the health effects among the estate workers. **Methodology:** This study involved 120 male estate workers who use pesticide in their daily work routine in the oil palm plantation at Kuala Lipis, Pahang. A cross-sectional study was conducted to investigate the knowledge, attitude, practice and its self-reporting symptoms by using questionnaires distribution among the respondents. The program of Statistical Package for Social Sciences (SPSS) version 22 was used to perform descriptive and bivariate analysis. **Results and Discussion:** The results of this study indicate that mixtures of pesticides were used by both local and foreign estate workers in the oil palm plantation. Finding of this study shows that, herbicides are commonly used at the oil palm field, followed by types of insecticide. In summary, 85.8% of respondents had a good knowledge of pesticide used, 46.7% of them indicated neutral level of attitude on the pesticide usage, and 68.3% of them demonstrated a good practice of while handling mixture of pesticides. Overall, there is a significant association between the practices of pesticide usage with the self-reporting health effects among the respondents. Headache is among the most common complaints of symptoms, followed by difficulty of breathing, vomiting, dizziness, redness of skin, and blurred vision or cough. At the same time, there is significant association between 'knowledge and attitude' ($X^2=11.065$; $p=0.026$) and 'knowledge and practice' ($X^2=10.406$; $p=0.034$) demonstrated the significant results. **Conclusion:** The study found that, estate workers are at risk of direct exposing to mixture of pesticides due to their self-reported symptoms. Nevertheless, study shows that the knowledge, attitude and practices of the safe handling of pesticide are vary among the estate workers. In view of this, study suggests that, replacing the traditional field training of pesticide usage to the sustainable field learning of pesticide usage is of crucial needs. The latter training approach should emphasize on implementing practicable practices, at the same time, inculcate right attitude and instil knowledge through comprehensive field intervention learning.

Keywords: Knowledge, Attitude, Practice, Pesticide Usage, Health Effects

ABSTRAK

PENGETAHUAN, TINGKAH LAKU DAN AMALAN PENGGUNAAN RACUN PEROSAK DAN KESAN TERHADAP KESIHATAN DALAM KALANGAN PEKERJA LADANG DI LADANG KELAPA SAWIT, KUALA LIPIS, PAHANG

SITI MARIAM MAZLAN

Pengenalan: Racun perosak kebiasaannya digunakan untuk kawalan perosak dalam bidang pertanian. Amalan penggunaan racun perosak dan kawalannya berpotensi memberi kesan yang buruk kepada kesihatan dalam kalangan pekerja ladang kelapa sawit. **Objektif:** Tujuan kajian ini adalah untuk menilai tahap pengetahuan, sikap dan amalan penggunaan racun perosak dan kaitannya terhadap kesan kesihatan dalam kalangan pekerja ladang. **Metodologi:** Kajian ini telah melibatkan 120 orang pekerja ladang lelaki sahaja yang menggunakan racun perosak dalam kerja rutin harian mereka di ladang kelapa sawit, Kuala Lipis, Pahang. Satu kajian keratan rentas telah dijalankan untuk mengkaji tahap pengetahuan, sikap, amalan dan simptom/gejala yang pernah dialami dengan menggunakan borang soal selidik dalam kalangan responden. Sains Sosial Statistik Program (SPSS) versi 22 telah digunakan untuk membuat analisis deskriptif dan analisis bivariat. **Keputusan dan Perbincangan:** Hasil kajian ini menunjukkan bahawa, campuran racun perosak telah digunakan oleh pekerja ladang tempatan dan warga asing di ladang kelapa sawit. Kajian mendapati bahawa, penggunaan racun rumpai adalah yang paling banyak digunakan dan diikuti dengan penggunaan racun serangga di ladang. Secara ringkasnya, hasil kajian mendapati bahawa 85.8% responden mempunyai tahap pengetahuan yang bagus dalam penggunaan racun perosak, 46.7% responden menunjukkan tahap sikap yang sederhana dan 68.3% responden menunjukkan tahap amalan yang baik apabila mengedalikan racun perosak di ladang. Secara keseluruhannya, terdapat hubungan yang signifikan diantara amalan penggunaan racun perosak dengan simptom/gejala kesan kesihatan yang dilaporkan dalam kalangan pekerja ladang. Sakit kepala adalah merupakan simptom/gejala yang sering dilaporkan dan diikuti dengan laporan kesukaran untuk bernafas, muntah, pening, kemerahan pada kulit, penglihatan kabur atau batuk. Pada masa yang sama, terdapat juga hubungan yang signifikan antara 'pengetahuan dan sikap' ($X^2=11.065$; $p=0.026$), dan antara 'pengetahuan dan amalan' ($X^2=10.406$; $p=0.034$) yang telah menunjukkan hasil yang ketara. **Kesimpulan:** Kajian mendapati bahawa pekerja ladang adalah berisiko apabila terdedah secara langsung dengan penggunaan racun perosak berdasarkan hasil simptom/gejala yang telah dilaporkan sendiri oleh mereka. Walaubagaimanapun, kajian menunjukkan bahawa pengetahuan, sikap dan amalan penggunaan racun perosak yang selamat adalah berbeza-beza dalam kalangan pekerja ladang. Sehubungan itu, kajian mencadangkan bahawa untuk menggantikan latihan penggunaan racun perosak yang tradisonal kepada pembelajaran racun perosak yang mampan di ladang dan ia merupakan satu keperluan yang amat penting. Pendekatan latihan yang seterusya adalah memberi penekanan kepada amalan penggunaan racun perosak yang lebih praktik dan pada masa yang sama memupuk sikap yang betul serta menerapkan ilmu pengetahuan melalui pembelajaran intervensi yang menyeluruh.

Kata kunci: Pengetahuan, Sikap, Amalan, Penggunaan racun perosak, Kesan Kesihatan

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LIST OF ABBREVIATIONS

| | |
|--------------|---|
| EQA | Environmental Quality Act |
| FFB | Fresh Fruit Bunches |
| IPM | Integrated Pest Management |
| KAP | Knowledge, Attitude and Practice |
| MCPA | Malaysian Crop life & Public Health Association |
| MHa | Million Hectare |
| MPOB | Malaysia Palm Oil Board |
| MPOC | Malaysia Palm Oil Council |
| MT | Metric Ton |
| NPC | National Poison Centre |
| OSHA | Occupational Safety and Health Act |
| PANAP | Pesticide Action Network Asia and Pacific |
| PPE | Personal Protective Equipment |
| SDS | Safety Data Sheet |
| USEPA | United State of Environmental Protection Agency |
| WHO | World Health Organisation |

CHAPTER 1

INTRODUCTION

1.1 Background

Synthetic pesticides have widely been used in industrial agriculture throughout the world since the 1950s, though the types and diversity of chemicals used have changed over time (Allsop et al, 2015). Pesticides had widely been used as to control a variety of pests, such as insects, weeds, rats and mice, bacteria and mold (US EPA, 2016) in agricultural areas. Despite of the extensive mixtures of pesticide used at different agricultural setting, many workers are not adequately informed about the health and safety hazards associated with the pesticide's chemicals (Al-zain & Mosalami, 2014).

Based on the World Health Organization (WHO) in July 2008, the first use of synthetic pesticides are starts from 1940 years and its consumption increased over time. In order to fulfil the increasing agricultural products demands, farmers applied various types of pesticides as the chemical substances to protect the agricultural crops and increase the production yields since green revolution. For decades pesticides are known to have importantly battling against disease for production of

crops that are being widely used for pest control in agriculture, gardening and soil treatment (Al-zain & Mosalami, 2014).

The most commonly reported pesticides used in palm oil plantations were Glyphosate, Metsulfuron-Methyl, 2, 4-D Dimethylamine, Glufosinate Ammonium and Paraquate Dichlorid (Watts et al., 2010). All of these pesticides have their own different side effects based on their types categorised. The used of insecticides is to control pests, then herbicides uses to control weeds and fungicides was used to control fungal pest (Allsop et al., 2015). Based on the research study (Gianessi, 2013), these pesticides are commonly used in oil palms agriculture which could evidently produce reddish fruitlets in bunches, weighing up to 40 to 50 kilograms, which are cut from the tree when ripe and taken to a mill for extraction of the oil. The trees were grows to a height of 20 to 50 meters and have a productive life of up to 30 years.

There are several acts (George, 2016) that regulate the environmental management of chemical substances and it has related to the pesticide usage in agriculture sectors, such that:

- I. Environmental Quality Act (EQA) 1974 is to control the chemical substance in the air and hazardous wastes.
- II. Occupational Safety and Health Act (OSHA) 1994, is to protect the safe and healthy handling and use of chemical substances at the workplace by the workers

- III. Pesticides Act 1974 to regulate all the chemical substances in pesticides for proper handling, register, and management at different settings.
- IV. Food Act, 1983 to control of chemical substances in the products and good in the food industry

Meanwhile, the management of these acts is not the responsible of single government ministry. Different ministry may enforce the acts that are relevant to the operation of that ministry. Hence, the Environmental Quality Act, 1974 is under the responsibility of the Ministry of Natural Resources and Environment. Then the Occupational, safety and Health Act, 1994 is by under the Ministry of Resources, whilst the Food Act, 1983 is enforced by the Ministry of Health. For the Pesticide Act, 1974, it is under the supervision and administration of the Ministry of Agriculture and Agro-based Industry. In other words, Malaysia has provided with sufficient laws and regulations to control the mixtures of pesticide used in various life cycles as to comply with the international law, in order to achieve a sustainability development in managing pesticide use (Mohd Tamrin, 2014).

1.2 Problem statement

According to the Department of Statistic Malaysia, agriculture is one of the main economics sectors, where the share of output is 8.8% equals to RM94 billion and employment is 12.5% equals to 1.8 million in year of 2015 (Malaysia Productivity Corporation, 2016). Other than that, the agriculture sector registered CAGR (Compounded annual growth rate) in employment and productivity of 5.4% and -3.7% respectively during the 10MP as compared to -0.04% and 1.9% during the 9MP (Malaysia Productivity Corporation, 2016).

To date, Malaysia, including all the other upper middle-income countries, shows no positive results in reducing pesticides use (Watts et al., 2010). In fact, almost 50% of the world labour, especially in the third world and developing countries was involved in agriculture activity and each of the pesticide handler at the agricultural industry are at risk of hazardous adverse health effects from exposing to mixture of pesticides during pesticide application (Mohd Tamrin, 2014).

The issues of pesticides usage in Malaysia have become serious concern about health risk arising from exposure of estate worker when mixing and applying pesticide in field. These activities have caused a number of accidental poisoning and even the routine use of pesticides can pose major health risk to workers in the short and long run and can degrade the environment (Damalas & Eleftherohorinos, 2011). Workers had been contacted with the pesticide, whether in the field work, during

pesticide application, harvesting or in their homes mainly for vector-control, or weed-control purposes (Al-zain & Mosalami, 2014). In tropical country like Malaysia, the practice of spraying frequency varies depending on the monsoon (wet and dry) season. The spraying frequency is more rapid in the wet season due to quick washed off of the pesticide and in most cases claimed that, the selection of pesticide to be used in pesticide mixture method was based on their own experience (Halimatunsadiyah et al., 2016). From this situation, it was evidently suggested that, the unsafe uses of pesticides by workers in agricultural field cause problems for human health (Bay & Heshmati, 2016).

In Malaysia, most of the estate workers in palm oil plantation are foreign workers that come from a few countries such as Bangladesh, Indonesia, Burmese, Nepal and some others countries. However, these estate workers are immigrants, and are employed on the mainly contractual basis (Abazue et al., 2015). Past studies showed that, pesticide exposure for migrant workers can be exacerbated due to a lack of facilities for hand washing, showering, and laundering contaminated clothing (Ward et al., 2001). Thus, the lacking of these basic facilities may affect the knowledge among the estate worker about the specific pesticide exposure and low confidence in their ability to apply safety measures related to pesticide use (Al-zain & Mosalami, 2014; Ward et al., 2001).

Estate workers were known by their hardworking attitude to work, which tends to become “safety negligible”, especially during the pesticide handling. This situation can prove by the usage pattern of pesticides in the field work and they also

tend to use more pesticides than basically required to increase the agricultural production (Al-zain & Mosalami, 2014; Halimatunsadiah et al., 2016). Moreover, the use of hazardous pesticides and lack of availability of appropriate precautionary tools are part of the contributing factors that causes detrimental to the worker's health. That's mean workers needs to understanding about the knowledge of pesticides' risk to reduce from any incidents happened (Jallow et al., 2017).

In addition, workers who handle mixtures of pesticides has insufficient knowledge of the potential hazards during storing, mixing, preparing. In fact, most of the pesticide handlers are not provided with protective clothing while handle and use pesticides. There are cases where the safety labels were removed from the pesticide containers by the employer before handover to their employees. As such pesticide handlers are inaccessible to the safety precaution of pesticide used with limited hazard communication methods available (Issa et al., 2010; S. V. Rengam & PAN Asia and the Pacific, 2008).

Besides pesticide handling, pesticide removal is one of the crucial issues to be concerned. Pesticide handlers used to wash their working clothes with other family member's clothes, which increases the chances of cross-contamination of pesticide residues among the household members. At times, farmers prefer to store the work-used pesticides at the backyard of their house regardless the hazardous effect of the pesticides (Issa et al., 2010). Therefore, the awareness of pesticide handling, storage and disposal is of particular interest to understand the local practices of pesticides among oil palm estate workers.

Past study on the behaviours related to pesticide use showed that most of the farmers (64%) did not read the labels or instruction on the pesticide containers (Al-zain & Mosalami, 2014) and they are likely to smoke while applying pesticides and eat at the work place (Issa et al., 2010). At the same time, attitude of the pesticide sprayers is only based on their learning and experience with no expert technical basis. This poor behaviour of pesticide handle and used may increase their risk of exposing to pesticide and may result in acute and chronic health problems.

Past study (Al-zain & Mosalami, 2014) also shows that, most of workers didn't use protective devices which are consistent with the results of many studies (Jallow et al., 2017; Mekonnen & Agonafir, 2002; Snelder et al., 2008) conducted in parts of the agricultural areas. In addition, most of the empty containers are considered as one of the dangerous hazardous wastes if workers were not thoroughly washed and rinse after use. Some of the example cases, workers dispose those pesticide containers either by burning, burial in the farm or reusable at home as water and food storage container. Its shows that worker's knowledge and perception about pesticides risk plays an important role in determining of health effects.

Handling pesticide without proper protective devices (PPE) is one of the major occupational health concerns of the pesticide handlers (Al-zain & Mosalami, 2014). Even though several reasons have been investigated such that due to the low level of knowledge about the health effects, unnecessary, hot weather, costly or unavailable in line with previous studies, no further action has been taken by the

agricultural authority to enhance the workers' practice (Al-zain & Mosalami, 2014; Issa et al., 2010).

The pesticides used in oil palm plantations have adverse impacts on human health and the environment. Agricultural workers in oil palm plantations are heavily exposed to pesticides and suffer a range of dangerous acute and chronic health effects, though many remain tragically ignorant of the causes (Rengam & PAN Asia and the Pacific, 2008). Some types pesticides used in oil palm plantations are like Glyphosate, Cypermethrin, Carbofuron and Paraquat, may produce and lead to chronic illness and death in humans. At the same time, based on the research study, Paraquat is a highly hazardous pesticide that is known to cause the highest number of poisoning of agricultural workers in the oil palm plantations in Malaysia (Rengam & PAN Asia and the Pacific, 2008) and there is also evidence that suggests some pesticides can disrupt normal endocrine function and immune systems in the body (Allsop et al., 2015). Past study highlighted that the most common known pesticide-induced health effects various from acute health symptoms to chronic health effects, such that irritation of eyes and excessive salivation and chronic diseases like cancer and reproductive or development disorders (Issa et al., 2010; Ward et al., 2001; WHO, 2008).

1.3 Research Justification

To date, palm oil agriculture is the leading oil crops in the world and it provides more than a quarter of global oil consumption (Abazue et al., 2015). Because of the growing demand in palm oil industry become increase, the pesticide usages also were highly increased. In other words, it may cause directly the agriculture's workers in the risk of exposure to occupational hazards, including pesticides, dust, bacteria, moulds, endotoxins and ammonia (Issa et al., 2010). Today, the largest producers of palm oil are Indonesia and Malaysia, accounting for 85% of world production. Indonesia and Malaysia each have export earnings of about \$17 billion/year from palm oil and it is grown by both smallholders and plantations (Gianessi, 2013).

Due to the increase demands of palm oil plantations and its subsequent products, the increase or discriminate types of pesticide used is expected, which induced hazardous health effects to the pesticide handlers, particularly during storing, mixing, and preparing. The usage of pesticide in plantation can cause health impacts to human health and its can affects the estate workers in dangerous acute and chronic health effects. Past study have been highlighted that, the most common known pesticide-induced health effects such that irritation of eyes, excessive salivation, difficulty breathing and chronic diseases like cancer and reproductive or development disorders (Issa et al., 2010; Ward et al., 2001; WHO, 2008). Therefore, this study aims to assess the level on awareness of practice, knowledge and

behaviours of estate workers in palm oil plantation regarding the safe use of pesticide in the workplace.

In contradiction, limited study had been conducted to examine the awareness of pesticide in palm oil agriculture sectors. To date, there are only a few researches about pesticide and health effects have done, particularly among the estate workers in palm oil plantation at Kuala Lipis, Pahang. In Malaysia, total oil palm planted area was increased by 5.64 million hectares in 2015 to 5.72 million hectares in 2016 (MPOB, 2016) and Pahang is the second larger of oil palm planted area (Abdullah & Sulaiman, 2013). The area was increased from 725,239 Ha in 2015 to 732,052 Ha in 2016 (MPOB, 2016).

In addition, the oil palm plantations are under private company that have branches in almost state of Malaysia includes of Sabah and Sarawak. The estimate numbers of local workers around 350, while for foreign workers are 1400 in oil palm plantations Kuala Lipis, Pahang. Among the foreign workers, 60% most of them are from Indonesian while other are from Nepal, Burmese, Bangladesh and Myanmar.

Therefore, the result of this study could use as the baseline information to examine the awareness of pesticide used and the background of health effects among workers in palm oil plantations. In other words, the good agricultural practices would be enhanced by understanding the knowledge (K), Attitude (A) and Practice (P) of

the safe use of pesticide in growing demand of palm oil production among the estate workers.

1.4 Conceptual Framework

Figure 1.0 shows that the conceptual framework of research activities. The aim of this study is to determine the K, A and P of pesticide usage and the health effects among the estate workers in oil palm plantation at Kuala Lipis, Pahang.

The framework showed that, pesticides had been used in both job scopes either in occupational and environmental sectors in Malaysia. For occupational, pesticide have widely been used in the agricultural sectors which is the main study variables examined in this study.

At the same time, this study focused on the awareness of pesticides handling in term of hazardous of chemical, mixing, spraying, storage, and personal protective equipment (PPE) among the estate workers in agriculture which is in oil palm plantation. There are a few categorised of pesticide that is usually used in agriculture group like herbicide, insecticide and fungicides.

Pesticides used causes acute and chronic health effect to human through occupational and environmental settings. The most common symptoms of acute

pesticide poisoning are fatigue, headache, skin irritation, skin rash, dizziness, nausea, vomiting, sweating and others severe cases. However, these symptoms could also be attributing with other disease. On the other hand, pesticides also can cause chronic health effects. It may occur years after even minimal exposure to pesticides in the environment. Chronic effects can cause cancer, leukaemia, non-Hodgkin's lymphoma, brain, bone and liver cancer and others related disease (Bassil et al., 2007).

In general, this research focuses on the relationship of knowledge, attitude and practice with the general symptoms of exposure to pesticides.

