PREVENTIVE BEHAVIOR ON PESTICIDE USAGE AMONG THE RICE FARMERS IN MUANG DISTRICT, SUPHANBURI PROVINCE, THAILAND

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PREVENTIVE BEHAVIORS ON PESTICIDE USAGE AMONG RICE FARMERS IN MUANG DISTRICT, SUPHANBURI PROVINCE, THAILAND

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ABSTRACT

The purpose of this descriptive cross sectional study was to assess the significant factors affecting practicing preventive behaviors on pesticide usage among the rice farmers in Suphanburi province, Thailand. The data was collected from nine villages in Muang district, 2004 by interviewing from a structured questionnaire. Number and percentages, Pearson Chi-square, and Spearman rank correlation tests were used to analyze data at $\alpha = 0.05$.

Based on the median value (69 scores or 82.1 % of total scores) as cut point value, 50.2 % of them had higher practicing score level than the cut point. 56.2 % of the respondents were male; most of them had an age of more than 30, were married, and lived with their children. The majority of them were self-employment, graduated from primary school, and had family incomes between 1000-5000 Baht per month. 13.5 % of them had good knowledge but not quite good perception, low accessibility to information, and high availability of good equipment.

It was revealed that their behaviors while using pesticides were significantly positively correlated with age, years of using pesticides, knowledge on pesticide danger and its usage, and availability of good equipment. Behaviors after using pesticides were significantly related with perception on seriousness, susceptibility, and benefits. Behaviors on days when not using pesticides had a significant correlation with age, and perception on susceptibility. In addition, perception on barriers, the accessibility to information and social support, all had a positive correlation to the three types of behaviors at $p<0.05$.

To decrease the occupational pesticide poisoning, the agricultural officers and community participants should educate the rice farmers more regularly with details of information about not only using but also after using and on days when not using pesticides.

KEY WORDS: PREVENTIVE BEHAVIORS/ PESTICIDES/ RICE FARMERS

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CHAPTER I
INTRODUCTION

1.1 Rationale and justification

Pesticides are chemical used to kill insects .They have been used for thousands of years, since 200 AC. Biblical references to covering the land with ashes focus on the control of pestilence and is among the earliest documented reports of pesticide use (1). Nowadays, pesticides are used commonly in almost countries in the world. Approximately 249 pounds of insecticides are used annually in the United Sates. It was estimates that approximately 100,000 pesticide poisonings occur annually (2) in United States. The World Health Organization also reported that approximately 3 million pesticide poisoning occur annually worldwide and causes more than annual 220,000 deaths related to pesticides usage occurred in the Third World, where 80 percent of the world's pesticides are used (3). Thailand is currently the second rank of exporting the rice products to the world market and one of the biggest users of pesticides in the South Asia region (4). Most of pesticides are used for rice farming to make plantation. Surely, the rice farmers used it with their expectation to kill insect and grass, protect their crops, and get more benefit from crops. From mentioned above, it is the one main reason that induce the researcher interest in pesticide use among them, the rice farmer groups. More ever, it provokes me with the two main questions to find out**:** how do Thai rice farmers practice preventive behaviors and what are the factors influence their practicing. These questions are important and necessary to reply as:

The first, pesticides are much available in Thailand. The “green revolution” has resulted in immense agricultural productivity throughout the world over the past haft-century. An important part of the technological innovations accompanied with this revolution is the introduction of a variety of chemicals generically known as “pesticide” in the farming land. Moreover, under liberal trade system, many pesticides

were imported toward Thailand for using with commercial plantation in agricultural farms. One general name of pesticides is sold in market with many various brand names (more than 2,000 brand names). However, two types of pesticide were mostly used were insecticide (51%) and herbicide (38%). Even through since 1977 the use of 82 kinds of pesticides has already been banned in Thailand (5) but many pesticides still available show in table 1

Table 1 Amount of imported pesticides to Thailand from 1966 to 2000

Years	**Amount of imported pesticide substances Tones**	**Imported value (million Baht)**
1966	9,906	208
1971	5,992	130
1976	N/A[1/]	N/A
1981	N/A[1/]	N/A
1986	17,837(12,777)[2/]	1,779
1991	(25,482)[2/]	2,811
1996	45,701(25,542)[2/]	4,924
1997	(27,127)[2/]	6,398
1998	(23,230)[2/]	6,401
1999	(33,969)[2/]	7,281
2000	52,739(31,454)[2/]	7,294

Source: Ministry of Agricultural and co-operation cited in Matichon Technology Chawban (2003:50)

N/A[1/]: non available

[2/]: the numbers in encircle showing the important pesticide substances are imported by that year.

