



## CHAPTER I

### INTRODUCTION

#### 1.1 Background and Rationale

Thailand is considered as an agricultural country despite its expansion of industrial country. Moreover, 60% of total workforce is engaged in agricultural activities. Many provinces in Thai have the most of people who be farmers. (National Statistic Office of Thailand, 2008)

In year 2009, Thailand has the entire area for rice farming approximately 66 million raise across the country. (Office of Agricultural Economics, 2009) Agrochemicals, such as fertilizers and pesticide have become a major part of farming in Thailand allowing for increased crop production and income. Thailand has been importance pesticides including herbicide, insecticide, and fungicide since the 1950s coinciding with the expansion of the country's agricultural system from domestic to industrial production and mono-cropping agriculture. In 2008, we were found that most patients with toxic chemicals from pesticides and the poisoning for getting with diseases of chemicals from occupations across the country totaling 2,141 persons and the most of them are farmers. (Siriwong et al., 2009)

Pesticides are extensively used across the world. Organophosphate (OP) and Carbamate insecticides form are the groups of chemicals that are primarily used in agriculture. In spite of their widespread use that has existed for a long time for public goods, OP pesticides have caused several harmful effects on the health of humans. In this connection, environmental exposure to OPs along with detrimental reproductive consequences in men and women working on or living in the proximity of farms are more and more reported all over the world. (Roshini et al., 2007)

The conditions of exposure to organophosphate and carbamate insecticides at high degree along with the accompanying health risks in developing countries of the

globe are famous. They are described as being highly acutely toxic. Organophosphate and carbamate insecticides produce an effect on the nervous system by causing disorder in the enzyme which controls acetylcholine, a neurotransmitter. An unspecified number of them are very toxic (Deerasamee, 2009).

Biological monitoring is an instrument for the measurement of pesticide exposure level that enters the body. It can evaluate human exposures to both environment and work pace. In case where exposure changes irregularly eventually, and or the skin are a meaningful path of absorption, biological monitoring has proved to obtain the absorbed dose information. The measurements of biological monitoring are used in blood, urine, saliva, or breast milk as biological media by the estimate of the amount of pesticide as its metabolite or its reaction product which is absorbed into the body.

Most of organophosphate or carbamate pesticides was inhibited the blood enzymes that call “erythrocyte cholinesterase” (AChE) and/ or “plasma cholinesterase” (PChE). Ache is basically chosen because of its lower biological variability and destitution of interferences than relative to PChE. After exposure to pesticide, recovery of AChE activity is always slow more than PChE due to its longer half-life (1 month for AChE and 2 week for PChE). And the quantitative determination of cholinesterase in whole blood can show the level of pesticide exposure. Organophosphate and carbamate insecticides have the highest morbidity rate of poisoning among the farmer. (Public Health, 2008: online)

There are three main ways of pesticides exposure are: inhalation, dermal, oral exposure. Typical sources of pesticides exposure from food, drinking water, residence, and worker who apply pesticides. The farmers as well as the general public will have the possibility of running the risk of gaining exposure to such substances from various forms of exposure such as breath, oral cavity, and skin. (Health Information System Development Office, 2009) By the way they can avoid or decreasing the risk of exposure pesticide by using Personal Protective Equipment (PPE). (Occupational Safety and Health Administration (OSHA, 2006)

Personal protective equipment (PPE) refer to designed to protect workers from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Besides face shields, safety glasses, hard hats, and safety shoes, protective equipment includes a variety of devices and garments such as goggles, coveralls, gloves, vests, earplugs, and respirators (Occupational Safety and Health Administration (OSHA, 2006)

Chainart Province has 3 importance rivers in the province: Noi River, Tha Chin River and the Chao Phraya River. Most of the local people are rice farming and approximately 79.58 percent of total area is the agricultural land. The most of income is from exporting rice and they can farm rice for 2-3 times per year so they have good yield. (Chai Nat Agricultural Extension Office, 2011)

## 1.2 Research Questions

1. What are knowledge attitude and practice on using pesticide of farmer in Chainart province, Thailand?
2. Are there any association between knowledge attitude and practice usage pesticides and cholinesterase levels in blood of farmers?

## 1.3 Hypotheses

### Null Hypothesis (H0)

- There are no association between knowledge attitude and practice usage pesticide and the level of cholinesterase in farmer's blood.

### Alternative Hypothesis (H1)

- There are association between knowledge attitude and practice usage pesticide and the level of cholinesterase in farmer's blood.