1.4.1 Conceptual framework chart

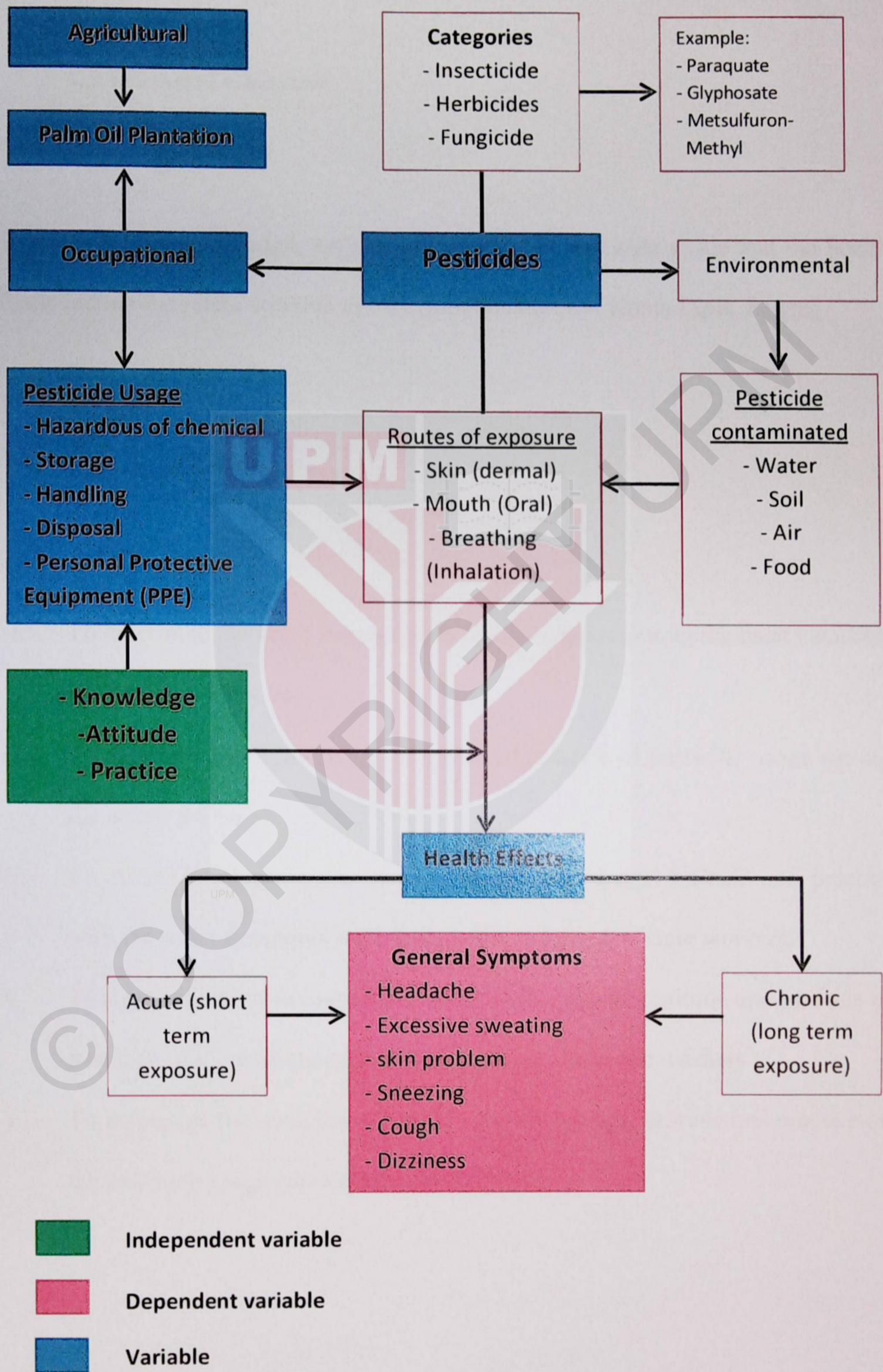


Figure 1.1: The conceptual framework of the research

1.5 Research Objectives

1.5.1 General Objective

To determine the knowledge, attitude and practice of pesticide usage and the health effects among the estate workers in oil palm plantations at Kuala Lipis, Pahang.

1.5.2 Specific Objectives

- I. To determine the socio demographic characteristics among the estate workers in oil palm plantation.
- II. To determine the knowledge, attitude and practice of pesticide usage among the estate workers.
- III. To determine the association between the knowledge, attitude and practice with the socio-demographic characteristic among the estate workers.
- IV. To determine the association between the knowledge, attitude and practice of pesticide usage with the health effects among the estate workers.
- V. To determine the association between the knowledge, attitude and practice on the pesticide usage among the estate workers.

1.6 Research Hypothesis

- There is a significant association between the knowledge, attitude and practice of pesticide usage with the socio-demographic characteristic among the estate workers.
- There is a significant association between the knowledge, attitude and practice of pesticide usage with the health effects among the estate workers.
- There is a significant association between the knowledge, attitude and practice on the pesticide usage among the estate workers.

1.7 Definition of Term

1.7.1 Conceptual definition

a) Pesticides

According to United State Environmental Protection Agency (US EPA) in December 2016, pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. From the previous study reveals that pesticide are often categorised according to the target pest, for example like insecticides, herbicides, fungicides and others,

but these three groups of pesticides are the most widely used in the agriculture sectors (Allsop et al., 2015).

Pesticides are potentially toxic to other organisms, including humans, and need to use safely also disposed of properly. It can be dividing into several groups such as insecticides, herbicides, fungicides and others. All of these categories are according to the target pest. An insecticide is a pesticide used against insects in all developmental forms. Then, herbicide is used to kill unwanted plants while a fungicide is a chemical compound used to prevent and control the spread of fungal pest.

b) Pesticides usage

According to the World Health Organization (WHO), authorized usage of pesticides is under practical conditions at any stage of production, storage, transport, distribution, and processing in agricultural commodities. In addition, pesticide being applied in such a manner as to leave residues that are the smallest amounts practicable and that are toxicologically acceptable. Farmers are exposed to pesticides in many different situations such as in handling, transporting, storage and disposal of pesticide.

In general, the exposure is high when the practice is concentrated or very near to the product for example when mixing, loading and spraying situations. One of the ways, to reduce the contamination of these pesticides exposure is with uses of proper personal protective equipment (PPE).Then,

the transport situation of pesticides is a very delicate matter and should be done carefully without transport pesticides with other materials, especially with food. For storage, pesticide should be stored in well-ventilated, cool and dark place to avoid high temperatures and frost. However, the disposal of toxic and hazardous pesticide must be disposed of in special places for hazardous waste (Fait et al., 2001).

c) Pesticide usage and knowledge

Based on Oxford dictionary (American English, 2017), knowledge is facts, information, and skills acquired through experience or education the theoretical or practical understanding of a subject. Farmers and especially those directly involved in handling of pesticides must have a good knowledge and understanding to use it properly. Knowledge be can improved by involved with the training of pesticide usage and applied it with the better ways on the workplace.

d) Pesticide usage and attitude

An attitude is a people's perceptions about the contamination, what they say about their intentions, understanding difficulties and obstacles to changing practices. While handling the pesticide, workers must have a good behaviour especially in every step of pesticide usage like mixing, spraying, disposal, use of PPE and read label of instruction on the pesticide containers (Al-zain & Mosalami, 2014).

e) Pesticide usage and practice

Practice is the real acts carried out by people in the situation; in this context of pesticide usage is the farmer's action in the management of pesticide. To practice must have some knowledge about the pesticide characteristic. This study examine the term "pesticide practices" at all procedures include of mixing, spraying, disposal, use of PPE and read label of instruction on the pesticide containers.

f) Health effects

Health effects are changes in health resulting from exposure to a source. Health effects are an important consideration in many areas, such as hygiene, pollution studies, and occupational safety and health, nutrition and health sciences in general. The health effects may occur immediately or the effects may be delayed. Health effects that occur immediately after a single exposure are called acute effects. In other cases, health effects will not occur until some point after the exposure. This is called a chronic effect. A chronic effect may occur hours, days, months or even years after exposure. Generally, acute effects are caused by a single, relatively high exposure. Chronic effects tend to occur over a longer period of time and involve lower exposures. Some toxic materials can have both acute and chronic health effects.

1.7.2 Operational definition

a) Pesticide

Pesticide is classified in term of herbicides, insecticides, rodenticides and fungicides that commonly used in agriculture planted area. In palm oil plantations, most of the types of pesticide that be used is herbicides such as Glufosinate Ammonium, Paraquate, Glyphosate Isopropylamine and others. Then, other types of pesticide used will followed by insecticide and fungicides.

b) Pesticide usage

It is a pesticide used by the estate workers in oil palm plantation to control a variety of pests and to produce reddish fresh fruitlets bunch (FFB) weighing up to 40 to 50 kg. Commonly, pesticides were applying by the workers in process of storage, handling, mixing, transportation and disposal to surround.

c) Pesticide usage and knowledge

In term of operational, mostly estate workers will get the knowledge's information based on their performance when joining the training that has been given and conducted by their employers before they start to apply the pesticides in field. The knowledge in term of pesticide handling, workers will receive according to the training of PPE used, types of pesticide, the routes of exposure and their effects to the health. Thus, education training is one of the emphasis knowledge to workers before they start to use it.

d) Pesticide usage and attitude

It is a response from estate workers to a situation where they have to apply the pesticide in work place. It can be positive or negative evaluation and it helps explaining whether the estate workers are adapting to a practice or not. Significantly, the attitudes of workers are based on their emotions, feelings or belief of workers applied the pesticide spraying. According from the study by Mohd Tamrin, (2014) reported that, the attitude of workers in oil palm plantation are based on their learning and experience with no technical basic to used it.

e) Pesticide usage and practice

Practice is a behavioural response from the estate worker about the pesticide. It is where the knowledge of pesticide usage is being translated into an action. Plus, it is a continuous action. Pesticide knowledge and understanding on pesticide use is co-determining practices. Workers usually use the recommended pesticide based on the order from their employer. The practices of pesticides used involve the process in storage (eg: consider the ventilation of storage room), handling (eg: spraying pesticide consider the windy condition), mixing, transportation and disposal of the pesticide container.

f) Health effects

A health effect is a change of estate worker's health resulting from the exposure of pesticide to a human body. Health effects can occur when estate workers apply the pesticide in wrong ways. It may occur through inhalation, ingestion and skin contact resulting in acute or chronic health effects. Mostly, pesticide can affect the human body through direct exposure while handling the pesticide in the field.

CHAPTER 2

LITERATURE REVIEW

2.1 Agriculture in Oil Palm Plantations

2.1.1 Agricultural activity in Malaysia with refer to palm oil

Started by pioneering efforts in the early part of the century, palm oil industry in Malaysia has grown to become dominant, stable and dynamic industry. On the other hand, oil palm is proven to be one of the main drivers of Malaysia's agriculture sector, contributed 30.1 per cent to 32.3 per cent per annum of agriculture's GDP for the period of 2006-2010 (Statistic, 2006-2010). However, the role of this industry is not only towards building the economic based, but also to attainment the socio-economic objective. The history of oil palm already spans across more than 100 years in Malaysia, hence giving advantage to Malaysia as one of the successful contributors of oils and fats in the world (Alang Mahat, 2012).

The oil palm sector was developed rapidly after the independence in 1957, when the government started to focus on the various schemes and assistance

particularly in R&D activities in order to steering the palm oil sectors. Since early 1960, government took initiatives to diversify the economy from rubber and tin to industrialization and other alternative crops. The introduction of commercial plantation scheme system in 1917 had effectively increased the planted area from only 400 hectares in 1920s to 3.4 million hectares in 2000 and reached 5.72 million hectares in 2016 (MPOB, 2016). In 1960, the total planted area was only 54,700 hectares and was owned by large estates while smallholders and government owned plantations were non-existent (Pletcher, 1991). Currently, oil palm becomes the biggest plantation crop in Malaysia due to rapid expansion of cultivation area in Sabah and Sarawak. Of the total palm oil planted areas in Sabah has the largest plantation areas of 1,383,109 hectares in 2016 and while Sarawak covers almost 1,268,942 hectares in 2016 (MPOB, 2016), as shown in figure 2.1.

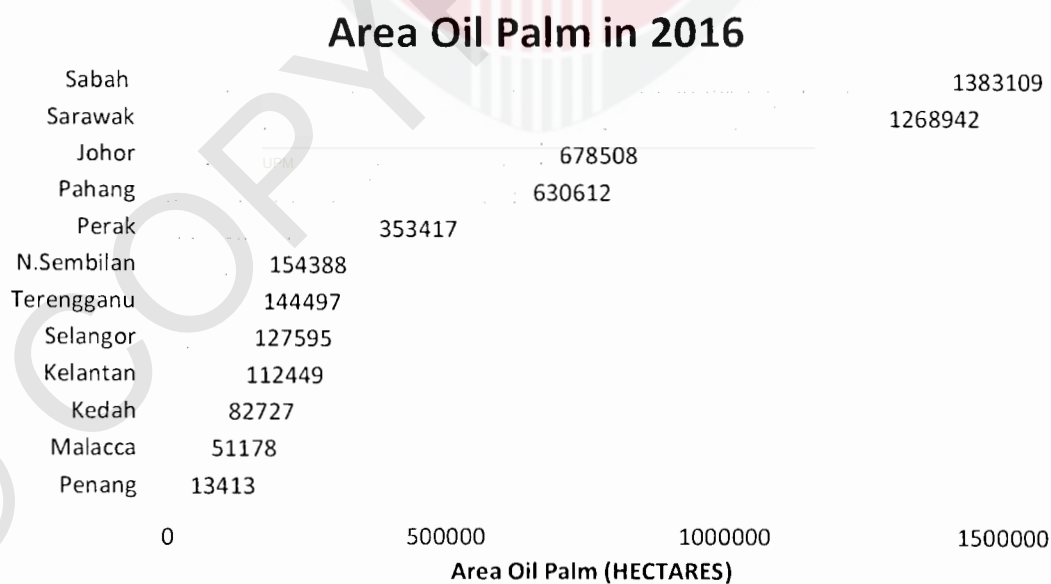


Figure 2.1: Oil Palm Planted Area by State as at December 2016 (Hectares)

Source: MPOB (2016)

2.1.2 Area of Oil Palm Plantation in Malaysia

According to Malaysia Palm Oil Council (MPOC) by Basiron (2015) state that, the total area planted with oil palm in Malaysia was 640,000 Ha back in the year 1975 which produced 1.26 million MT of palm oil. Then, in 2015, planted area is 5.4 million Ha but production will reach 20.3 million MT. It shows that the land area of oil palm had been increased by only 8 times, but the production has increased by almost 17 times (figure 2.2).

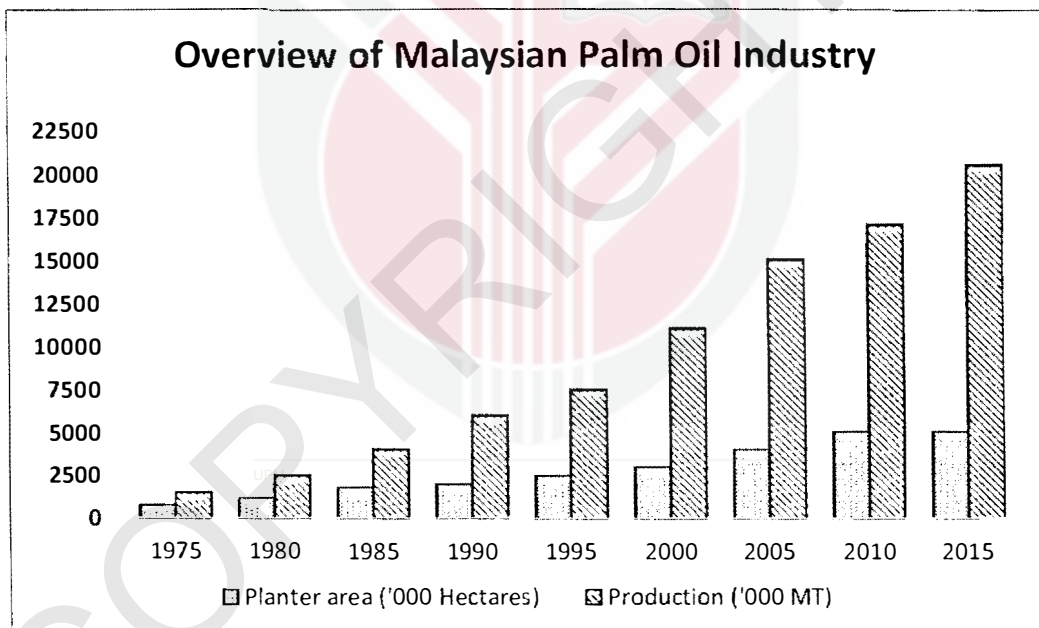


Figure 2.2: Overview of Malaysia Palm Oil Industry

Source: Malaysia Palm Oil Council (2015)

Besides, the potential increases in the area of industrial oil palm plantations in Southeast Asia including Malaysia were estimated by projecting the recent oil palm area expansion trends and changes therein, in the near future. It is estimated that the

increase in the area of oil palm trees in Malaysia in 10 to 20 coming years will be increased to 6.2 Mha in 2020 and 7.2 Mha in 2030 (Miettinen., 2012).

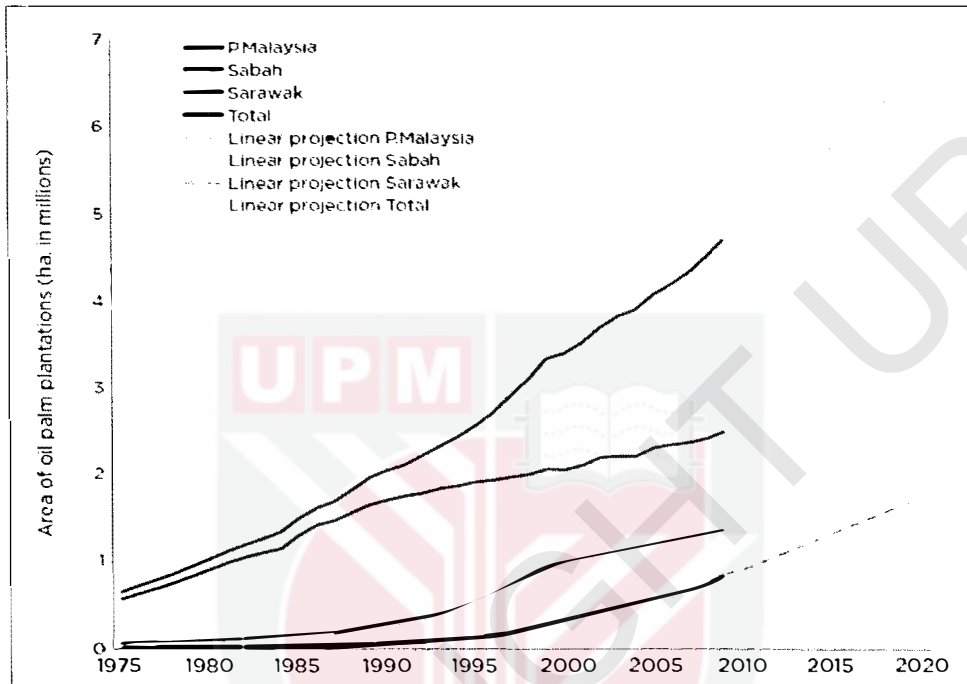


Figure 2.3: Planted palm oil area in Malaysia 1975-2009, with linear projection out to 2030

Sources: Oil Palm Plantation Expansion on Peatland in Southeast Asia (2012)

Figure 2.2 shows historical planted areas in Malaysia, divide into peninsular Malaysia and Borneo states of Sabah and Sarawak. It states that, if both the overall palm area and the amount of palm expansion on peat followed the linear trend based on the previous data, it is expecting to see about 42% of palm expansion in Malaysia occurring on peat.

2.2 Pesticides

According to United State Environmental Protection Agency (US EPA), pesticide is defined as any substance or mixture or substances intended for preventing, destroying, repelling or mitigating any pest. Pesticides are often applied to chemical agents and also commonly known as 'plant production product'. Based on the table 2.1 below, it was showed that, the consumption of crop care products in Malaysia. Pesticides consist of herbicides, insecticides, fungicides and rodenticides which are agent to control insect pests, fungal, weeds, rodents, nematodes (roundworm) and others related respectively (George, 2016).