Surprisingly, there was dangerous imported agricultural substances in the first three-month (January - March) of year 2003 calculated to 11,268 Tones. These amount are accounted nearly to the whole imported substances by the year1985 about 12,832 Tones (6).Therefore pesticides are really getting more and more available in

this country, Thai merchants try to distribute it through many various advertising channels, such as propaganda, television, games, direct personal sell. Marketing system makes pesticides spread widely and easy for farmers to access them.

The second, many kinds of pesticides are so widely used for killing insects, unwanted plant in many rice farming. The reasons to explain why the pesticides are popularly used by the rice farmer were that farmers always being in risk of loosen crops because of attacking from insects, competing of grass with their plant. Furthermore, with the availability of pesticides products at varied shop with low price, as its quick functional killing insect and unwanted plant, the pesticides are popular used.

In 1993, pesticide consumption in Thailand was used by the rice farmers as demonstrated in figure 1(7). In addition, in western part of Thailand, 60% pesticides used are insecticides, 30% are herbicides with four generic names are organophosphate, organochlorine, pyrethoid (paraquat) and carbamate. According to the report from Toxic Substance Division, 1995, 85% of rice sample in Central Region, Thailand was found organochlorine. These examples are clear evident of popular pesticides usage among rice farmers in Thailand.

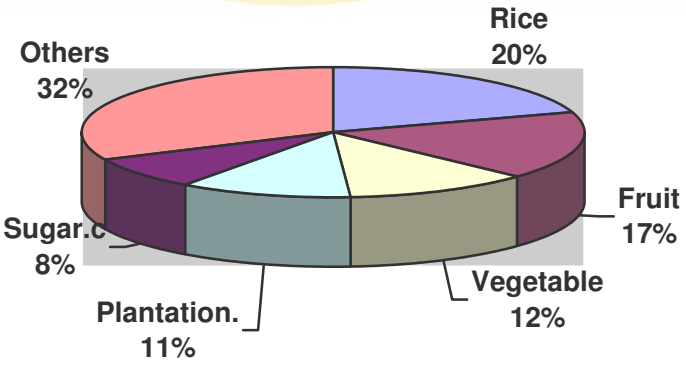

Figure 1: Amount of pesticides used in africulturist farming

Source: Agriculture regulatory Division, 1993

The third, pesticides can cause a lot of dangers or harmful effects to users if they use them inappropriately. The acute effects of pesticide exposure can cause fatal or mild dangerous level. They may include symptoms such as skin allergic reactions and eye burns, headache, nausea, blurred vision, muscle cramping, vomiting, and difficult breathing. Information on the chronic health effects of pesticides is carcinogenic (8). Many pesticides, particularly insecticides, cause neurotoxicity to humans and other animals because their mechanism of action targets the insect nervous system. Agriculturists receive both acute and chronic effects from the poisoning pesticides. Until the level of pesticides collected in his body is high enough, dangerous symptoms will be show. Dangers from the accumulated pesticides are the cause of several diseases such as heart disease, nervous disease, hepatopathy, nephropathy, and finally patient will die. If the patient survives, he will have a high risk of paralysis or cancer later. Most farmers commonly use pesticides belonging to the one chemical family namely "Organophosphates." Many of these are highly toxic and affect the human central nervous system (brain) and peripheral nervous system (nerves found outside of the brain or spinal cord). Exposure to cholinesterase-inhibiting pesticides has been linked to impaired neurological development in the fetus and in infants, chronic fatigue syndrome, and Parkinson's disease (9). Pesticide also damage liver, kidney, and lung.

People are exposed to pesticides in several ways, the most common exposures occur during mixing and application (10) such as breathing through the nose and lungs; ingestion through the mouth and stomach; absorption through the skin. Although these chemicals will clearly improve farm productivity, they pose serious health dangers for the people who apply with them, both in short-term toxicity and in long-term biological effects.