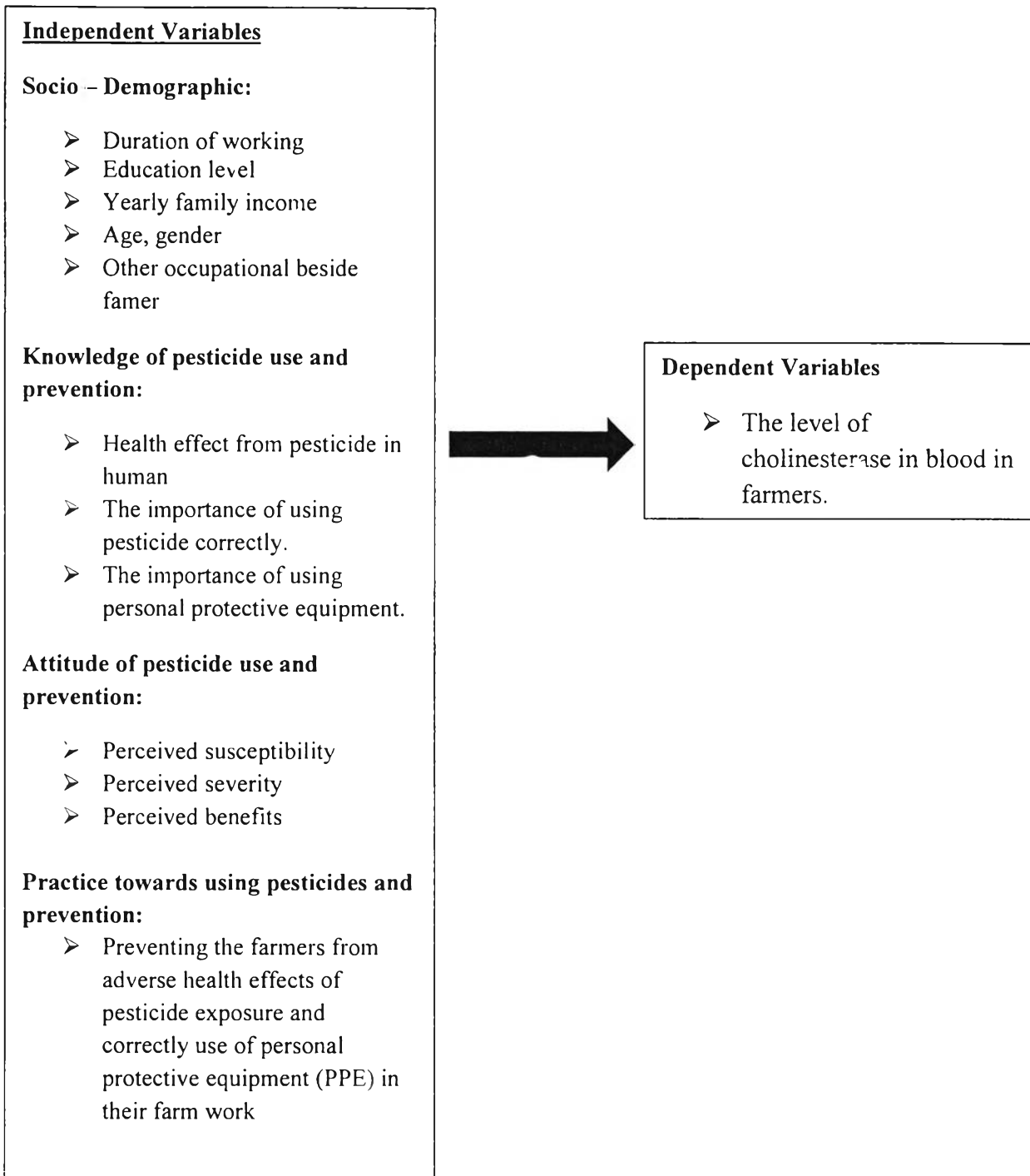
### Research Hypothesis:

- The levels of cholinesterase in farmer's blood were depended on Knowledge attitude and practice.

## 1.4 Research Objectives

- To assess the KAP of farmers at Nang Ler sub-district in Chainart province on usage pesticides.
- To assess association between Knowledge attitude and practice and the level of cholinesterase in farmer's blood.

## 1.5 Conceptual Framework



## 1.6 Operational Definition

- **Cholinesterase level** refer to the level of blood enzymes erythrocyte cholinesterase (AChE) and plasma cholinesterase (PChE) related with OP and carbamate insecticides measure by Test-mate ChE Cholinesterase Test System (Model 400). The unit of cholinesterase level is U/mL.
- **AChE** refers to red blood cell cholinesterase. There is identical to the enzyme found in the nervous system, and it is thought to be a good indicator of actual neuronal activity. The turnover rate for red blood cells is slow (about 3 months), and AChE measurements reflect this slow replacement rate. Thus, AChE is typically used as a marker of chronic exposure.
- **PChE** refer to plasma. PChE turnover is much quicker. PChE is a better short-term indicator due to its more rapid response to exposure; it is used as an indicator of recent, acute exposure.
- **Personal protective equipment (PPE)** refer to designed to protect workers from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Besides face shields, safety glasses, hard hats, and safety shoes, protective equipment includes a variety of devices and garments such as goggles, coveralls, gloves, vests, earplugs, and respirators (OSHA, 2006)
- **Knowledge, Attitude and practice (KAP)** serves as an educational tool for the community. A KAP survey is a representative study of specific population to collect information on what is known, believed and done in relation to a particular topic (WHO, 2008).
- **Direct exposed farmers** refer to the farmers who have only work on spraying, mixing, and loading pesticide on farm.
- **Indirect exposed farmers** refer to the farmers who are harvesting rice but not using pesticide by themselves.