To date, Malaysia farming sectors is still dependent on agrochemical including pesticides usage. The uses of pesticides become increased and also have given some impacts on food safety, environment surrounding and adverse health effects to human.

Table 2.1: Malaysian Pesticides Market (RM Millions)

| | 2014 | 2015 |
|---------------------|-----------|-----------|
| Herbicides | 370 (66%) | 355 (64%) |
| Insecticides | 136 (25%) | 145 (26%) |
| Fungicides | 27 (5%) | 31 (6%) |
| Rodenticides | 22 (4%) | 23 (4%) |
| Total | 555 | 551 |

Sources: Malaysian Crop life & Public Health Association (MCPA) (2016)

2.2.1 Agricultural pesticides standard compliance.



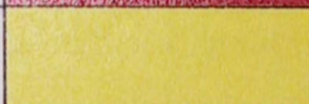

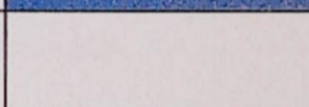
According to the Ministry of Agriculture and Agro-Based Industry, since 1984, Malaysia have their own Nationality Agriculture Policy (NAP) which have NAP1 (1984-1991), NAP2 (1992-1997) and NAP3 (1998-2010) that has been enacted to improve the agriculture sector. The aims of Malaysia Nationality agriculture policy is to ensure that the capability of the agricultural sector to play its strategic role in national development is sustained and enhanced in light of new and emerging challenges facing agricultural development. Other than that, this policy aims to set in place the enabling and supportive measures as well as a conducive environment to promote growth in the agricultural sector. One of the emphases in this policy is to increase the area of oil palm plantation where it can be seen nowadays. From years by years, the area of oil palm plantations become largest to increase the productivity and competitiveness of the sector also to conserve and utilise natural resources on a sustainable basis.

In Malaysia, pesticide must be complying with Pesticide Laws. For instance, the safe handling of pesticide must follow the legislation and regulation in Environmental Quality Act 1974 (Act 127), Environmental Quality (Scheduled Waste) regulation 2005, Pesticides Act 1974 (Act 149) (Amendment 2004) and OSH (USECHH) Regulation 2000. Other than that, it must also be indicated the label instruction, transportation, mixing, applying, storage, disposal, PPE use, medical surveillance and record keeping.

In addition to this, the information needed to be on the labelling of pesticide are such that product description, hazard classification, name and address of registrant, registration number, direction for use, medical and first aid statements and precaution and safety statement.

Moreover, pesticide also must be label with the class, colour band & hazard statements to ensure that pesticides are labelled in accordance with good labelling practices and give the relevant information (PAN International, 2015) such in table 2.2:

Table 2.2: Colour Band & Hazard Statements of pesticides

| Class | Hazard statement | Symbols | Colour band |
|-----------|-----------------------|---------------------|---|
| Class Ia | Very highly poisonous | Skull & Cross Bones |  |
| Class Ib | Highly poisonous | Skull & Cross Bones |  |
| Class II | Poisonous | -- |  |
| Class III | Harmful | -- |  |
| Class IV | -- | -- |  |

Source: Pesticide Action Network International (2015)

2.3 Pesticide usage

There are a few types of pesticides use in agriculture nowadays. According from the previous studies ,mainly herbicides and rodenticides are using and followed by insecticides and fungicides (Table 2.3) in palm oil plantations (Joshi et al., (2002). The area of oil palms in Malaysia is expected to rise from 2.7 million ha in (1998) to 4.3 million ha in (2020), with a subsequent rise in the utilisation of agrochemicals such as herbicides, rodenticides, insecticides and fungicides.

Based on the previous studies, workers tend to use more pesticides than required to increase the agricultural production (Al-zain & Mosalami, 2014). However, they don't use or practice pesticide with a proper technique and take it easier in the field work process. For example, these pesticides are used under varying conditions of use that presents a high level of hazardous exposure. Sources of exposure to pesticides include of partial, inadequate, or complete lack of personal protective equipment (PPE), with a wide variance of responses. Then, another type of exposure is spillages while mixing, spraying and/or loading of pesticides.

Past studies by Watts et al., (2010) shows that, some respondents sprayed against and along the wind direction was answering unknown about the wind direction. It's also indicates workers have poor storage and disposal practices of pesticide handling.

2.3.1 Pesticide usage in Oil Palm Plantation

Pesticides usage commonly use in oil palm to produce reddish fruitlets in bunches weighing up to 40 to 50 kg. The trees will growth to 20 to 50 meters and have a productive life of up to 30 years old (Gianessi, 2013). Past study state that, the commonly pesticide used were Glyphosate, Metsulfurun-Methyl, 2,4-D Dimetehylamine, 2,4-D Sodium Monohydrate, Glufosinate Ammonium and Paraquat dichloride (Watts et al., 2010). Figure 2.3 below shows one of the examples of pesticide used in oil palm plantation among the estate workers.



Figure 2.4: Pesticide used (Glyphosate Isopropylamine) in oil palm plantation

The pesticides industry is widely accepted as a growing market in Malaysia. The area under oil palm plantations has been increasingly over the year, with a consequent rise in consumption of agrochemical products and herbicides contributing as much as 75% of the RM 326 market for pesticides in 1997 (Joshi et al., 2002).

Table 2.3: Agrochemical usage on Oil palms in Malaysia (1998-2020)

| Year | 1998 | 2000 | 2006 | 2010 | 2020 |
|------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Oil palm area (000 ha) | 2742 | 2874 | 3192 | 3518 | 4251 |
| Herbicides (million litres) | | | | | |
| Glyphosate | 7.7 | 8 | 8.9 | 9.9 | 11.9 |
| Paraquate | 4.8 | 5.0 | 5.6 | 6.1 | 7.4 |
| 2, 4-D amine | 1.0 | 1.0 | 1.1 | 1.2 | 1.5 |
| Spray adjuvants | 0.5 | 5.2 | 5.7 | 6.3 | 7.7 |
| Rodenticides (tonnes) | | | | | |
| Warfarin | 2.8 | 2.9 | 3.3 | 3.6 | 4.3 |
| Bromadioline | 0.5 | 0.5 | 0.6 | 0.7 | 0.8 |
| Insecticides | | | | | |
| Cypermethrin (000 litres) | 1974 | 2069 | 2298 | 2533 | 3061 |
| Carbofuran (000 kg) | 1398 | 1466 | 1628 | 1794 | 2168 |
| Sime RB Pheromone (000 sachets) | 129 | 135 | 150 | 165 | 200 |
| Fungicides (kg) | | | | | |
| Thiram | 4524 | 4742 | 5267 | 5805 | 7014 |
| Benomyl | 2550 | 2673 | 2968 | 3272 | 3953 |

Source: AGROW Agribusiness intelligent (2002)

2.4 Pesticide and Health Effects

Pesticides are poisons that can never be safe to use. Pesticide also can kill living organisms and remain to contaminate land and water. According to Pesticide Action Network (PAN) International, (2015), every year about 25 million workers suffer from pesticide poisoning. WHO (2008) estimated that a minimum of 300,000 people die from pesticide poisoning each year, with 99% of these from low- and middle- income countries and in 2008, the World Bank put the number of deaths at 355,000.

Pesticides can affect workers through three routes of exposure such as skin, inhalation and ingestion. It is widely known that, all pesticides are potentially harmful to health. There are two types of poisoning which is acute toxicity and chronic toxicity. Acute toxicity occurs when the poisonous effects of the pesticide are felt right away. Another name for acute toxicity is acute poisoning. On the other hand, chronic toxicity occurs when the poisonous effects of pesticides on health are de-layed. That is taking a long time effect to develop until after months or years of exposure to the pesticide. Some acute health effects include headache, dizziness, nausea, vomiting, convulsions and others. Example of chronic health effects such as cancer, neurotoxins, respiratory disease, birth defects and others related disease.

2.4.1 Poisoning cases

Increased of pesticide usage, have not solved all of the pest control problems now. In fact, it also can increase the problem of pesticide poisoning among the workers in agriculture sectors. Poisoning cases statistic by Awang, (2016) from National Poison Centre (NPC) Malaysia state that, there were more than 35,000 poisoning cases enquiries that have been reported from years 2006 to 2014 to poison centre since its establishment from year 1995. The poisoning cases that were involved like pharmaceuticals, household products, drug of abuse and also pesticides. Data from NPC shows that, pharmaceutical are the largest cases which is 36% (12084) and pesticides is the second larger of poisoning cases which is 29% (9609) (Figure 2.4).

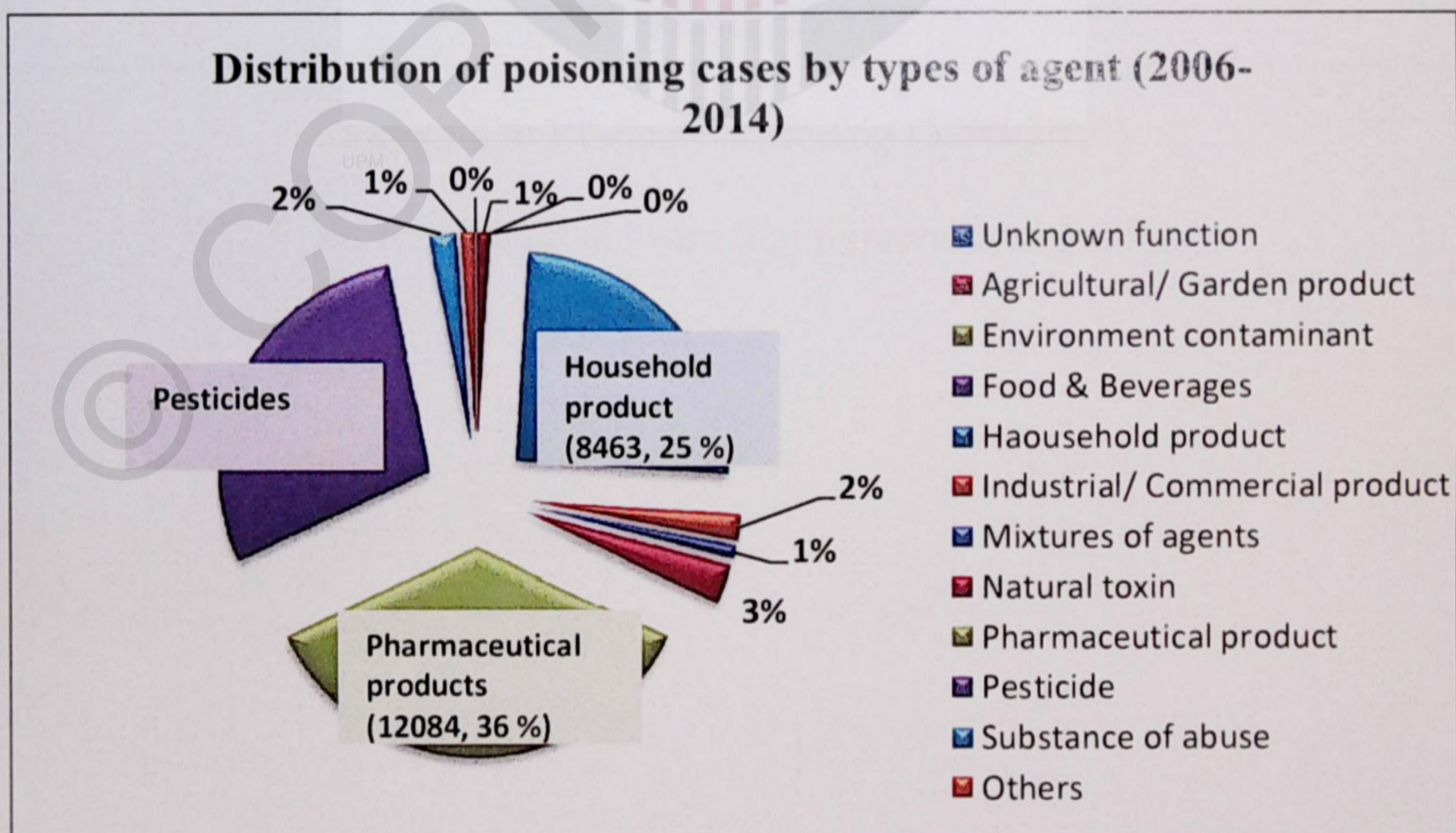


Figure 2.5: Distribution of poisoning cases by types of agent (2006-2014)

Source: National Poisoning Symposium (2016)

There are a few types of pesticide poisoning that have been reported in National Poisoning Symposium 2016 by Rahmat such as insecticide, herbicide, rodenticide, fungicide and others. The larger number of cases report is herbicide usage with 4,166 cases. Then, follow by insecticide with 3,303 cases and rodenticide with 957 (Figure 2.5).

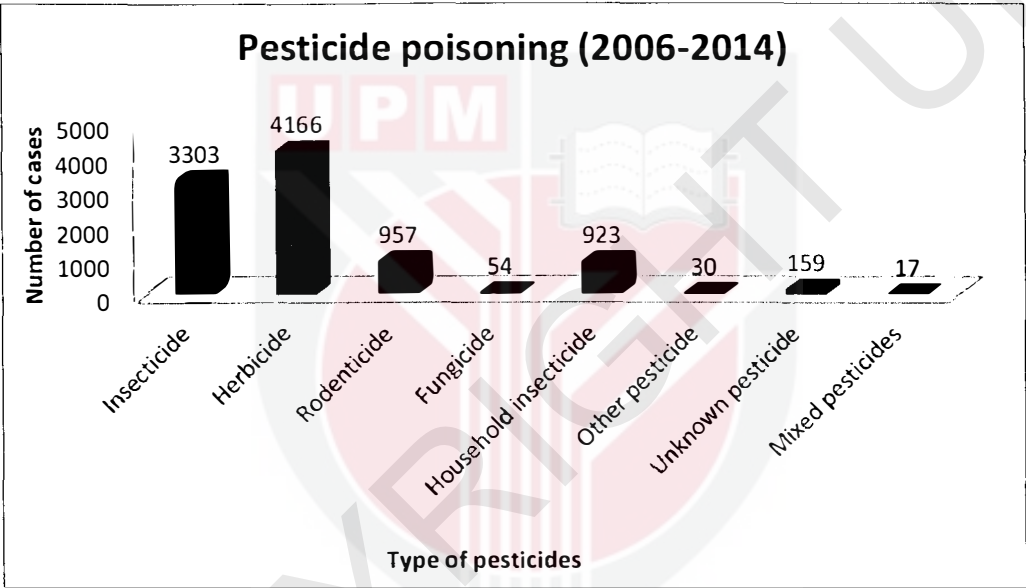


Figure 2.6: Pesticide poisoning (2006-2014)

Source: National Poisoning Symposium (2016)

2.5 Knowledge, Attitude and Practice of pesticide handling

2.5.1 Knowledge of pesticide handling

Knowledge is not sufficient to changes the behaviours and attitude of oneself if workers have low confidence to apply safety measures that related to pesticide use. A factor that influences workers in pest management practices are renamed as knowledge, awareness and experience (Halimatunsadiah et al., 2016). “A good knowledge” is described as the workers who have adequate and suitable methods to be used in their pest control by using the synthetic pesticide. They understand the appropriate pesticides handling from the beginning until the end of task handle. It's included hazard communication through label reading as well as interpreting the safety data sheet of pesticide container in order to determine the quantity of mixing, spraying and the important is wearing protective clothing.

In addition, workers also needed to have an awareness of the risk that can be emerged due to heavy pesticide usage as of the great possibility on environmental pollution and health impacts. As we know, pesticides are poisonous to health and can be brought to death. Thus, knowledge of pesticide usage must be instilled among the worker's mind to minimize the chances of potential adverse health effects.

2.5.2 Attitude of pesticide handling

The attitude of sprayers sometimes is based on learning and experience passed from their community which are neighbours, family, and local beliefs with no technical basis. As such most of the respondents were believed drinking coconut water can reduce toxicity level in body (Mohd Tamrin, 2014). But, in present, there is still no proven scientific research to cure these poisonings.

Generally from the website study (Literary Devices, 2017), attitude is a behaviour a person adopts toward other people, things, incidents or happenings. In literature, the term “attitude” can be referred as perspective or tone of the writer he adopts in a certain work. Attitude influences an individual’s choice of action and responses to challenges, incentives and rewards.

The types of open environment were increase the windy condition and have the possibility to spread to the workers as well as community in the vicinity. Most were given free hand of spraying without proper training and most of the workers were more concerned with finishing the task given in order to complete the task given (WHO, 2002).

2.5.3 Practice of pesticide handling

Pesticide knowledge was significantly associated with practices in the field. Analysing pesticide use as a social practice allows for bridging the farmers' lifestyles and socio-technical systems of provision. The concept of lifestyle refers to an individual's participation in different social practices in combination with the story telling that goes along with this. A lifestyle is both individually and collectively constructed as it is a unique combination of shared social practices. This social practices approach is applied here to clarify how actors and the structural conditions effectively co-construct pesticide use practices (Mengistie et al., 2015).

Little research has explored farmers' actual practices, while applying an approach based on practice theory could improve understanding of these practices and the changes therein. The central claim in a practice approach is that the transition to sustainability needs to go beyond individual attitude and behavioural change and that actual practice should be the main unit of analysis (Mengistie et al., 2015).

Pesticide knowledge and understanding on pesticide use is co-determining practices. Workers usually use the recommended pesticide based on the order from their supervisor. By Yassin et al, (2002) pointed that, even though the farmers had high levels of knowledge on the health impact of pesticides, they did not practice according to the knowledge they had. Sometimes they were mix the pesticide with bare hand, spray under windy condition, clean pesticide container with river water and without use detergent before storage it.

CHAPTER 3

METHODOLOGY

3.1 Study Location

This study was conducted in the district of Kuala Lipis, Pahang where the oil palm cultivation has become the identity of the community as oil palm is the main crop. Workers who known as estate workers work in the oil palm agriculture sectors were recruited to participate in this study. Workers are made up from both local and foreign workers such as from Bangladesh, Burmese, Indonesian, and Nepal, and also from our local resident.

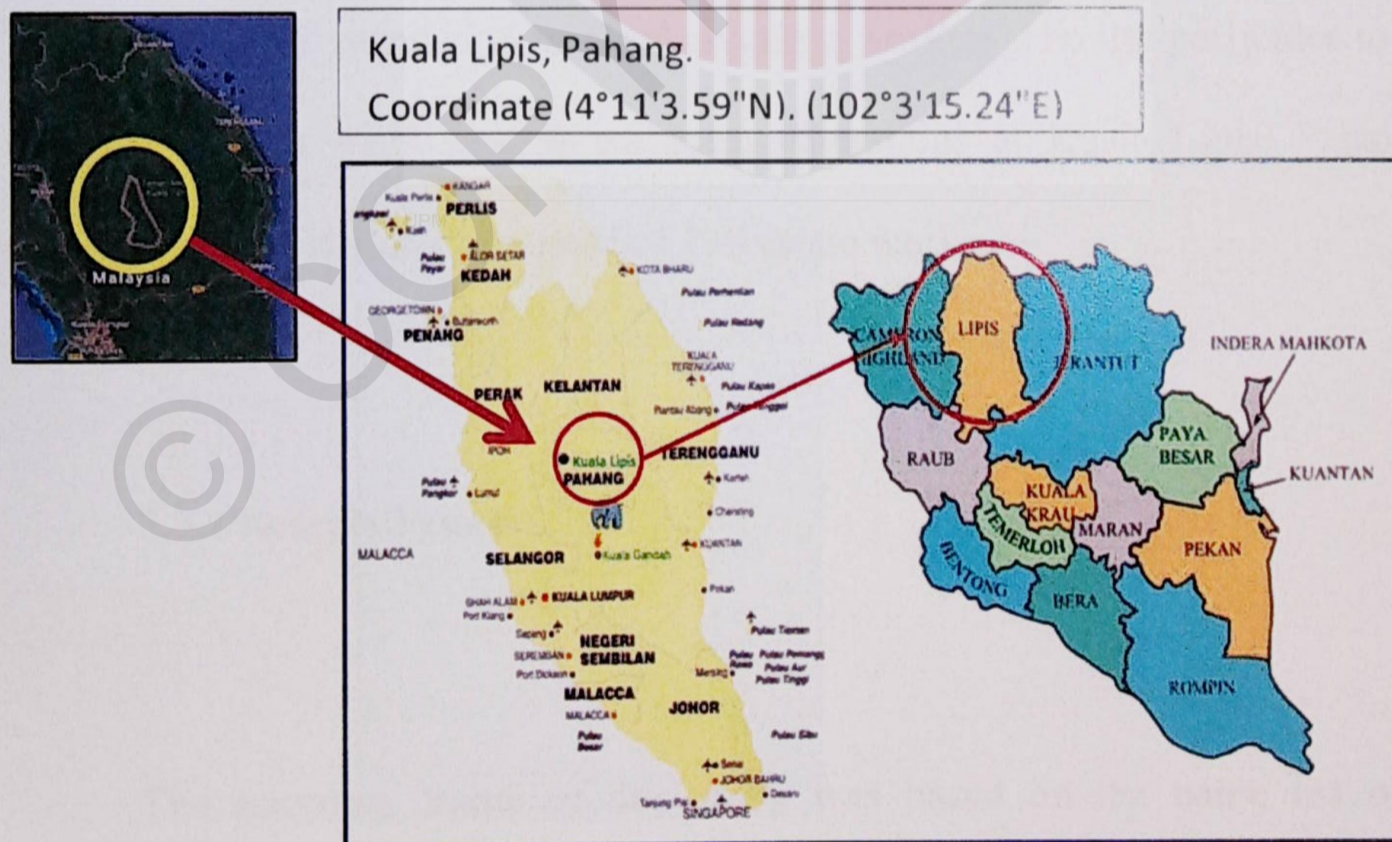


Figure 3.1: Location study of oil palm plantation in Kuala Lipis, Pahang

Sources: Google Map (2017)

3.2 Study Design

This is a cross-sectional study conducted from January until March 2017 which aims to assess the knowledge, attitude and practice of pesticide usage and the health effects among the estate workers in palm oil plantations at Kuala Lipis, Pahang.