The fourth, from reviewing many data from the past to present, it was found that the Thai farmers especially in the rice farmers still use pesticide inappropriately. Statistics from the Ministry of Public Health on occupational poisoning show some decreasing number from a high of 5,154 in 1989 to 3,165 in 1994 although there has been no changing in the type of pesticides used or the application of technology. The

study estimated that there could be up to 39,600-pesticide poisoning cases per year. Researchers found that approximately half of Thai farmers employ it higher dose than recommended concentrations. They applied pesticides without protective clothing and observation for recommended intervals between spraying and harvest (6); many of the sprayers were women. In this survey, 80% of women were reported with symptoms of acute pesticide poisoning including dizziness muscular pain, headache, nausea, weakness, and difficulty breathing. For the first half of 1996, 1,760 people were admitted to hospital and 16 people died (6). The number was increase two years later, in 1998 and 1999 (4,169 patients included 31 death cases), and then decreased in three years later, in 2002 (2,531 patients with 11 death).

In the year of 1996, the Occupational Health Division, Ministry of Public Health, conducted a study of lung capacity of 545 farmers exposed to one pesticide namely "Paraquat" in six provinces in the Central Region and found that 58.2 % of the farmers developed sign and symptoms of Paraquat poisoning and 8.3 % had abnormal lung capacity. The prevalence rate was related to its duration of exposure (11).

The Department of Health statistics measured on cholinesterase levels in blood of farmers during 1992-2000, as in table 2 (12), it was shown that 16-21 % of the farmers had abnormal enzyme level because of their exposures to pesticides. The result of low cholinesterase levels among the farmers were related to inappropriate pesticides usage.

Table 2 Numbers of farmers with abnormal blood cholinesterase levels, 1992-2000

Years	Numbers of sample	Abnormal Cholinesterase	
		Numbers	Percentage
1992	42,471	8,669	20.41
1993	242,820	48,500	19.97
1994	411,998	72,590	17.62
1995	460,521	78,481	17.04
1996	156,315	40,520	25.92
1997	563,354	89,926	15.96
1998	369,573	77,789	21.05
1999	360,411	48,217	13.38
2000	278,612	52,604	18.88

Source: Department of Health, Ministry of Public Health, 1999

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According to the report of Spider researcher groups, agricultural workers were rarely, if ever, given insufficient information on their pesticides involved with risky behaviors and they did not take proper protective when using the pesticides. Most answers from the farmers when they were asked about reason why they did not aware to use protective equipment were that it was too hot, too cumbersome, unavailable and too expensive (13).

The fifth reason, the problem of inappropriate pesticides usage among agriculturist farmers are concerned so much from Ministry of agricultural and cooperation. In addition, these could be shown as the data between 8th and 9th National Health Plan (1997-2001), Ministry of Public Health tried to reduce the farmer groups who have risky behaviors not more than 20% and enhance using rate of protective instruments near to 90%. Ministry of Agricultural Cooperation set up one importance policy and master plan between 2002-2002 for tackling with the pesticides problems. It was aimed to support pesticides usage with efficiency and safety,

disseminate, and educate dangers how to use it safely for all general population groups. Moreover, the central government has announced that it will be the food safety year starting from the first day of January 2004. From mentioned above the government encourages the farmers to wear protective equipment such as protective clothes, mask, eyeglass…, etc. The farmers are provoked to employ pesticides with safely ways through workshops, training courses within collaboration projects between Government and Non-Government organization. However it showed the fact that, many provinces still have the rice farmers who practice the pesticides unsuitably in the field, such as the result of the pilot project was firstly launched at Nakhon Pathom province (10 participant hospitals) in August 1999 to January 2000. There were 130 reported cases involved with pesticides usage and followed by 28.46% occupational cases. It was also found that unknown chemical types showed major problem of poisoning (34%). The second phase was expanded to collect cases for 1 year starting from May 2000 to April 2001 in 66 hospitals of 5 provinces i.e., Kamphaeng Phet, Nakhon Pathom, Nakhon Ratchasima, Nakhon Sawan and Pathum Thani. Totally 1,416 cases were reported including to 29.17% occupational cases. The major chemicals were organophosphorus (31.21%), unknown types (24.01%), and dipyridyl (15.26%). The recovery cases were 64.19% (14). Another study was launched in Phuthumthani in 2001; it was shown that most of agriculturists did not use pesticides appropriately (15).