3.3 Sampling

3.3.1 Study Population

The study population focused on estate workers who use pesticides to control the pest in their work task in oil palm plantations at Kuala Lipis, Pahang. The population for this study consisted of 120 estate workers.

3.3.2 Sample Frame

The sampling frame of this study was based on the name list of estate workers in palm oil plantations obtained from the office of region in Kuala Lipis, Pahang. However, only workers who fulfil the selection criteria were being included in this study.

3.3.3 Selection criteria

- Male estate worker
- Estate workers with age group 18-50 years old
- Estate workers who handle pesticides in their routine work activity
- At least one years of work experience at the current position
- Understand Malay and Indonesia language

3.3.4 Sample Size Calculation

The sample size was calculated by using formula estimation of sample size according to (Krejcie & Morgan, 1970).

Population size (N) = 150 of estate workers involved with pesticide in their work task.

$$s = \frac{X^2 NP(1 - P)}{d^2(N - 1) + X^2 P(1 - P)}$$

Where:

s = Required sample

χ^2 = The table value of chi-square for one degree of freedom at the desired confidence level ($1.96 \times 1.96 = 3.8416$)

N = The population size

P = The population proportion will be 0.455 which is taken from the previous study based on attitude level of pesticide usage by (Norkaew et al., 2010)

d = The degree of accuracy expressed as a proportion (0.05)

Therefore:

By using of Knowledge with population proportion (P) = 0.228

$$s = (3.8416) \times (151) \times (0.228) (1 - 0.228) \div (0.05)^2 (151 - 1) + (3.8416) \times (0.228) (1 - 0.228)$$

$$= (3.8416) \times (151) \times (0.1760) \div (0.05)^2 (150) + (3.8416) \times (0.1760)$$

$$= 102.0944 \div (0.375 + 0.676)$$

$$= 97$$

By using of Attitude with population proportion (P) = 0.455

$$\begin{aligned} s &= (3.8416) \times (151) \times (0.455) (1 - 0.455) \div (0.05)^2 (151 - 1) + (3.8416) \times (0.455) (1 \\ &\quad 0.455) \\ &= (3.8416) \times (151) \times (0.2480) \div (0.05)^2 (150) + (3.8416) \times (0.2480) \\ &= 143.86024 \div (0.375 + 0.9527) \\ &= 109 \end{aligned}$$

By using of Practice with population proportion (P) = 0.85

$$\begin{aligned} s &= (3.8416) \times (151) \times (0.85) (1 - 0.85) \div (0.05)^2 (151 - 1) + (3.8416) \times (0.85) (1 \\ &\quad 0.228) \\ &= (3.8416) \times (151) \times (0.1275) \div (0.05)^2 (150) + (3.8416) \times (0.1275) \\ &= 73.9604 \div (0.375 + 0.4898) \\ &= 86 \end{aligned}$$

The sample size was calculated for the second objective in this study according to population proportion for knowledge, attitude and practice from the previous study (Norkaew et al., 2010). Thus, attitude proportion was shown has the highest sample size compared to knowledge and practice.

To account any missing data during data collection process values are rounded up to 10%, which;

$$10\% \times 109$$

$$= 10.9$$

$$= 10.9 + 109$$

$$= 119.9$$

$$= \mathbf{120 \text{ respondents}}$$

The sample size was calculated for the **second objective** in this study. Thus the total sample size is **120 respondents** of estate workers in a population group.

3.4 Instrumentation

3.4.1 Approval Letter

The consent letter had been given to the respondents who fulfil the selection criteria and voluntary participant in this study (Refer Appendix III).

3.4.2 Questionnaire

One of the main instruments used to get the information from the estate workers are by using the questionnaire. This adapted questionnaire consists of **six sections**, such as:

i. Section A: Socio-demographic Information

These parts consists a few of question such as general personal information on demographic background, age, status, nationality, education, duration of employment and transportation.

ii. Section B: Pesticide usage

These part consist a questions such as type of pesticides use; hours contribute with pesticide, how long in day per month's works with pesticides and PPE usage.

iii. Section C: Knowledge of pesticides usage

This part consists of ten questions that could be answered by 'Yes', 'No' and 'Don't know'. One point will be given for each correct answer, one point was deducted for each wrong answer and selecting 'don't know' answer did not affect the grade. The range of knowledge score was dividing by three levels based on the previous study (Norkaew et al., 2010) which are:

- Low level = less than 60%
- Moderate level = between 61% - 80%
- High level = between 81% - 100%

iv. Section D: Attitude of pesticide usage

This part consists of ten questions that could be answered by 'agree' 'not agree' or 'don't know'. One point will be given for each correct answer, one point was deducted for each wrong answer and selecting 'don't know' answer did not affect the grade. The range of attitude score was dividing by three levels based on the previous research study (Norkaew et al., 2010) which are:

- Concern attitude = between 81% - 100%
- Neutral attitude = between 61% - 80%
- Not concern attitude = less than 60%

v. Section E: Practices of pesticide usage

This part consist of twenty question that could be answered by either 'usually' 'sometimes' or 'never'. The range of practice score was dividing by three levels based on the previous research study (Norkaew et al., 2010) which are:

- Good Practice = between 81% - 100%
- Fair Practice = between 61% - 80%
- Poor Practice = less than 60%

vi. **Section F: Symptom of pesticide usage towards health**

These part consist of two question only which are what the symptom that workers have experience and how worker get the treatment to treat their symptoms effects from the use of pesticide.

The questionnaires were prepared in Bahasa Malaysia and English language. It had been performed expert validity test among agricultural officer from the estate office of Kuala Lipis. Then followed by test-retest reliability among the respondents who had the similar socioeconomically background as like the study population (Refer Section 3.6).

The respondents who fulfil the selection criteria were be selected with the assistance of the local field supervisor. These respondents had been briefed on the study objective by the subject information sheet and suggest signing for the consent letter (Refer Appendix III) as an acknowledgment of participation.

Upon the commencement of data collection, the local field supervisor and OSH office were being trained first to answer the items from the questionnaire by the

researcher. With the assistance of the local field supervisor and OSH, a face-to-face interview will be conducted between two-parties.

The measurement tools used had developed by standardized questionnaire, which had been use by previous study from Journal Health Research (Norkaew et al., 2010) and Environment Health Prevalence Medicine (Zyoud et al., 2010).

3.5 Data Analysis

All the data analysis was being analysed by using statistical analysis by performing SPSS 2.2 (Statistical Package for Social Science) version and Microsoft excel 2007 for window seven. Descriptive statistic including means, median and standard deviation had been being run and also to analyse the distribution of all variable including in this study.

The descriptive statistics were used to analyse the descriptive data such as socio demographic of respondents, awareness of pesticide usage like knowledge, attitude and practice and also in part of description of adverse health effects. Then, the statistical analysis was run to know the percentage, means, and standard deviation. Then, the Chi-square analysis was used to test the significance association between categorical variables.

Table 3.1: Data analysis of the study

| No. | Hypothesis / specific objective | Data Analysis |
|-----|--|----------------------|
| 1. | To determine the socio demographic characteristics among the estate workers in oil palm plantation. | Descriptive analysis |
| 2. | To determine the knowledge of pesticide usage among the estate workers. | |
| 3. | To determine the attitude of pesticides usage among the estate workers. | |
| 4. | To determine the practice of pesticide usage among the estate workers. | |
| 5. | To determine the association between the knowledge, attitude and practice with the socio-demographic characteristic among the estate workers. | Chi square |
| 6. | To determine the association between the Knowledge, Attitude and Practice of pesticide usage with the health effects among the estate workers. | |
| 7. | To determine the association between the knowledge, attitude and practice on the pesticide usage among the estate workers | |

3.6 Quality Control

3.6.1 Quality Control 1:

Pre-testing of the questionnaire was being conducted for 10% sample size, which are 12 respondents all together before data collection process. These procedures want to ensure the entire question that asked in the questionnaire was understandable and

could be answered by the respondents. Two pre-testing of the questionnaire had been conducted in these studies which are expert validity test and reliability test. Both of this pre-testing was being conducted among the population who had the similar socio-economical background and in oil palm plantation workers.

i. Validity testing

Test validity refers to the degree to which the test actually measures what it claims to measure. **Content validity** was performed by letting the recognized subject matters experts to evaluate whether test items assess defined the content of the study. To measure the content validity, the method was developed by Lawshe (1975). It is essentially a method for gauging agreement among raters or judges regarding how essentially a particular item is:

- a. Each of the subject matter expert raters (SMEs) on the judging panel respond to the following question for each item. It was involved four subject matter expert in this study. Most of them have an experience handle with pesticide and workers at the palm oil plantation. One of them was from human resource department and he was familiar with the type of pesticide purchased from suppliers for use on the plantation. Then another subject matter expert are one of the safety and health officer (SHO) and two supervisor that was who are responsible for their subordinate's workers at oil palm plantation.

- b. If more than half the panelists indicate that an item is essential, that item has at least some content validity. Alternatively, the formula termed the content validity ratio developed by Lawshe (1975) was being use.

$$\text{Content validity ratio (CVR)} = \frac{(n_e - N/2)}{(N/2)}$$

n_e = number of SME panelists indicating "essential to ask",

N = total number of SME panelists.

- c. The mean CVR across items shows that, a value range from +1 to 0.5; positive values indicate that at least half the SMEs rated the item as essential.

ii. Reliability testing

Since the questionnaire was prepared in both Bahasa Malaysia and English language, reliability test was performed in order to ensure that the degree to which a test is consistent and stable in measuring what it is intended to measure. In this context, two reliability test was performed, i) test-retest reliability and ii) internal consistency reliability test.

Alternatively, **internal consistency reliability test** were performed to measure of how well the items on the test measure the same construct or idea. Cronbach's alpha is the most common measure of internal consistency ("reliability"). The following guidelines below had been used:

| | |
|-------------------------|--------------------------|
| $\alpha \geq 0.9$ | Excellent Reliability |
| $0.9 > \alpha \geq 0.8$ | Good Reliability |
| $0.8 > \alpha \geq 0.7$ | Acceptable Reliability |
| $0.7 > \alpha \geq 0.6$ | Questionable Reliability |
| $0.6 > \alpha \geq 0.5$ | Poor Reliability |
| $0.5 > \alpha$ | Unacceptable Reliability |

The data was tested for internal consistency reliability test using Cronbach's alpha coefficient. And it showed that the result for knowledge is 0.627, attitude with 0.707 and lastly practice which is 0.766.

Table 3.2: The result of reliability test to determine the internal consistency reliability

| Component test | Cronbach's alpha result |
|-----------------------|--------------------------------|
| Knowledge | 0.627 |
| Attitude | 0.707 |
| Practice | 0.766 |

3.6.2 Quality Control 2:

For the quality control, the way of distributing this questionnaire had been helped by the supervisors who are responsible for their subordinate's workers. Their subordinate's workers mostly are foreign workers' that comes from a few countries, including Bangladesh, Burmese and Indonesian. Before this questionnaire begins to distribute, we were looking for a representative worker who is fluent and able to speaking in Bahasa Malaysia or Bahasa Indonesia to act as the translator for our respondents when they answer this questionnaire.

The translators were needed to help the researchers to distribute and explain this questionnaire to ensure all the question that asked from the respondents were being understandable by the respondents and could be answer properly. Other than that, it also can avoid questionnaire bias and can improve strengthen of result.

3.7 Ethical Consideration

This study had been approved by ethics committee members of University Putra Malaysia (UPM/TNCPI/RMC/JKEUPM/1.4.18.1/F1). This study had been conducted on a voluntary basis where all the respondents had been briefed on how the studies were being conducted (Refer Appendix I).

CHAPTER 4

RESULT

4.1 Socio-Demographic of the Respondents

A total of 120 estate workers who use pesticides during their work task in oil palm plantations at Kuala Lipis, Pahang recruited to take part in this study. Based on the Table 4.1, 69.2% of the estate workers had secondary school education, with 24.2% of the estate at primary school level. There is no reporting of workers who are illiterate in this study. Among the 120 respondents, 85.8% of them are Indonesian, with the rest is Malaysian. In this study, 36.7% of estate workers age from 30-year-old to 39-year-old and followed by 35.0 % of them age range from 21-year-old to 29-year-old.

Besides that, most of the workers (61.7 %) had married and 89.2% of them had been employed for at least a year working as pesticide applicator, whereby the estimated daily working hour was approximately within 6 hours or more. Data from Table 4.1 also showed that 43.3% of respondents prefer to take lorry and 35% of them prefer tractor as their transportation to work.

Table 4.1: Socio-demographic characteristics of the respondent (N=120)

| Socio-demographic characteristics | Frequency (%) | Mean (SD) |
|--|-------------------|--------------|
| Age: | | 32.88 (7.83) |
| ≤20 year old | 4 (3.3) | |
| 21 until 29 years old | 42 (35.0) | |
| 30 until 39 years old | 44 (36.7) | |
| ≥40 years old | 30 (25.0) | |
| Educational: | | |
| Primary school | 29 (24.2) | |
| Secondary school | 83 (69.2) | |
| College | 8 (6.7) | |
| Nationality: | | |
| Malaysian | 17 (14.2) | |
| Indonesian | 103 (85.8) | |
| Marital status: | | |
| Single | 40 (33.3) | |
| Married | 74 (61.7) | |
| Widower | 3 (2.5) | |
| Year of work: | | |
| <10 years | 107 (89.2) | |
| 11 to 20 years | 3 (2.5) | |
| ≥21 years | 10 (8.3) | |
| Daily working hour | | |
| <2 hours | 0 (0.0) | |
| ≥2 – 6 hours | 62 (51.7) | |
| ≥6 hours | 58 (48.3) | |
| Days in a month (pesticide used): | | |
| One days | 0 (0.00) | |
| 2 to 10 days | 3 (2.5) | |
| 11 to 20 days | 20 (16.7) | |
| >20 days | 95 (79.2) | |
| Transportation: | | |
| Walking | 8 (6.7) | |
| Motorcycle | 9 (7.5) | |
| Car | 8 (6.7) | |
| Lorry | 52 (43.3) | |
| Tractor | 42 (35.0) | |

4.2 The Survey of Pesticide Used and PPE-application

This section is to summarize the background of pesticide used by the study respondents in the palm oil plantation. Information such as the types of pesticide used, PPE application, self-reported symptoms and the ways of treatment if poisoned by respondents in this study.

Figure 4.1 reveals the general functions of pesticide reported to use by the respondents in the oil palm plantation. Among all, 75% of respondents claimed that weed control is the most common purpose of pesticide used, and 46.7% of them indicated that it was mainly used for pest control purposes. However, a small proportion of respondents reported that sometimes they would use pesticide for fungi (7.5%) and rodent (5.0%) control at the particular phase during oil palm plantation. Another 3.3% indicate that the pesticide used is control the plant pathogen and caterpillars.

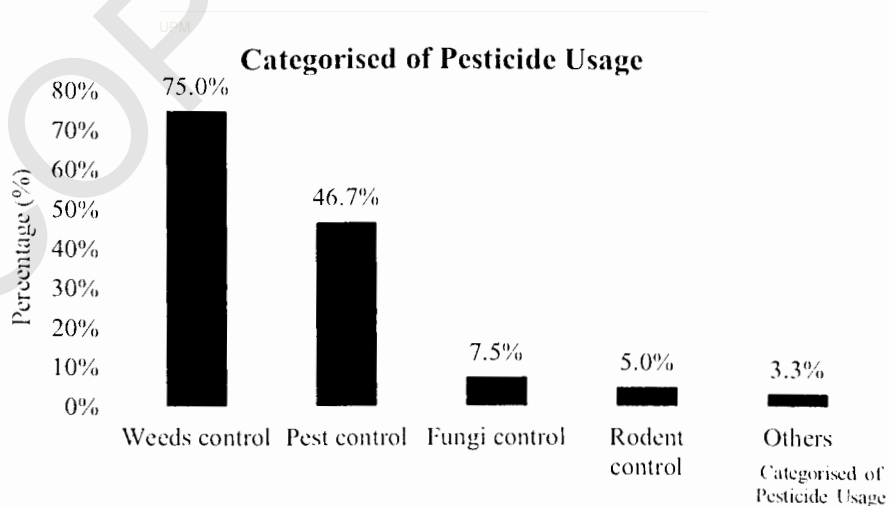


Figure 4.1: The Functions of pesticide reported to be used by the study respondents (N=120)

Figure 4.2 summarizes the types of pesticides reported to use among the respondents. Based on the survey of this study, the most commonly reported of pesticides were Glyphosate Isopropylamine (67.5%), Metsulfuron Methyl (65.8%), Supersate (64.2), Garlon (60.8%), Paraquate (40.8%), Glufosinate Ammonium (38.3%) and Cypermethrin (32.5%). However, there are a few of pesticide reported that had been used sometimes like round up (23.3%), Mancozeb (10.8%) and Strane (5.0%). Another 5.8% indicates that they used Sodium Chloride, Antracol, Phythoh, Monex and Dithane occasionally for pest control purposes in the oil palm plantation.

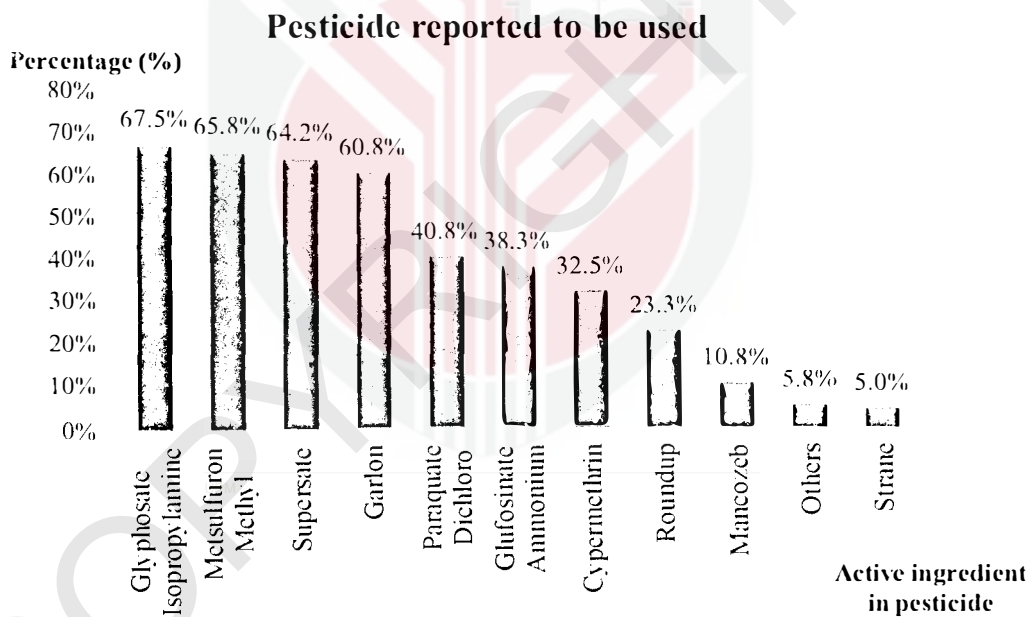


Figure 4.2: The commonly type of pesticide used among the population (N=120)

Figure 4.3 summarizes the types of personal protective equipment (PPE) reported to use by the respondents. Regardless of the suitability of the types of PPE used, most of the pesticide applicator reported that they use protective clothing when applying pesticides, such that 97.5% reported they wear gloves, shoes/boots and long sleeve shirt. Then, 95.8% were using a respirator followed by 92.5% wearing apron and 86.7% uses eye mask.

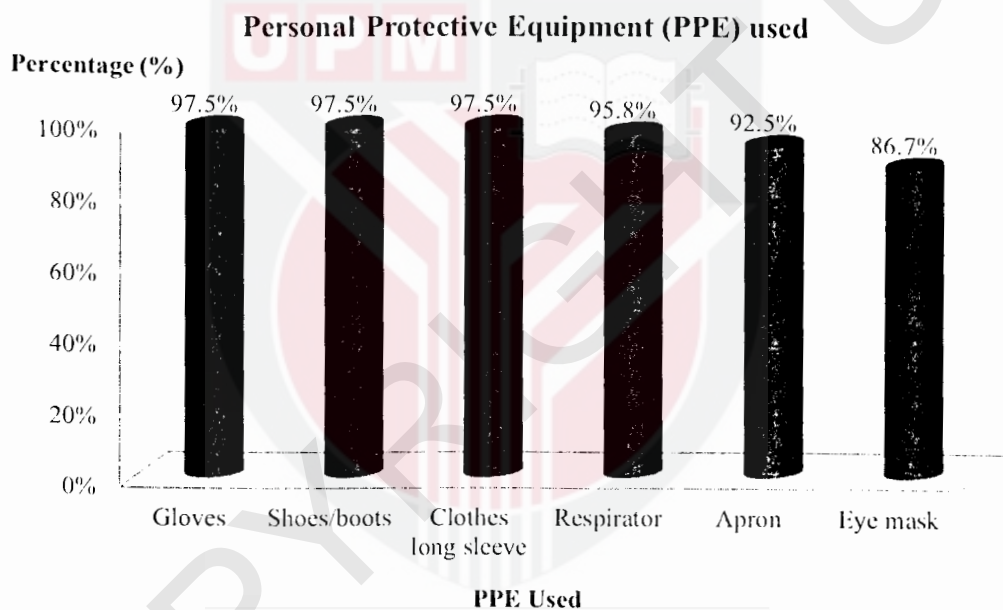


Figure 4.3: The type of PPE used among the study respondents (N=120)

Signs and Symptoms experienced by the respondents before, during and after the usage of pesticides are as displayed in **Figure 4.4**. The most common symptoms experienced were headache (66.7%), difficulty breathing (28.3%), dizziness (27.5%), and nausea and redness skin (23.3%). Other symptoms are likes, cough and skin rashes (20.8%), excessive salivation (19.2%) and blurred vision (15.8%). A small proportion of them (0.5%) also indicates others symptoms such as excessive sweating and hand tremor.

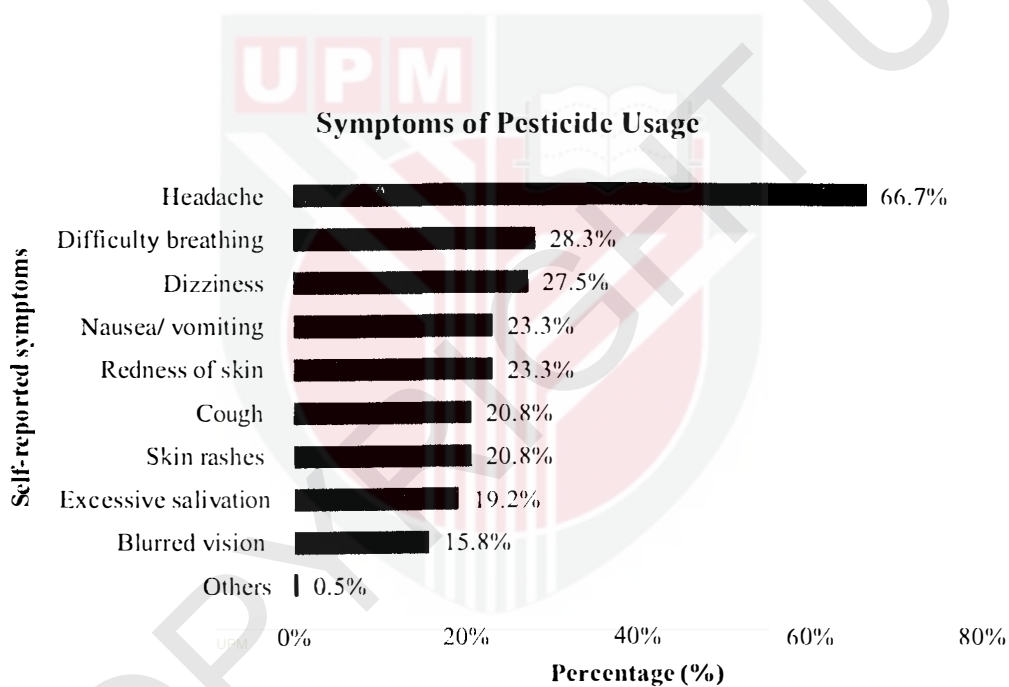


Figure 4.4: The symptoms reported by the study respondents (N=120)

When questions “How do you respond if you get poisoned” asked to the study respondent, the most common response was going to private clinics (67.5%), followed by hospitals (51.7%) and health centre (40.8%). Other answers for the treatment of symptoms, including by themselves (17.5%), medication (12.5%) or using herb (4.2%). Therefore, details for treatment are provided in the **Figure 4.5**.

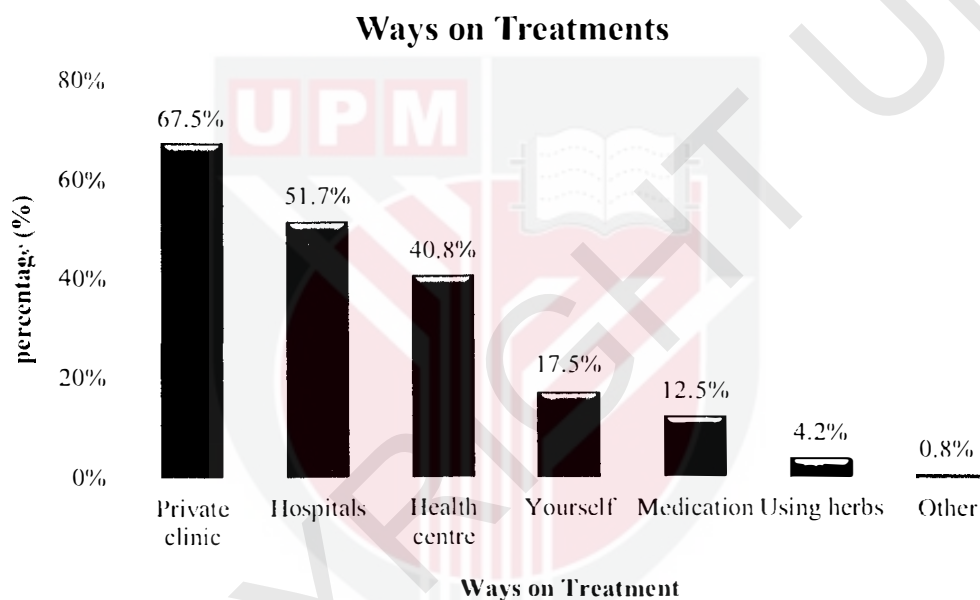


Figure 4.5: The ways of treatments if poisoned reported by study respondents (N=120)

4.3 The Knowledge Level of Pesticide Usage among the Estate Workers (N=120)

This section is to examine the knowledge level of estate workers who take part in this study. As shown in **Table 4.2**, a total of 10 items were examined with the decision of “*Yes*”, “*No*” or “*Don't Know*” to be determined by the estate workers.

In general, most of the estate workers have a good knowledge level of pesticide usage. For instance, 97.5% of them aware that training is necessary for proper pesticide handling and the uses of PPE are important to protect the body from direct expose to the mixture of pesticides. Besides, they are noted that pesticides can lead to adverse health effect and can cause death through inhalation (95.0%), ingestion (89.2%) and skin absorption (81.7%) in within 24 hours (74.2%). In addition, 88.3% of them also know that pesticide not only affect the human but also the animals.

Table 4.2: The Knowledge of Pesticide Usage among the Estate Workers (N=120)

| | Knowledge | Choice of answer | Frequency (%) |
|-----|---|-------------------------|----------------------|
| 1. | Training of pesticide handling is important for personal safety | Yes | 117 (97.5) |
| | | No | 2 (1.7) |
| | | Don't know | 1 (0.8) |
| 2. | Pesticide can lead to health problem | Yes | 117 (97.5) |
| | | No | 1 (0.8) |
| | | Don't know | 2 (1.7) |
| 3. | Pesticide can affects human health | Yes | 111 (92.5) |
| | | No | 2 (1.7) |
| | | Don't know | 7 (5.8) |
| 4. | Pesticide can affects animals | Yes | 106 (88.3) |
| | | No | 5 (4.2) |
| | | Don't know | 9 (7.5) |
| 5. | Pesticide can affects human health within 24 hours | Yes | 89 (74.2) |
| | | No | 14 (11.7) |
| | | Don't know | 17 (14.2) |
| 6. | Ingesting pesticides can cause death | Yes | 117 (97.5) |
| | | No | 0 (0.0) |
| | | Don't know | 3 (2.5) |
| 7. | Pesticide exposure is through inhalation | Yes | 114 (95.0) |
| | | No | 1 (0.8) |
| | | Don't know | 5 (4.2) |
| 8. | Pesticide exposure is through ingestion | Yes | 107 (89.2) |
| | | No | 10 (8.3) |
| | | Don't know | 3 (2.5) |
| 9. | Pesticide exposure is through skin absorption. | Yes | 98 (81.7) |
| | | No | 13 (10.8) |
| | | Don't know | 9 (7.5) |
| 10. | The use of PPE is important to protect the body from exposure to toxins | Yes | 117 (97.5) |
| | | No | 1 (0.8) |
| | | Don't know | 2 (1.7) |

A total score of knowledge represents the summation of knowledge acquired by each of the estate workers who take part in this study shows that **Table 4.3**. The result indicated that 85.8% of respondents had a high knowledge toward pesticide usage at the palm oil plantation, 10% of them have medium marks and 4.2% were reported to score below 60% which consider as having low knowledge of pesticide usage.

Table 4.3: The Total Score for Knowledge on Pesticide Usage among the Estate Workers (N=120)

| Level of knowledge | Frequency (n) | (%) |
|---------------------------|----------------------|------------|
| High | 103 | 85.8 |
| Medium | 12 | 10.0 |
| Low | 5 | 4.2 |
| TOTAL | | 100 |

4.4 The Attitude Level of Pesticide Usage among the Estate Workers (N=120)

This section is to examine the attitude level of estate workers on the proper handling and manage of pesticide in the oil palm plantation. As shown in **Table 4.4**, a total of 10 items were asked to decide either “*Agree*” or “*Not Agree*” to be selected by the estate workers.

In general, the findings of this result indicated that most of estate workers (96.7%) agreed that pesticide training is of necessary before starting of pesticide handling activity in the plantation field, at the same time, 95% of them also agree that proper PPE shall be applied when spraying pesticides. On the other hand, 91.7% of estate workers claimed that they took showers immediately after spraying activity on the day. Another 68.3% of them indicated that it is not right to use pesticide based on own experience. In addition, at least 37.5% of estate workers agree to standing against the wind direction while spraying and 60.8% of estate workers tend to drink water after being exposed to pesticide (60.8%).

Table 4.4: The Attitude of Pesticide Usage among the Estate Workers (N=120)

| | Attitude | Choice of answer | Frequency (%) |
|-----|---|---------------------------|--------------------------------|
| 1. | I need training of pesticide handling before start work | Agree Not agree | 116 (96.7) 4 (3.3) |
| 2. | I will standing against windy direction while spraying | Agree Not agree | 45 (37.5) 75 (62.5) |
| 3. | I will drink water after being exposed to pesticide | Agree Not agree | 73 (60.8) 47 (39.2) |
| 4. | I will wear full PPE when spraying pesticide | Agree Not agree | 114 (95.0) 6 (5.0) |
| 5. | I immediately take a bath after spraying | Agree Not agree | 110 (91.7) 10 (8.3) |
| 6. | I will take an exercise to remove pesticide toxicity through sweating | Agree Not agree | 39 (32.5) 81 (67.5) |
| 7. | I will mixing pesticide using stick rather than using hands | Agree Not agree | 97 (80.8) 23 (19.2) |
| 8. | I chose pesticide to be used based on own experience | Agree Not agree | 38 (31.7) 82 (68.3) |
| 9. | I do not need to wear a full of properly attired when spraying | Agree Not agree | 13 (10.8) 107 (89.2) |
| 10. | I will drink coconut water for treatment of pesticide poisoning | Agree Not agree | 80 (66.7) 40 (33.3) |

A total score of “Attitude” on the safe use of pesticides were evaluated by summing the scores of each item as tabulated in Table 4.4. In view of this, **Table 4.5** summarizes that 46.7% of estates workers have a neutral attitude towards safe use of pesticides, and 34.2% of them consider as not concerning to the right attitude to handle pesticide safely while working the plantation field.

Table 4.5: The Total Score for Attitude on Pesticide Usage among the Estate Workers (N=120)

| Level of attitude | Frequency (n) | (%) |
|--------------------------|----------------------|------------|
| Consent | 23 | 19.2 |
| Neutral | 56 | 46.7 |
| Not consent | 41 | 34.2 |
| TOTAL | | 100 |

4.5 The Practice Level of Pesticide Usage among the Estate Workers (N=120)

This section is to examine the self-declaration of the practice level of estate workers while handling and manage of pesticide in the oil palm plantation. As shown in **Table 4.6**, a total of 20 items were asked with the decision of “*Usually*”, “*Sometimes*” or “*Never*” to be determined by the estate workers.

As tabulated in **Table 4.6**, 89.2% of the estate workers claimed that they usually check the spraying equipment and material before spraying and only used recommended pesticide in the field. About 70.8% from them also will read label on the container and follow the instruction before start spraying. Besides, 88.3% of them indicated that, they wear gloves and mask while mixing pesticide and always try to avoid from human and animal before spraying activity. However, 80.0% of the estate workers reported that they tend to smell the container before use and mix the pesticide with their bare hand. Furthermore, 70.0% of them also claimed that never smoke while spraying.

Upon completion of pesticides spraying activity, 80.8% of the estate workers claimed that they do not burn pesticide container after spraying, and 85.8% of them claimed that they rarely disposed pesticide container after-used into the river. In fact, 76.7% of them mentioned that they prefer to store the pesticide container in storage room after spraying. Meanwhile, 52.5% of them reported that they rarely clean the spraying equipment with detergent before stored it in the workplace storage room or

at the backyard of their house. In addition to this, 57.5% of them either use water from the river, or 29.2% of them prefer to use river water after finishing spraying for spraying equipment cleaning purposes.

On the other hand, most of them (90%) apply the good practices of hand washing hygiene after spraying and before having a meal (90.0%). Not only that, 74.2% of these estate workers reported that they will change their working clothes, wash the clothes (75.8%) and always shower (79.2%) immediately after spraying from the workplace.

Table 4.6: The Practice of Pesticide Usage among the Estate Workers (N=120)

| Practice | Choice of answer | Frequency (%) |
|---|-------------------------|----------------------|
| 1. Check equipment and materials before spraying | Usually | 107 (89.2) |
| | Sometime | 10 (8.3) |
| | Never | 3 (2.5) |
| 2. Wear gloves and masks while mixing pesticides | Usually | 106 (88.3) |
| | Sometime | 13 (10.8) |
| | Never | 1 (0.8) |
| 3. Read label on the container and follow the instruction before spraying | Usually | 85 (70.8) |
| | Sometime | 31 (25.8) |
| | Never | 4 (3.3) |
| 4. Avoid human and animals before spraying | Usually | 106 (88.3) |
| | Sometime | 10 (8.3) |
| | Never | 4 (3.3) |
| 5. Choose the recommended pesticide before spraying | Usually | 107 (89.2) |
| | Sometime | 11 (9.2) |
| | Never | 2 (1.7) |
| 6. Smell the container before use | Usually | 96 (80.0) |
| | Sometime | 17 (14.2) |
| | Never | 7 (5.8) |

| Practice | Choice of answer | Frequency (%) |
|--|--|---|
| 7. Mix pesticide with bare hands | Usually Sometime Never | 96 (80.0) 15 (12.5) 9 (7.5) |
| 8. Wear safety boots while spraying | Usually Sometime Never | 103 (85.8) 7 (5.8) 10 (8.3) |
| 9. Smoke while spraying | Usually Sometime Never | 10 (8.3) 26 (21.7) 84 (70.0) |
| 10. Spray pesticide under windy condition | Usually Sometime Never | 7 (5.8) 36 (30.0) 77 (64.2) |
| 11. Stand towards windward direction while spraying without protective equipment | Usually Sometime Never | 7 (5.8) 36 (30.0) 77 (64.2) |
| 12. Clean pesticide containers with water from river after finish spraying | Usually Sometime Never | 16 (13.3) 35 (29.2) 69 (57.5) |
| 13. Dispose pesticide containers into the river after use | Usually Sometime Never | 7 (5.8) 10 (8.3) 103 (85.8) |
| 14. Clean the spraying equipment with detergent before storage | Usually Sometime Never | 63 (52.5) 29 (24.2) 63 (52.5) |
| 15. Change clothes immediately after spraying | Usually Sometime Never | 89 (74.2) 23 (19.2) 8 (6.7) |
| 16. Wash clothes immediately after spraying | Usually Sometime Never | 91 (75.8) 18 (15.0) 11 (9.2) |
| 17. Store the pesticide in storage room after spraying | Usually Sometime Never | 92 (76.7) 15 (12.5) 13 (10.8) |
| 18. Burn pesticide containers after spraying | Usually Sometime Never | 10 (8.3) 13 (10.8) 97 (80.8) |

| Practice | Choice of answer | Frequency (%) |
|---|------------------|---------------|
| 19. Wash hand after spraying and before having meal | Usually | 108 (90.0) |
| | Sometime | 10 (8.3) |
| | Never | 2 (1.7) |
| 20. Shower immediately after spraying | Usually | 95 (79.2) |
| | Sometime | 13 (10.8) |
| | Never | 12 (10.0) |

A total score of "Practice" on the safe use of pesticides were evaluating by summing the scores of each item as tabulated in **Table 4.7**. The findings of this result shows that 68.3% of respondents had a good level of practice score, which this score is higher than 81 % in practice item. Whereby, 25.0% of them fall under the fair practice level and 6.7% of them are categorized as those who had poor practice level with a score less than 60%.