Picture of pesticide use and pesticide poisoning seems to be too attractiveness for the researcher to discover it. However, it is difficult to cover completely a large country like Thailand. Focusing on one agriculture province with the highest pesticide poisoning may help the researcher find out appropriate answer for two questions mentioned above.

Suphanburi province is located in the west- central region of Thailand, approximately 107 km far away from Bangkok by superhighway road. It covers the area of 5,358 square kilometers (3, 3348,755 Rais). People work on agriculture along the Tha-Chin riverside. Suphanburi divides its administration into 10 districts, 110 sub-districts, 970 villages, and 2 municipal areas. Total population is about 853,313

persons with 218,786 households (20,239 households are the rice farmer's households) and 60 % of total lands are used for rice plantation. Most of farmers are rice farmers and most of them use pesticides (inorganic pesticide) to kill insect and control unwanted small plants. According to the reports from the Provincial Agricultural Office, four kinds of pesticide are mostly used by rice farmers are Cabarmat (44%), Organophosphate (33%), Organochlorine (12.2%), and Paraquat (11.1%). Even though numbers of pesticide poisoning in Suphanburi were being decreased as shown in table 3, but Suphanburi is still a province that has the highest case of occupational pesticide poisoning between zone 2 as well as the Central Region (16).

Table 3 The numbers of case and death from occupations caused by pesticides in Suphanburi province, 1997-2002

Years	Numbers of case (patient)	Number of death
1997	145	0
1998	197	1
1999	147	2
2000	91	1
2001	67	0
2002	59	0

Source: Division of Epidemiology, Office of Permanent Secretary of Public Health 2002

However, there is only one study about the risk factors related to pesticide poisoning among the water- chestnut farmer in Sriprachan district (17) (near by Muang district) in the year of 2000. It was showed that 9.6 % of the farmers had cholinesterase at harmful level, 43.6% at high-risk level. In this study, it was also revealed that 81.9 % farmers did not wear fully protective equipment during spraying, 53.2% did not wear it when mixing pesticide.

According to the data of Suphanburi province, it creates my interesting to do this research and the following details are as follows:

1.2 Research question

1.2.1 What are the preventive behaviors regarding pesticide usage among rice farmers in Suphanburi province?

1.2.2 What are the factors related to this preventive behaviors?

1.3 Research Objective*:*

1.3.1 General objective:

1.3.1.1 To describe the preventive behavior on pesticides usage among the rice farmers

1.3.1.2 To identify the correlation between predisposing factors, enabling factors and reinforcing factors and preventive behaviors on pesticides usage among the rice farmers

1.3.2 Specific objective:

1.3.2.1 To describe preventive behavior on pesticides usage among rice farmer

1.3.2.2 To delineate the predisposing, enabling, reinforcing factors among rice farmer.

1.3.2.3 To investigate the correlation between the predisposing factors, enabling factors and reinforcing factors and the preventive behaviors on pesticides usage among the rice farmers