Table 4.7: The Total Score for Practice on Pesticide Usage among the Estate Workers (N=120)

| Level of practice | Frequency (n) | (%) |
|-------------------|---------------|------------|
| Good | 82 | 68.3 |
| Fair | 30 | 25.0 |
| Poor | 8 | 6.7 |
| TOTAL | | 100 |

4.6 The association between knowledge, attitude and practice with Socio demographic characteristic among the respondents

A Chi-square analysis was used to evaluate the association between the Knowledge, Attitude and Practice on pesticide usage with the Socio Demographic Characteristics such as age, educational level, nationality, year of work, daily working hours and day's works in months. Based on the **Table 4.8**, the results showed that, there is significant association between the knowledge levels with age ($X^2= 17.335$; $p= 0.008$) and year of work ($X^2= 14.746$; $p= 0.005$) of pesticide handling. While there are no significant association between educational levels, nationality, daily working hour and days works in months with the knowledge level among the estate workers.

However, results also shows that, there are no significant associations between socio-demographics background with the attitude and practice of pesticide usage in palm oil plantation.

Table 4.8: Association between Knowledge, Attitude and Practice of Pesticide Usage with Socio Demographic Characteristics among the Respondents (N=120)

| Socio-demographic background | Variable, n (%) | | | | | |
|------------------------------|-----------------|---------------|----------|----------|----------|---------|
| | Knowledge | | Attitude | | Practice | |
| | χ^2 | P- value | χ^2 | P- value | χ^2 | P-value |
| Age | 17.335 | 0.008* | 5.382 | 0.496 | 3.208 | 0.782 |
| Educational level | 4.170 | 0.384 | 3.268 | 0.514 | 8.363 | 0.079 |
| Nationality | 0.900 | 0.638 | 0.332 | 0.847 | 1.215 | 0.545 |
| Years of work | 14.746 | 0.005* | 4.821 | 0.306 | 7.879 | 0.096 |
| Daily working hours | 1.411 | 0.494 | 2.095 | 0.351 | 0.416 | 0.812 |
| Days works in months | 4.142 | 0.657 | 3.211 | 0.782 | 6.024 | 0.421 |

N=120 Chi-square test *significant at $p < 0.01$

4.7 The Association between the Knowledge, Attitude and Practice (KAP) of Pesticide usage with the Health Effects among the Estate Workers

4.7.1 The association between the Knowledge of Pesticide Usage with the Health Effects among the Estate Workers (N=120)

A Chi-square analysis was used to evaluate the association between the knowledge on pesticide usage with the health effects among the estate workers. Based on the **Table 4.9**, the results showed that, there is no significant association between knowledge levels with the symptoms of pesticide exposure reported by the estate workers.

Table 4.9: Association between Knowledge of Pesticide Usage and Health Effects of Respondents (N=120)

| Symptoms | | Knowledge level Frequency (%) | | | X ² | P value |
|----------------------|-----|----------------------------------|----------|-----------|----------------|---------|
| | | High | Medium | Low | | |
| Headache | Yes | 69 (57.5) | 9 (7.5) | 2 (1.7) | 1.980 | 0.372 |
| | No | 34 (28.3) | 3 (2.5) | 3 (2.5) | | |
| Dizziness | Yes | 27 (22.5) | 5 (4.2) | 1 (0.8) | 1.434 | 0.488 |
| | No | 76 (63.3) | 7 (5.8) | 4 (3.3) | | |
| Excessive vision | Yes | 18 (15.0) | 2 (1.7) | 3 (2.5) | 5.619 | 0.060 |
| | No | 85 (70.8) | 10 (8.3) | 2 (1.7) | | |
| Cough | Yes | 21 (17.5) | 2 (1.7) | 2 (1.7) | 1.252 | 0.535 |
| | No | 82 (68.3) | 10 (8.3) | 3 (2.5) | | |
| Nausea/ vomiting | Yes | 23 (19.2) | 4 (3.3) | 1 (0.8) | 0.760 | 0.684 |
| | No | 80 (66.7) | 8 (6.7) | 4 (3.3) | | |
| Redness of skin | Yes | 22 (18.3) | 4 (3.3) | 2 (1.7) | 1.672 | 0.434 |
| | No | 81 (67.5) | 8 (6.7) | 28 (23.3) | | |
| Difficulty breathing | Yes | 27 (22.5) | 6 (5.0) | 1 (0.8) | 3.173 | 0.205 |
| | No | 76 (63.3) | 6 (5.0) | 4 (3.3) | | |
| Skin rashes | Yes | 19 (15.8) | 4 (3.3) | 2 (1.7) | 2.606 | 0.272 |
| | No | 84 (70.0) | 8 (6.7) | 3 (2.5) | | |
| Blurred vision | Yes | 16 (13.3) | 2 (1.7) | 1 (0.8) | 0.078 | 0.962 |
| | No | 87 (72.5) | 10 (8.3) | 4 (3.3) | | |
| Others | Yes | 4 (3.3) | 1 (0.8) | 0 (0.0) | 0.760 | 0.684 |
| | No | 99 (82.5) | 11 (9.2) | 5 (4.2) | | |

N=120 Chi-square test *significant at p<0.01

4.7.2 The association between the Attitude of Pesticide Usage with the Health Effects among the Estate Workers (N=120)

The Chi-square analysis is used to determine the association between the attitudes of estate workers on the safe use of pesticides and their reported health effects. According to the **Table 4.10**, the results showed one's attitude to pesticides has shown no significant association with the reported symptoms, except on the symptoms of nausea/vomiting. As most of the estate workers reported to have neutral to low attitude on safe used of pesticide, this has significant association ($p=0.020$) with the reporting nausea/vomiting among the estate workers.

Table 4.10: Association between Attitude of Pesticide Usage and Health Effects of Respondents (N=120)

| Symptoms | | Attitude level | | | χ^2 | P value |
|----------------------|-----|----------------|-----------|-------------|----------|---------------|
| | | Frequency (%) | | | | |
| | | Concern | Neutral | Not concern | | |
| Headache | Yes | 17 (14.2) | 41 (34.2) | 22 (18.3) | 4.746 | 0.093 |
| | No | 6 (5.0) | 15 (12.5) | 19 (15.8) | | |
| Dizziness | Yes | 6 (5.0) | 17 (14.2) | 10 (8.3) | 0.451 | 0.798 |
| | No | 17 (14.2) | 39 (32.5) | 31 (25.8) | | |
| Excessive vision | Yes | 3 (2.5) | 8 (6.7) | 12 (10.0) | 4.118 | 0.128 |
| | No | 20 (16.7) | 48 (40.0) | 29 (24.2) | | |
| Cough | Yes | 4 (3.3) | 10 (8.3) | 11 (9.2) | 1.360 | 0.507 |
| | No | 19 (15.8) | 46 (38.3) | 30 (25.0) | | |
| Nausea/vomiting | Yes | 10 (8.3) | 8 (6.7) | 10 (8.3) | 7.806 | 0.020* |
| | No | 13 (10.8) | 48 (40.0) | 31 (25.8) | | |
| Redness of skin | Yes | 4 (3.3) | 13 (10.8) | 11 (9.2) | 0.735 | 0.693 |
| | No | 19 (15.8) | 43 (35.8) | 30 (25.0) | | |
| Difficulty breathing | Yes | 6 (5.0) | 14 (11.7) | 14 (11.7) | 1.046 | 0.593 |
| | No | 17 (14.2) | 42 (35.0) | 27 (22.5) | | |
| Skin rashes | Yes | 3 (2.5) | 14 (11.7) | 8 (6.7) | 1.479 | 0.477 |
| | No | 20 (16.7) | 42 (35.0) | 33 (27.5) | | |
| Blurred vision | Yes | 4 (3.3) | 6 (5.0) | 9 (7.5) | 2.295 | 0.317 |
| | No | 19 (15.8) | 50 (41.7) | 32 (26.7) | | |
| Others | Yes | 0 (0.00) | 2 (1.7) | 3 (2.5) | 2.069 | 0.355 |
| | No | 23 (19.2) | 54 (45.0) | 38 (31.7) | | |

N=120 Chi-square test *significant at $p < 0.01$

4.7.3 The Association between the Practices of Pesticide Usage with the Health Effects among the Estate Workers (N=120)

The Chi-square analysis was used to determine the association between the practices of pesticides used and the reported symptoms among estate workers. As shown in **Table 4.11**, most the estate workers indicated that their practice towards pesticide usage has significant association with the self-reporting symptoms from the pesticides used in their daily work routine. The findings showed that there is significant association ($p < 0.001$) of the practices of pesticide used and the symptoms of dizziness, excessive vision, cough, nausea/ vomiting, redness of skin, difficulty breathing, skin rashes, and blurred vision. Another significant symptom indicates for the excessive sweating and hand tremor.

Table 4.11: Association between Practice of Pesticide Usage and Health Effects of Respondents (N=120)

| Symptoms | | Practice level | | | X ² | P value |
|----------------------|-----|----------------|-----------|---------|----------------|----------|
| | | Frequency (%) | | | | |
| | | Good | Fair | Poor | | |
| Headache | Yes | 55 (45.8) | 18 (15.0) | 7 (5.8) | 2.169 | 0.338 |
| | No | 27 (22.5) | 12 (10.0) | 1 (0.8) | | |
| Dizziness | Yes | 14 (11.7) | 15 (12.5) | 4 (3.3) | 14.120 | <0.001** |
| | No | 68 (56.7) | 15 (12.5) | 4 (3.3) | | |
| Excessive vision | Yes | 7 (5.8) | 11 (9.2) | 5 (4.2) | 21.607 | <0.001** |
| | No | 75 (62.5) | 19 (15.8) | 3 (2.5) | | |
| Cough | Yes | 10 (8.3) | 10 (8.3) | 5 (4.2) | 14.973 | <0.001** |
| | No | 72 (60.0) | 20 (16.7) | 3 (2.5) | | |
| Nausea/vomiting | Yes | 12 (10.0) | 10 (8.3) | 6 (5.0) | 17.084 | <0.001** |
| | No | 70 (58.3) | 20 (16.7) | 2 (1.7) | | |
| Redness of skin | Yes | 9 (7.5) | 13 (10.8) | 6 (5.0) | 25.646 | <0.001** |
| | No | 73 (60.8) | 17 (14.2) | 2 (1.7) | | |
| Difficulty breathing | Yes | 13 (10.8) | 14 (11.7) | 7 (5.8) | 25.047 | <0.001** |
| | No | 69 (57.5) | 16 (13.3) | 1 (0.8) | | |
| Skin rashes | Yes | 9 (7.5) | 11 (9.2) | 5 (4.2) | 17.812 | <0.001** |
| | No | 73 (60.8) | 19 (15.8) | 3 (2.5) | | |
| Blurred vision | Yes | 9 (7.5) | 9 (7.5) | 4 (3.3) | 8.851 | 0.012* |
| | No | 73 (60.8) | 24 (20.0) | 4 (3.3) | | |
| Others | Yes | 2 (1.7) | 1 (0.8) | 2 (1.7) | 9.361 | 0.009* |
| | No | 80 (66.7) | 29 (24.2) | 6 (5.0) | | |

N=120 Chi-square test *significant at p<0.01

4.8 The Association of Knowledge, Attitudes and Practice of Pesticide Usage among the Estate Workers (N=120)

4.8.1 The Association of Knowledge on the Practice of Pesticide Usage among the Estate Workers (N=120)

The Chi-square analysis was used to determine the association between the knowledge of estate workers on the practice of pesticide usage. According to the **Table 4.12**, the results indicate that, their practice towards pesticide usage has significant association ($p=0.026$) with their knowledge level in daily work routine.

Table 4.12: Association of Knowledge on the Practice of Pesticide Usage among the Estate Workers (N=120)

| Knowledge level | Practice level, n (%) | | | X^2 | P value |
|-----------------|-----------------------|-----------|---------|--------|---------|
| | Good | Fair | Poor | | |
| High | 75 (62.5) | 21 (17.5) | 7 (5.8) | 11.065 | 0.026* |
| Medium | 6 (5.0) | 6 (5.0) | 0 (0.0) | | |
| Low | 1 (0.8) | 3 (2.5) | 1 (0.8) | | |
| Total | 82 (68.3) | 30 (25.0) | 8 (6.7) | | |

N=120 Chi-square test *significant at $p<0.01$

4.8.2 The Association of Attitude on the Practice of Pesticide Usage among the Estate Workers (N=120)

A Chi-square analysis was used to evaluate the association between the attitudes on the practice of pesticide usage. Based on the **Table 4.13**, the results showed that, there is no significant association between the practice levels with the attitudes level of pesticide usage reported by the estate workers.

Table 4.13: Association of Attitude on the Practice of Pesticide Usage among the Estate Workers (N=120)

| Attitude level | Practice level, n (%) | | | X ² | P value |
|----------------|-----------------------|-----------|---------|----------------|---------|
| | Good | Fair | Poor | | |
| Concern | 15 (12.5) | 7 (5.8) | 1 (0.8) | 6.812 | 0.146 |
| Neutral | 44 (36.7) | 10 (8.3) | 2 (1.7) | | |
| Not concern | 23 (19.2) | 13 (10.8) | 5 (4.2) | | |
| Total | 82 (68.3) | 30 (25.0) | 8 (6.7) | | |

N=120 Chi-square test *significant at p<0.01

4.8.3 The Association of Knowledge and Attitude of Pesticide Usage among the Estate Workers (N=120)

The Chi-square analysis was used to determine the association between the attitudes level of estate workers with their knowledge of pesticide usage. According to the **Table 4.14**, the findings showed that, there is significant association ($p=0.034$) of the attitude of pesticides used and the knowledge among the estate workers.

Table 4.14: Association of Knowledge and the Attitude of Pesticide Usage among the Estate Workers (N=120)

| Attitude level | Knowledge level, n (%) | | | X ² | P value |
|----------------|------------------------|-----------|---------|----------------|---------------|
| | High | Medium | Low | | |
| Concern | 18 (15.0) | 7 (5.8) | 1 (0.8) | 10.406 | 0.034* |
| Neutral | 54 (45.0) | 2 (1.7) | 0 (0.0) | | |
| Not concern | 31 (25.8) | 7 (5.8) | 3 (2.5) | | |
| Total | 103 (85.8) | 12 (10.0) | 5 (4.2) | | |

N=120 Chi-square test *significant at $p<0.01$

CHAPTER 5

DISCUSSION

5.1 Socio Demographic

To date, there is a defining characteristic of the labour regime in the palm oil industry due to the mass migration by Indonesian workers to Malaysia (Kaur, 2014) . In fact, nearly 400,000 registered Indonesian workers are employed in the plantation sector (Kumar et al., 2014). In this study, a total of 120 male respondents from oil palm plantations in Kuala Lipis of Pahang were recruited with an average age from 20 to 50 years of age, at least 85.8% of the respondents were Indonesian workers and the rest is made up of local workers.

Most of the palm oil workers have acquired the formal education level, from elementary to high school; only a small proportion of them accomplished the tertiary education. This is presumed that, workers are able to write, read and understand the written safety and health precautionary procedures should there be printed in their languages (i.e. Bahasa Indonesia/Bahasa Malaysia).

Besides, the finding of marital status reveals that, most of the respondents had married and a few of them were still single. On the other hand, most of the workers also, had been employed for at least a year working as a pesticide applicator in oil palm plantation. Whereby, the estimated daily working hour was around 6 to 8 hours and most of them claimed that they work more than 20 days in a month.

In terms of transportation, most of the workers were used lorry and tractors going to the workplace. The plantation offices have provided the transportation for them since the distance from the office to the field is quite far and it will probably take a long time to arrive if they go by walking. However, there were still, have a few of workers use their own transportation like motorcycle into the oil palm plantation and it's usually being of local workers.

5.2 The survey of pesticide usage and PPE use

Finding of this study showed that most of the pesticide used in oil palm plantation is for weed and insect control purpose. This finding was consistent with the report showed by (Watts et al., 2010; Glossary, 2016) which indicated that the main purposes of pesticide used in palm oil plantation is to eradicate the weed growth that will disrupt the plant yield and against grasses, beetles and worm. Based on the interview with the estate workers, they commonly used herbicides that contain active ingredient such as *glyphosate isopropylamine*, *metsufuron methyl*, *supersate*,

paraquate and *glufosinate ammonium*. Then, it was followed by the uses of insecticide that contain active ingredient like *cypermethrin* to control insect pests.

The findings of this study indicated that, most of the estate workers used protective clothing when applying pesticides. This was consistent with the interview with the employer who claimed that the company is responsible to take care of the health, safety and welfare of their employees. Among all the safety and health practices, employer provide the personal protective equipment (PPE) for the use of their workers while handling pesticides, such as gloves, shoes/boots, apron, respirator or eyes mask. After that, it depends on the workers itself to keep the items given and maintain in a good condition to use.

When palm oil estate workers were examined on the self-reported symptoms after using a mixture of pesticide at work, headache is among the most common complaints of symptoms, followed by difficulty breathing, vomiting, dizziness, difficult breathing, and redness of skin, cough or other related symptoms. This is consistent with the past study which showed that most of the self-report symptoms are among the younger workers who are also aware of the pesticide hazardous to health as compared to the veteran's workers (Lekei et al., 2014; Recena et al., 2006).

Next, estate workers were asked what they would do if they their peers was poisoned by pesticides. The most common responses, they will go to a private clinic (67.5%) by call their supervisor or office clerk. This is because, most of the estate

workers come from neighbouring countries and they have been working under the responsibility of the company. So, in the event of any problems, they need to contact their supervisor in advance. Another answer was followed by going to the hospitals, health care centre or treat by itself.

5.3 The Knowledge, Attitudes and Practice of Pesticide Usage among the Estate Workers

5.3.1 Knowledge

The finding of this study shows that most the palm oil estate workers have a relatively high level of knowledge. This could be due to the fact that most of the estates workers participate in this study are educated and received formal education.

The participant's knowledge of the effects of pesticides on human health was consistent with other studies (Zyoud et al., 2010; Norkaew et al., 2010), such that, most of the participants recognized the potential route of exposure, e.g. inhalation, ingestion and skin absorption while handling pesticide and pesticide can cause harm to both humans and animals as discussed in previous studies.

In addition, palm oil estate workers who with good practice knowledge are keen to use pesticides based on the recommended guidelines for personal protective

measures in their organization. In fact, most of them claimed that, wearing PPE is the only resort they can use to protect themselves against the hazards of the pesticides used during their routine of work. Nevertheless, some other study showed a contradicts results such that, higher levels of knowledge of pesticide use among those with high educational level workers, but had poor awareness of the safe use of protective equipment (Mohd Tamrin, 2014; Salameh et al, 2004) .

5.3.2 Attitude

This section is to examine the attitude of the pesticide used among the palm oil estate workers. With the knowledge acquired through training, information and instruction provided on site, most of the estate workers agreed that training is necessary for them to better understand the safety and health signal, the potential health effects, as well as the first aid and emergency procedures. In addition, with the acquired knowledge had in each estate worker, most of them reported of wearing protective clothing while handling pesticides and they will drink water after being exposed to pesticides with the belief that it will help to dilute the pesticide spills or contaminated in the body. Nevertheless, none of them are aware that their drinking water sources were often from pesticide-treated areas.

Spraying agricultural chemicals, whether from the ground or the air, needs to be properly planned and carefully executed, to minimise the risk of off-target chemical movement. Spray drift is the most common cause of off-target chemical

movement. It can injure or damage plants, animals, the environment or property, and even affect human health. Nevertheless, 37.5% of the estate workers claimed that they will stand against windy direction while spraying. However, 62.5% of farm workers are more concerned with the direction of the wind, who worked to ensure that the pesticides they apply stay within the target area. This shows that the majority of them were able to use critical thinking and digested simple logic in applying the technique of applying pesticide.

According to the Mohd Tamrin, (2014) state that, the attitude of pesticide spraying sometimes is based on their learning and experience passed from their community (neighbours, family and local beliefs) with no technical basic. This is consistent with the result of this study which shows that 66.7% of the estate workers believed that drinking coconut water after exposing to pesticide can help to reduce toxicity level in the body and act as an alternative treatment for pesticide poisoning. But, in present, there is still no proven scientific research or from previous study showed the effectiveness to cure these poisonings.

In this study, the estate workers claimed that, showering would remove the pesticides from contaminated body surface. The habit of taking a shower was apparently uncommon, though an overwhelming majority of the sprayers changed their clothes before and after pesticide exposures (Mekonnen & Agonafir, 2002). Besides, 31.7% workers would choose pesticide based on their own experience. However, 68.3% most of them will use the recommended concentration of pesticides from their supervisor guidance. Also the use of recommended concentration of

pesticides was positively associated to reduce the self-reported toxicity among the estate workers

5.3.3 Practice

Practice theorists refer to practical knowledge as practical consciousness (Mengistie et al., 2015), as knowing 'how to go on' in everyday life. It is obvious that the pesticide knowledge and understanding of estate workers on pesticide use is co-determining practices. Studies have shown that it is beneficial to look at the knowledge, practice and attitude towards pesticide use. (Yassin et al., 2002) in a study in the Gaza Strip have pointed to the fact that even though the farmers had high levels of knowledge on the health impact of pesticides they did not practice according to the knowledge they had.

In this study, estate workers relate to pesticide handling practice in the plantation. Workers were interviewed on their application practices during including storage, application rate, quantity, method, product mixing, disposal and use of personal protective equipment. This study found that most of the estate workers tended to smell the container before use it and mix the pesticide with bare hand. Even they know, pesticide can effects human health instead of via inhalation or skin contact, workers were not practice their knowledge very well in the field. This is because pesticide can enter the body through inhalation or smell the container and

through direct skin contact with hand. In facts, 97% of all body exposure that happens during pesticide spraying is through skin contact.

However, workers usually use the recommended pesticide based on the order from their supervisor. Through this way, it can limit the uses of pesticide also can avoid from overusing the dose of pesticides and only uses for the recommended specific pest.

On the others hand, 52.5% half of them never clean the spraying equipment with detergent before storage it. Proper rinsing and handling of empty pesticide containers is very important because it can be very dangerous to people, animals and environment. If they do not wash the equipment with detergent clearly, some of the pesticide residue will still remain attached to the equipment and it will give harmful effects to human health.

Sometimes workers would clean the pesticide container with water from the river after finish spraying. Whereby, this practice uses of river water can cause the pesticide contaminated in environment especially to the water which it can affect the aquatic life like fish. Based on the interviewed, the river water from this plantation was connected and flow to the main river water that surrounded in Kuala Lipis. Where a few of river water around the Kuala Lipis is a recreation area place for people and there is also have a number of settlements of population that live near the river.

In term of storage, majority estate workers claimed that, they store the pesticide in a storage room located at the plantation office. They store the pesticides in a place that can be locked and keep away from food and drink water.

Furthermore, most of them also reported that, never burn the pesticide container after use it. This is because burning is against the law and unsafe practice; also it can release the toxic fumes and cause illness. They sometimes were reuse the container and try to recycle it or used to let other function uses such containers are used for planting flowers. But reuse of pesticide containers is risky and not recommended. However, containers are suitable for reuse depends on the material are made and what they contained.

5.4 The association between Knowledge, Attitude and Practice of Pesticide Usage with Socio Demographic Characteristics among the Estate Workers

Finding of this study showed that, there is significant association between the knowledge of pesticide handling with the age and years of work among the estate workers. Research from Wilsonporter (2015) has been released that suggests there's a difference between the knowledge younger and older generations can supply in their place of work. Besides, according from the study that had been produced by American Psychological Association (APA) suggests, older staffs are more likely to possess more understanding or mature compared to younger counterparts and also by the previous study state that, knowledge were increased with age of workers (Lisa & Soederberg, 2009). Thus, due to the increasing of age, the estate worker's knowledge on pesticide handling also was become better at the field.

Then, the significant also shows that, knowledge of workers on pesticide handling increases along with the years of works in oil palm plantation. The more highly qualified people are, the more likely they are to participate in learning activities. This is because workers would increasingly learn from time to time or from year to year on the instruction and guidance provided by the employer from the plantation itself. Workers will increase the knowledge and work experience long as it has gained experience working in a long period of time and knowledge work requires continuous learning on the part of the knowledge worker (Drucker, 2006).

However, from this study, there are no significant association between the attitude and practice with the socio demographic characteristic among the estate workers.

5.5 The Association between Knowledge, Attitude and Practice of Pesticide Usage with the Health Effects among the Estate Workers

This study suggests that there is association between the knowledge, attitude and practice of pesticide usage with the health effects among the estate workers. A finding of this study shows that, there is no association between the knowledge of pesticide usage with health effects of the respondents. This might due to the fact that knowledge on pesticide hazardous to health is commonly known among the estates workers. In other words, the knowledge of one's on the safe use of chemical may not consistently related to one's health effects/complaints from the pesticide used.

In term of association between the attitudes of pesticide usage with the health effects among the respondents, it also showed no significant association with report symptoms, except on the symptoms of nausea or vomiting. Past study showed that nausea and vomiting are among the most general symptoms reported by the pesticide handler (Watts et al., 2010) and according to the interview, workers complained that these symptoms are considered common after pesticide usage. In view of this, past study supported that the associated attitude of pesticide usage and the symptoms of nausea or vomiting are part of the explicit attitudes where the workers first feel the uncomfortable self-report symptoms.

Anyhow, attitudes are changeable, people can be learned from a person's past and present and they can influence another person's behaviour and well-being

(Boundless, 2016). Some attitudes are explicit (deliberately formed) while others are implicit (unconscious or outside of awareness). Therefore, implicit and explicit attitudes can both affect estate worker's in self-reporting symptoms to their superior for immediate medical assistance and treatment.

Then, for the finding of the association between the practices of pesticide used with the health effects were showed, there is significant association between both. Most of the workers reported that, they had experienced health effects caused by the pesticide used on plantation. The symptoms that frequently reported when use the pesticide were like dizziness, excessive vision, cough, nausea/vomiting, redness of skin, difficulty breathing, skin rashes, blurred vision, excessive sweating and hand tremor which this symptoms was consistent with the previous study (Recena et al., 2006; Watts et al., 2010). Each of these symptoms has the significant association with the pesticide handling at the workplace.

5.6 The Association of Knowledge, Attitudes and Practice of Pesticide Usage among the Estate Workers

5.6.1 Association between Knowledge and Practice

Knowledge is an important part that promotes behaviour changes and workers must have adequate and correct information on pesticide handling in order to implement the preventive behaviour. Finding of this study showed that, there is a significant association between the knowledge of pesticide usage with the practice level among the estate workers. It may be due to the high level of knowledge among the estate workers who have good practice in term of pesticide handling. Based on the studies by Salameh et al., (2004) mentioned that, basic objective of education, are to ensure that workers understand the health hazards of relevant pesticides, become familiar with and adopt proper work practice, use protective equipment properly, practice personal hygiene measures, recognize early symptoms of overexposure or poisoning and obtain first aid at earliest time possible.

5.6.2 Association between Attitude and Practice

Next, from the finding of the association between the attitudes level and practice level of pesticide usage found that, there is no significant association between these variable. This is because respondents have reported neutral attitudes

towards the pesticide handling meanwhile their practices are stated in a good condition. It's also may be due to the some of the attitude workers that many of them tend to spray the pesticide against the windy direction which it can be considered as the major problem. If it is against the spraying direction, it can distract the proper spraying manoeuvre and take the chemical off target (Mekonnen & Agonafir, 2002). However, this attitude may further encourage estate workers to be careless towards the proper pesticide handling in the workplace, plus it will put their practice at risk condition.

5.6.3 Association between Knowledge and Attitude

The findings showed that, there is a significant association between the attitudes of pesticide usage with the knowledge among the estate workers. This shows that the knowledge of one's may influence the attitude of handling pesticide safely. For instance, estate workers always felt positive towards the way they handle pesticides, even though new safety and health instruction were to introduce, or choosing the traditional work clothing (work shirt-and-jeans-types outfit) over the selected personal protective equipment. They are always different of the "properly attired" they wear to work as compared to the standard PPE which shall equip for pesticide handlers. In other words, the knowledge and attitude of the workers towards safety and health must be improved, and there must be a scope for the provision of better facilities and infrastructures (Mekonnen & Agonafir, 2002).

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Generally, this study indicates that palm oil estate workers have a considerable high level of knowledge of pesticide used, neutral level of attitude in response to the risk of pesticide handling and relatively good level of practices to prevent and mitigate the risks of the mixture of pesticide used at the palm oil plantation.

The research showed that, there is no significant association between the knowledge and attitude of pesticide usage with the health effects among the estate workers. This study suggests that knowledge is best to use as the indicator to measure the basic information acquired by one, and attitude is usually a settled way of thinking or feeling about ways of handling pesticide and protect them away from hazardous risk, which may be later reflected in a person's behaviour. Practices are the actual application or use of an idea, belief, or method as opposed to theories about such application or use.

In other words, knowledge and attitude cannot measure the health effects; however, practices can use to measure the health effects from direct exposure and affecting workers through their experience, the idea and method of application for handling pesticides.

The findings of this study show that there is a significant association between the practices of pesticide usage with the health effects on human health. Whereby, pesticides with direct exposure on estate workers' activities were easier to give acute health effects among them. Thus, there is needed a proper practice to handling the pesticide among the pesticide sprayer and at the same time it can reduce the health effects among them.

In addition, study also showed the significant association between 'knowledge and practice' and between 'knowledge and attitude'. On the other hand, there is no significant association between the attitude and practice on pesticide usage among the estate workers. Thus, there is a need to improve their proper knowledge, attitude and practice whereby the information sources are widely available on pesticide handling and estate workers should be more aware of it and take the precaution measures during the pesticide spraying in the field.

The most importance key message here is how to practically manage the pesticide safely through hands-on practice with good example by sharing, showing or demonstrating. The theoretical knowledge sharing in the classroom basis may not be

effectively delivered the information to the labour workers in this context. In other words, for the sustainable learning purposes, the workers shall be exposed to a learning platform where their knowledge can be acquired through practice, hands-on problem-based learning, this will not only enhance their practical knowledge but also avoid any misconception of pesticide hazardous to health among the estate workers.

A limitation of this study is based mainly on self-reported data, relying on the honesty of respondents which is subjected to bias. As a self-report, it is possible that there may be some inaccurate data such as respondents wanting to report socially desirable behaviours. For example, self-report of PPE use and safe disposal of empty pesticide containers, and the adoption of other safety practices may be influenced by the respondents' desire to indicate that they comply with protective measures against occupational pesticide exposure. However in some estate workers, observations were conducted to verify workers reports, and these observations were supported by the responses of the interviewed the workers.

Another limitation relates to the inability to directly link health symptoms experienced by respondents to pesticide exposure. The health symptoms experienced by respondents, such as headaches and fatigue, were not specific, and in some of the cases these symptoms might have been due to causes other than exposure to pesticides, such as long exposure to the sun, especially if no head protection is worn. Nevertheless, that the symptoms reported by respondents occurred immediately after applying or handling pesticides and the frequency of occurrence is a great cause of concern.

However, our intention is not to generalize, but to explore and highlight important occupational health and pesticide safety issues for individual workers.

6.2 Recommendation

This study highlights one of the most common problems to maintain the sustainable development of agricultural activity with the intensive used of pesticides at the agricultural field. In fact, findings of this study well depict the gap between the knowledge and attitude or practice, as such; there is room for improvement in knowledge and attitude or practices related to pesticide-health effects among the palm oil plantation workers.

As a recommendation, plantation workers need to be educated on the precautionary measures to be followed while handling the pesticide. The employers have a very important role in ensuring the safety, health and welfare among the estate workers in pesticides used on the plantation. Employers need to monitor the level of awareness of workers in each process of the uses of pesticide to avoided from any undesirable situation and can reduce the level of accidents related to pesticides in the fields.

The continuous Educational programme should be organized to raise the awareness of the estate workers and bring attitudinal change towards their conventional practices. In addition, it can be organized by holding standard training

protocol for plantation workers that include understanding of health hazards, adoption of proper work practices, use of PPE, practice good personal hygiene, recognition of early symptoms, quick first aid, safe transport and storage of pesticide, safety labels and safety data sheets and lastly by proper disposal of empty containers. This includes, ensuring their proper training and refreshment practical on pesticide application and encourage them to be attentive to the timing of re-entry into recently sprayed areas. With education and awareness, estate workers will be empowered to resist injustice and violation of rights in palm oil plantations.

In view of this, this study suggests that, replacing the traditional field training of pesticide usage to the sustainable field learning of pesticide usage is of crucial needs. The latter training approach should emphasize on implementing practicable practices, at the same time, inculcate right attitude and instil knowledge through comprehensive field intervention learning.

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Appendix

**ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS
(JKEUPM)
UNIVERSITI PUTRA MALAYSIA**

| | |
|-----------------------|--|
| Research title | : "Knowledge, Attitude And Practice Of Pesticide Usage And The Health Effects Among The Estate Workers In Oil Palm Plantations At Kuala Lipis, Pahang" |
| Study Site | : Kuala Lipis, Pahang |
| JKEUPM Ref No. | : FPSK(EXP16-OSH)U022 |
| Researcher | : Siti Mariam Binti Mazlan |
| Supervisor | : Dr. Vivien How |

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 18/10/2016
2. Respondent Information Sheet & Consent (English) Version 2 dated 25/11/2016
3. Respondent Information Sheet & Consent (Malay) Version 2 dated 25/11/2016
4. Proposal (English), Version 2 dated 21/11/2016
5. Questionnaire (English), Version 1 dated 18/10/2016
6. Questionnaire (Malay), Version 1 dated 18/10/2016
7. Curriculum Vitae of:
 - a. Dr. Vivien How

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

- Approved
- Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**
- Disapproved

Please note that the approval is valid until 7 December 2017

Researchers should comply with the following:

- I. Complete a Study Final Report upon study completion (Form D).
- II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

**APPENDIX II:
APPROVAL LETTER FROM OIL
PALM PLANTATION**

Ref. : [1/2017] 40400800/Lawatan
Date : 22 February, 2017

Dr. Vivien How
Supervisor
Jabatan Kesihatan Persekitaran & Pekerjaan
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia
43400 UPM Serdang
Selangor Darul Ehsan

Dr.,

APPROVAL TO VISIT FOR RESEARCH ACTIVITIES AT WILAYAH KUALA LIPIS ESTATE ("FGVPM")

The above subject matter refers and also your letter dated 31th October 2016.

2. We are very delightful on receiving visitation by university students to our estates. However, FGVPM wants to avoid any kind of accidents that could cause injuries and loss of life during the visitation.

3. Therefore, all visitors shall comply with the safety procedures and emergency response plan prescribed by our estates.

4. We acknowledged that the following student is a researcher who will conduct a survey at our estates:-

Name : Siti Mariam binti Mazlan
No. Tel : 014-5229450
University : University Putra Malaysia (UPM)

5. The indicated estates and dates of visitation are described below:-

i. *Wilayah Kuala Lipis Estate (01 Mac 2017 until 31 Mac 2017)*

6. Attached herewith is the letter of undertaking to be signed by Siti Mariam binti Mazlan and a Non-Disclosure Agreement to be signed by the relevant representative of UPM.

7. Subject to completion the execution of the NDA and stamping of the same.



APPENDIX III:
NON-DISCLOSURE
AGREEMENT FROM OIL PALM
PLANTATION



APPENDIX IV:
CONSENT LETTER



FORM B1: RESPONDENT'S INFORMATION SHEET AND CONSENT FORM

Please read the following information carefully and do not hesitate to discuss with the researcher should you need further clarification.

1. STUDY TITLE :

Knowledge, attitude and practice of pesticide usage and the health effects among the estate workers in oil palm plantations at Kuala Lipis, Pahang.

2. INTRODUCTION:

Palm oil production is vital for the economy of Malaysia. In 2012, the palm oil industry in the country has employed an estimated 491,000 workers. In order to fulfill the increasing oil palm products demand, estate workers applied various types of pesticides to protect the agricultural crops and increase the production yields. Meanwhile, the issues of pesticides usage at the palm oil plantation have become serious health concern among these estate workers. This study aims to investigate the knowledge, attitude and practice of pesticide usage among the estate workers in oil palm plantations at Kuala Lipis, Pahang. At the same time, determine the association between the knowledge, attitude and practice of pesticide usage with the health effects among the estate workers.

3. WHAT WILL YOU HAVE TO DO?

Once you understand the study background, you should sign up the consent form as enclosing below in **Section 9 (Consent Form)** to indicate your interest in participating in this study voluntarily. The researcher will contact you to follow-up on the date of briefing together with your field supervisor. By then, a face-to-face interview with a validated questionnaire will be conducted by the researcher. Your field supervisor will be assisted on-site should you want find it necessary to clarify any uncertainty during the interview session. This questionnaire consists of six section which are socio demographic, pesticide handling, knowledge, attitude and practice of pesticide usage and lastly symptoms of pesticide usage.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

The respondents who not fulfill the inclusive criteria as stated below are not eligible to participate in this study,

Inclusive criteria

- Male estate worker
- Estate workers with age group 18-60 years old
- Estate workers who handle pesticides in their routine work activity
- At least one years of work experince at the current position

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

Respondents will understand their knowledge, attitude and practice status of pesticide used at the palm oil plantation, at the same time, help to increse their awareness of good agricultural practices and safe use of pesticide in order to minimize the potential health effects due to pesticide exposure among the estate workers.

(b) TO THE INVESTIGATOR?

The finding of this study will be used as the baseline information to understand the knowledge, attitude and practice of pesticide used and the background of health effects among estate workers in the palm oil plantations. This result would help to understand the gaps exists on the pesticide used, at the same time, enhance the good agricultural practices and safe use of pesticide awareness in growing demand of palm oil production among the estate workers.

6. WHAT ARE THE POSSIBLE RISKS?

There are no possible risks is foreseen while partipating in this study

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All the information and identity that are provided by the respondents will remain confidential and will solely used for research purposes only

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

Should you have further enquiry, kindly contact the researcher or the project leader below for clarification.

Siti Mariam Binti Mazlan

Researcher

Bachelor of Science (Environmental and Occupational Health)

Department of Environmental and Occupational Health

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

014-5229450

mariammazlan94@gmail.com

Dr. Vivien How

Project Leader

Department of Environmental and Occupational Health

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

Tel: 03-89472396/ faks: 03-89472395

vivien@upm.edu.my

Please initial here if you have read and understood the contents of this page _____

9. CONSENT FORM

I Identity Card No.
address.....

.....hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent’s Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* **wish / do not wish** to know the results related to my participation in the research

I* **agree/do not agree** that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

*** delete where necessary**

Signature
(Respondent)

Signature
(Witness)

Date :.....

Name :.....

I/C No. :.....

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date

Signature
(Researcher)

BORANG B1: PENERANGAN DAN PERSETUJUAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1. TAJUK KAJIAN

Pengetahuan, tingkah laku dan amalan penggunaan racun perosak dan kesan terhadap kesihatan dalam kalangan pekerja ladang di ladang kelapa sawit, Kuala Lipis, Pahang.

2. PENGENALAN

Pengeluaran minyak sawit adalah penting untuk ekonomi Malaysia. Pada tahun 2012, industri minyak sawit di negara ini telah berkhidmat kira-kira 491,000 pekerja. Bagi memenuhi permintaan keluaran kelapa sawit yang semakin meningkat, pekerja ladang terpaksa menggunakan pelbagai jenis racun perosak untuk melindungi tanaman pertanian dan meningkatkan hasil pengeluaran. Sementara itu, isu-isu penggunaan racun perosak di ladang kelapa sawit telah menjadi satu masalah kesihatan yang serius kepada pekerja-pekerja ladang. Kajian ini bertujuan untuk mengkaji pengetahuan, sikap dan amalan penggunaan racun perosak dalam kalangan pekerja ladang di ladang kelapa sawit, Kuala Lipis, Pahang. Pada masa yang sama, untuk menentukan hubungan antara pengetahuan, sikap dan amalan penggunaan racun perosak dengan kesan-kesan kesihatan dalam kalangan pekerja ladang.

3. APAKAH YANG PERLU ANDA LAKUKAN?

Sebaik sahaja anda memahami latar belakang kajian ini, anda perlu menandatangani borang kebenaran seperti yang dilampirkan di dalam seksyen 9 (Borang Persetujuan) untuk menunjukkan minat anda dalam mengambil bahagian dalam kajian ini secara sukarela. Penyelidik akan menghubungi anda untuk tindakan susulan pada tarikh taklimat bersama-sama dengan penyelia ladang. Pada masa itu, temu bual secara bersemuka untuk 'validate' soal selidik akan dijalankan oleh pengkaji. Penyelia ladang anda akan membantu anda di lokasi untuk menerangkan apa-apa perkara yang belum jelas semasa sesi temuduga dilakukan. Soal selidik ini terdiri daripada enam bahagian soalan iaitu Sosio Demografi, Pengendalian Racun Perosak, Pengetahuan, Sikap dan Amalan Penggunaan Racun Perosak dan akhir sekali ialah Gejala Penggunaan Racun Perosak.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Responden yang tidak memenuhi kriteria seperti dibawah adalah tidak layak untuk mengambil bahagian dalam kajian ini.

Kriteria yang di perlukan:

- Pekerja Lelaki
- Pekerja Ladang yang berumur 18-60 tahun
- Pekerja Ladang yang terlibat dengan penggunaan racun perosak dalam tugas kerja
- Sekurang-kurangnya mempunyai satu tahun pengalaman sebagai pengendali racun perosak

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PESERTA?

Responden akan memahami Pengetahuan, Sikap dan Amalan penggunaan racun perosak yang digunakan di ladang kelapa sawit. Pada masa yang sama, ini dapat membantu meningkatkan kesedaran peserta terhadap amalan pertanian yang baik dan keselamatan penggunaan racun perosak bagi mengurangkan kesan-kesan kesihatan yang berpotensi disebabkan oleh pendedahan racun perosak dalam kalangan pekerja ladang.

b) KEPADA PENYELIDIK?

Dapatan kajian ini akan digunakan sebagai maklumat asas untuk memahami pengetahuan, sikap dan amalan penggunaan racun perosak serta latar belakang kesan kesihatan dalam kalangan pekerja ladang kelapa sawit. Hasil daripada kajian ini dapat membantu, untuk mencari kekurangan yang ada semasa pengendalian racun perosak dan pada masa yang sama, dapat meningkatkan amalan pertanian yang baik dan penggunaan yang selamat dalam permintaan yang semakin meningkat daripada pengeluaran minyak sawit dalam kalangan pekerja ladang kini.

6. ADAKAH IA BERISIKO?

Tiada risiko semasa mengambil bahagian dalam kajian ini

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Semua maklumat dan identiti yang disediakan oleh responden akan dirahsiakan dan hanya akan digunakan untuk tujuan penyelidikan sahaja.

8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?

Jika anda mempunyai sebarang pertanyaan anda boleh menghubungi penyelidik yang bertanggungjawab bagi kajian ini atau ketua projek.

Siti Mariam Binti Mazlan

Penyelidik

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vivien@upm.edu.my

Sila tandatangan di sini sekiranya anda telah membaca dan memahami kandungan halaman ini _____

9. PERSETUJUAN

Saya..... No Kad Pengenalan.
beralamat.....
.....dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman video/kumpulan sasaran/temuduga/ soal selidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan. Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.

I setuju/tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan Tandatangan
(Responden) (Saksi)

Tarikh : Nama :

No. K/P:

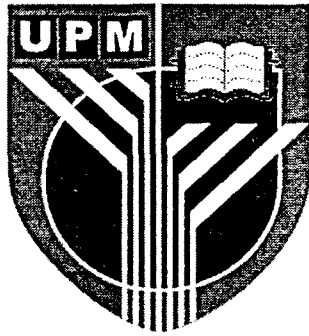
Saya mengesahkan bahawa saya telah menerangkan kepada responden ini sifat dan tujuan penyelidikan yang tersebut di atas.

Tarikh

Tandatangan
(Penyelidik)



**APPENDIX V:
QUESTIONNAIRE**



**DEPARTMENT OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH
FACULTY OF MEDICINE AND HEALTH SCIENCE
UNIVERSITY PUTRA MALAYSIA**

**KNOWLEDGE, ATTITUDE AND PRACTICE OF PESTICIDE USAGE AND THE
HEALTH EFFECTS AMONG THE ESTATE WORKERS IN OIL PALM PLANTATIONS
AT KUALA LIPIS, PAHANG
QUESTIONNAIRE FORM**

Respondent's ID : _____

Date : _____

Signature : _____

All responses will be treated as confidential. No one beyond the study team will have access to your details. Any summary results will be presented in an anonymous format so that no one will be able to recognize you from the results.

There are SIX sections to this questionnaire and it should take about 5 to 10 minutes to complete answering the questionnaire. Please answer the question by ticking (✓) or WRITING in the spaces provided.

QUESTIONNAIRE

This page contains questions related to your personal information. Please answer and tick (✓) in each question completely.

Part A : Socio Demographic Background

1. Age: ____ years

3. Educational level : Primary school Secondary school
 College/ University Others

4. Nationality : Malaysian Bangladesh Indonesian
 Nepal Burmese Lain-lain (nyatakan): _____

5. Marital status : Single Married Widower Widow

6. How many years have you been working at this plantation: ____ years

7. what is your transportation going to work at the plantations:

Lorry Car Walking Others (specify): _____

Part B : Pesticide Usage.

1. What is the main purpose you used pesticides at the oil palm plantations. You may tick (✓) more than one.

Control of weeds Control of pest control Control of fungi
 Control of rodent Others _____

2. Which chemical are you using? You may tick (✓) more than one.

| Chemicals | (✓) |
|---------------------------------------|-----|
| 1. Ally (Metsulfuron Methyl) | |
| 2. Ecomax (Glyphosate Isopropylamine) | |
| 3. Cypermethrin | |
| 4. Basta 15 (Glufosinate Ammonium) | |
| 5. Paraquate Dichloro (Paranox 13) | |
| 6. Mancozeb | |
| 7. Garlon | |
| 8. Roundup | |
| 9. Supersate | |
| 10. Strane | |
| 11. Others, please specify: _____ | |

3. How long will you be using pesticides in the palm oil plantations?

| Hour | (√) |
|----------------------------|-----|
| 1. Less than 2 hours | |
| 2. Between 2 until 6 hours | |
| 3. More than 6 hours | |

4. How many days a month do you work using pesticides on plantations?

| Days | (√) |
|----------------------|-----|
| 1. One days | |
| 2. 2 until 10 days | |
| 3. 11 until 20 days | |
| 4. More than 20 days | |

5. Do you wear protective clothing when applying pesticides?

Yes

No

If yes, please tick (√) one or more protective clothing you use when handling of pesticide.

| | |
|-----------------------------------|--|
| Wears an eye mask | |
| Wears special gloves | |
| Wears special shoes/boots | |
| Wears special clothes long sleeve | |
| Wears special apron | |
| Wears a special respirator | |

Part C: Knowledge of pesticide usage among the plantations workers

| No. | Activity | Yes | No | Don't know |
|-----|---|-----|----|------------|
| 1. | Training of pesticide handling is important for personal safety | | | |
| 2. | Pesticide can lead to health problem | | | |
| 3. | Pesticide can affects human health | | | |
| 4. | Pesticide can affects animals | | | |
| 5. | Pesticide can affects human health within 24 hours | | | |
| 6. | Ingesting pesticides can cause death | | | |
| 7. | Pesticide exposure is through inhalation | | | |
| 8. | Pesticide exposure is through ingestion | | | |
| 9. | Pesticide exposure is through skin absorption. | | | |
| 10. | The use of PPE is important to protect the body from exposure to toxins | | | |

Part D: Attitude of pesticide usage among the plantations workers

| No. | Activity | Agree | Not agree | Don't know |
|-----|---|-------|-----------|------------|
| 1. | I need training of pesticide handling before start work | | | |
| 2. | I will standing against windy direction while spraying | | | |
| 3. | I will drink water after being exposed to pesticide | | | |
| 4. | I will wear full PPE when spraying pesticide | | | |
| 5. | I immediately take a bath after spraying | | | |
| 6. | I will take an exercise to remove pesticide toxicity through sweating | | | |
| 7. | I will mixing pesticide using stick rather than using hands | | | |
| 8. | I chose pesticide to be used based on own experience | | | |
| 9. | I do not need to wear a full of properly attired when spraying | | | |
| 10. | I will drink coconut water for treatment of pesticide poisoning | | | |

Part E: Practice of pesticide usage among the plantations workers

| No. | Activity | Usually | Sometime | Never |
|-----|--|---------|----------|-------|
| 1. | Check equipment and materils before spraying | | | |
| 2. | Wear gloves and masks while mixing pesticides | | | |
| 3. | Read label on the container and follow the instruction before spraying | | | |
| 4. | Avoid human and animals before spraying | | | |
| 5. | Choose the recommended pesticide before spraying | | | |
| 6. | Smell the contain before use | | | |
| 7. | Mix pesticide with bare hands | | | |
| 8. | Wear safety boots while spraying | | | |
| 9. | Smoke while spraying | | | |
| 10. | Spray pesticide under windy condition | | | |
| 11. | Stand towards windward direction while spraying without protective equipment | | | |

| | | | | |
|-----|--|--|--|--|
| 12. | Clean pesticide containers with water from river after finish spraying | | | |
| 13. | Dispose pesticide containers into the river after use | | | |
| 14. | Clean pesticide applicator with detergent before storage | | | |
| 15. | Change clothes immediately after spraying | | | |
| 16. | Wash clothes immediately after spraying | | | |
| 17. | Store the pesticide in storage room after spraying | | | |
| 18. | Burn pesticide containers after spraying | | | |
| 19. | Wash hand after spraying and before having meal | | | |
| 20. | Shower immediately after spraying | | | |

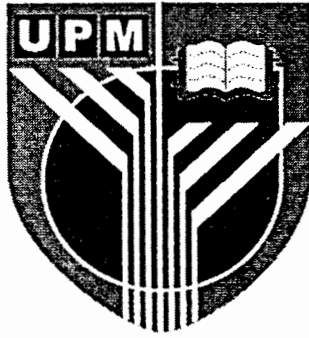
Part F: Symptoms of pesticide use on health

1. Have you ever experience any of the following signs and symptoms every time after handling/exposing to pesticide due to pesticide spraying activity at the field? You may tick (√) more than one.

| Matter | (√) |
|------------------------------|-----|
| 1. Headache | |
| 2. Dizziness | |
| 3. Excessive vision | |
| 4. Cough | |
| 5. Nausea/ vomiting | |
| 6. Redness of skin | |
| 7. Difficulty breathing | |
| 8. Skin rashes | |
| 9. Blurred vision | |
| 10. Others, please specify : | |

2. How do you treat the toxic effects of pesticide use?

| Matter | (√) |
|--------------------------|-----|
| 1. Yourself | |
| 2. Using herbs | |
| 3. Medication | |
| 4. The health centre | |
| 5. Go to private clinic | |
| 5. Hospitals | |
| 6. Other, please specify | |



UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

**JABATAN KESIHATAN PERSEKITARAN DAN PEKERJAAN
FAKULTI PERUBATAN DAN SAINS KESIHATAN
UNIVERSITI PUTRA MALAYSIA**

**PENGETAHUAN, TINGKAH LAKU DAN AMALAN PENGGUNAAN RACUN
PEROSAK DAN KESAN TERHADAP KESIHATAN DALAM KALANGAN PEKERJA
LADANG DI LADANG KELAPA SAWIT, KUALA LIPIS, PAHANG**

BORANG SOAL SELIDIK

ID Responden :

Tarikh :

Tanda Tangan :

Semua maklum balas adalah sulit. Orang luar selain dari ahli kajian ini tidak boleh mempunyai akses kepada maklumat anda. Apa-apa keputusan ringkasan akan dibentangkan dalam format tanpa nama supaya tiada siapa yang akan dapat mengenali anda.

Terdapat ENAM bahagian soalan untuk soal selidik ini dan ia mengambil masa dalam 10 hingga 15 minit untuk selesai menjawab. Sila jawab soalan dengan menandakan (✓) atau MENULIS dalam ruang yang disediakan.

SOAL SELIDIK

Laman ini mengandungi soalan-soalan yang berkaitan dengan maklumat peribadi anda. Sila jawab dan tandakan (✓) pada setiap soalan dengan lengkap.

Bahagian A : Latar Belakang Sosio-Demografi

1. Umur: ____ tahun
3. Tahap pendidikan : Sekolah Menengah Sekolah Rendah
 Kolej/Universiti Tidak Bersekolah
4. Warganegara: Malaysia Bangladesh Indonesia
 Nepal Burma Lain-lain (nyatakan): _____
5. Status perkahwinan: Bujang Berkahwin Duda Janda
6. Berapa lamakah anda bekerja di ladang ini: ____ tahun
7. Bagaimanakah pengangkutan anda ke tempat kerja di ladang:
 Lori Kereta Berjalan kaki lain-lain, nyatakan:

Bahagian B : Penggunaan racun perosak

1. Apakah tujuan utama anda menggunakan racun perosak di ladang kelapa sawit? Boleh tanda lebih daripada satu (✓).

- Kawalan rumpai Kawalan perosak Kawalan kulat
 Kawalan Rodent Lain-lain _____

2. Bahan kimia manakah yang anda gunakan? Boleh tanda lebih daripada satu (✓)

| Bahan-bahan | (✓) |
|---------------------------------------|-----|
| 1. Ally (Metsulfuron Methyl) | |
| 2. Ecomax (Glyphosate Isopropylamine) | |
| 3. Cypermethrin | |
| 4. Basta 15 (Glufosinate Ammonium) | |
| 5. Paraquate Dichloro (Paranox 13) | |
| 6. Mancozeb | |
| 7. Garlon | |
| 8. Roundup | |
| 9. Supersate | |
| 10. Strane | |
| 11. Lain-Lain: Sila Nyatakan _____ | |

3. Berapa jam anda menggunakan racun di ladang ?

| Jam | (√) |
|--------------------------|-----|
| 1. Kurang daripada 2 jam | |
| 2. Antara 2 hingga 6 jam | |
| 3. Lebih daripada 6 jam | |

4. Berapa hari dalam sebulan anda bekerja menggunakan racun di ladang?

| Hari | (√) |
|---------------------------|-----|
| 1. 1 hari | |
| 2. 2 hingga 10 hari | |
| 3. 11 hingga 20 hari | |
| 4. lebih daripada 20 hari | |

5. Adakah anda memakai alat pakaian perlindungan diri semasa mengendalikan racun?

Ya Tidak

Jika Ya, sila tandakan (√) satu atau lebih alat perlindungan pakaian yang digunakan semasa mengendalikan racun.

| | |
|--------------------------------|--|
| Memakai topeng mata | |
| Memakai sarung tangan | |
| Memakai kasut but | |
| Memakai pakaian lengan panjang | |
| Memakai apron | |
| Memakai alat pernafasan | |

Bahagian C: Pengetahuan mengenai penggunaan racun dalam kalangan pekerja ladang

| Bil. | Perkara | Ya | Tidak | Tidak tahu |
|------|---|----|-------|------------|
| 1. | Latihan penggunaan racun adalah penting untuk keselamatan diri | | | |
| 2. | Racun perosak berbahaya kepada kesihatan manusia | | | |
| 3. | Racun perosak boleh memberi kesan kepada haiwan | | | |
| 4. | Racun perosak boleh memberi kesan kepada alam sekitar | | | |
| 5. | Racun perosak boleh memberi kesan kepada kesihatan dalam tempoh 24 jam | | | |
| 6. | Meminum racun perosak boleh menyebabkan kematian | | | |
| 7. | Racun masuk ke dalam badan melalui sedutan | | | |
| 8. | Racun masuk ke dalam badan melalui mulut | | | |
| 9. | Racun masuk ke dalam badan jika terkena kulit | | | |
| 10. | Penggunaan PPE adalah penting untuk melindungi badan daripada terkena racun | | | |

Bahagian D: Tingkah laku mengenai penggunaan racun dalam kalangan pekerja ladang

| Bil. | Perkara | Setuju | Tidak bersetuju | Tidak tahu |
|------|---|--------|-----------------|------------|
| 1. | Saya perlu mengikuti latihan penggunaan racun sebelum memulakan kerja meracun di ladang | | | |
| 2. | Saya berdiri melawan arah angin semasa meracun | | | |
| 3. | Saya minum air selepas terdedah kepada racun perosak | | | |
| 4. | Saya memakai PPE yang lengkap semasa meracun | | | |
| 5. | Saya segera mandi selepas meyembur racun | | | |
| 6. | Saya akan melakukan senaman kerana ia boleh membantu untuk menghapuskan keracunan racun melalui peluh | | | |
| 7. | Saya menggaul racun perosak dengan menggunakan kayu kerana ia lebih selamat daripada menggunakan tangan | | | |
| 8. | Saya memilih racun perosak yang hendak digunakan berdasarkan pengalaman sendiri | | | |
| 9. | Saya tidak perlu memakai pakaian yang lengkap semasa meracun di ladang | | | |
| 10. | Saya akan minum air kelapa untuk merawat keracunan yang disebabkan oleh racun perosak | | | |

Bahagian E: Amalan mengenai penggunaan racun dalam kalangan pekerja ladang

| Bil. | Perkara | Selalu | Kadang-kadang | Tidak pernah |
|------|--|--------|---------------|--------------|
| 1. | Memeriksa peralatan dan bahan sebelum melakukan semburan | | | |
| 2. | Memakai sarung tangan dan penutup mulut semasa membancuh racun | | | |
| 3. | Membaca label pada bekas dan mengikut arahan sebelum melakukan semburan | | | |
| 4. | Mengelakkan daripada manusia dan haiwan sebelum semburan | | | |
| 5. | Memilih racun perosak yang disarankan sebelum semburan | | | |
| 6. | Bau bekas sebelum digunakan | | | |
| 7. | Membancuh racun dengan menggunakan tangan | | | |
| 8. | Memakai kasut keselamatan semasa semburan racun | | | |
| 9. | Merokok semasa semburan racun | | | |
| 10. | Menyembur racun perosak dalam keadaan yang berangin | | | |
| 11. | Berdiri ke arah angin semasa semburan tanpa memakai alat perlindungan diri | | | |

| | | | | |
|-----|--|--|--|--|
| 12. | Membasuh bekas racun dengan menggunakan air sungai selepas siap melakukan semburan | | | |
| 13. | Membuang bekas racun perosak ke dalam sungai selepas digunakan | | | |
| 14. | Mencuci peralatan racun dengan sabun sebelum di simpan | | | |
| 15. | Menukar pakaian dengan segera selepas habis melakukan semburan | | | |
| 16. | Membasuh pakaian dengan segera selepas melakukan semburan | | | |
| 17. | Menyimpan racun perosak di dalam bilik simpanan selepas melakukan semburan | | | |
| 18. | Membakar bekas racun perosak yang kosong selepas habis digunakan | | | |
| 19. | Membasuh tangan selepas semburan racun dan sebelum makan | | | |
| 20. | Mandi dengan segera selepas melakukan semburan racun | | | |

Bahagian F: Simptom penggunaan racun terhadap kesihatan

1. Pernahkah anda mengalami gejala dan simtomps berikut, setiap kali selepas mengendali racun perosak di ladang. Boleh tanda lebih daripada satu (✓).

| Perkara | (✓) |
|--------------------------------|-----|
| 1. Pening | |
| 2. Sakit kepala | |
| 3. Peluh berlebihan | |
| 4. Batuk | |
| 5. Loya muntah | |
| 6. Kemerahan pada kulit | |
| 7. Sukar untuk bernafas | |
| 8. Ruam kulit | |
| 9. Bersin | |
| 10. Lain-lain, sila nyatakan : | |

2. Bagaimana anda merawat kesan toksik daripada penggunaan racun perosak?

| Perkara | (✓) |
|------------------------------|-----|
| 1. Diri sendiri | |
| 2. Menggunakan herba | |
| 3. Pengambilan ubatan | |
| 4. Ke pusat kesihatan | |
| 5. Ke klinik swasta | |
| 5. Hospital | |
| 6. Lain-lain, sila nyatakan: | |