1.4 Research conceptual framework

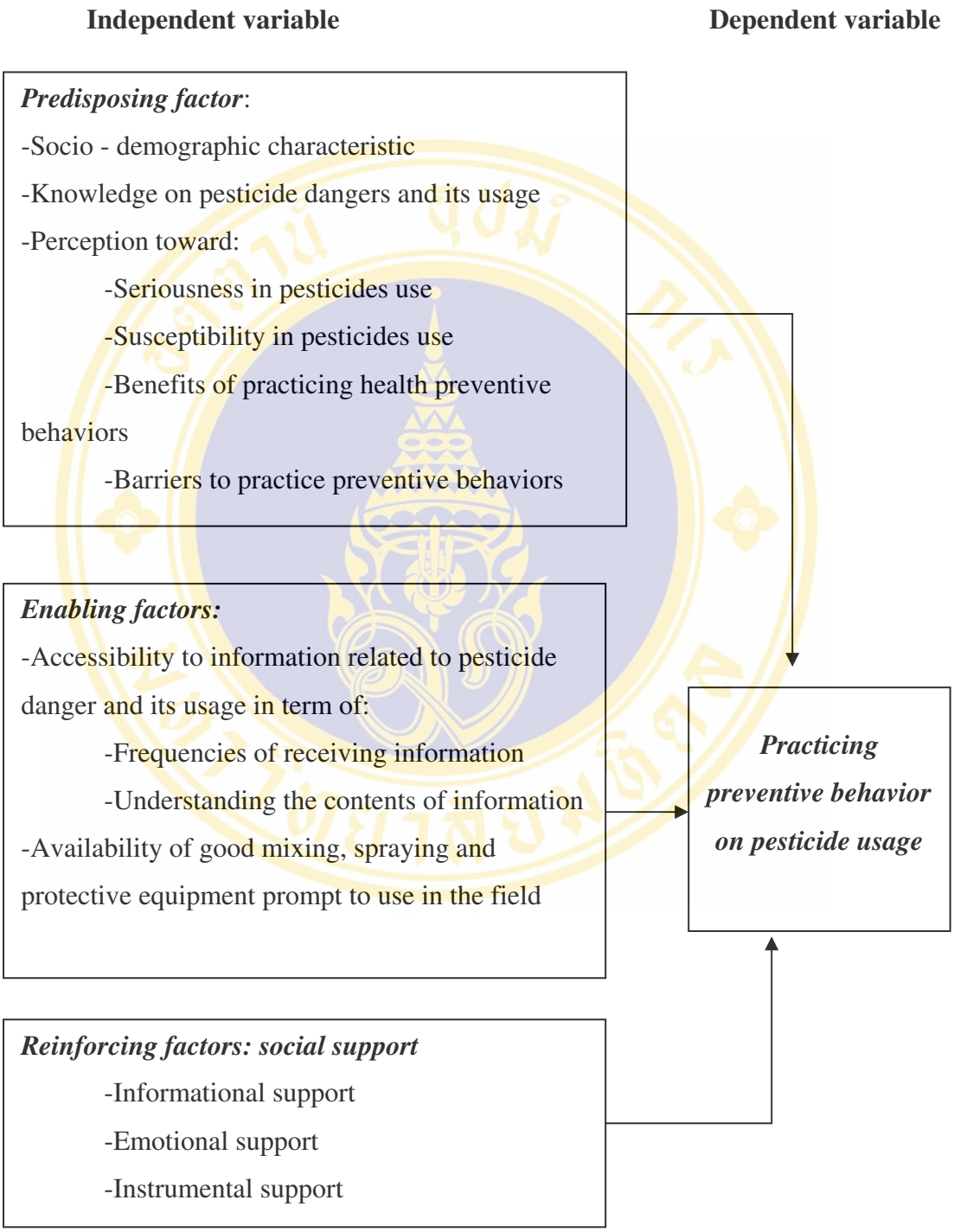

Figure 1: Conceptual framework of performing preventive behaviors on pesticides usage among the rice farmers in Suphanburi province

1.5 Operational definition

1.5.1 Preventive behavior among rice farmers

Preventive behavior means to appropriate actions employed by the farmers during the process of using pesticide, after using it and on days when not using it, which aims to prevent themselves, their family and environments away from danger of pesticides.

1.5.1.1 While using the pesticide

Mixing

-Wear protective equipment.

-Mix the pesticides follow on the label

-Use stick to stir the pesticide mixers

Spraying

-Wear protective equipment.

-Spray it in the same direction of the wind

-Spray and walk backward

-Spray on early morning or late afternoon (windless and mild strong sunlight time).

-Do not smoke or eat when spraying the pesticide

- -Keep children, food, water far away from the field when spraying it

1.5.1.2 After using the pesticides

-Clean body (wash hand, take a bath, wash hair) with water and soap immediately after using it;

-Change spraying clothes immediately

-Separate spraying clothes from other ones

-Spraying equipment and protective equipment are cleaned carefully and far away from source of utilized water

1.5.1.3 On days when not using the pesticides

-Containers are burn or buried after using pesticide

-Do not use container of pesticides to store food and drinking water

-Keep pesticides in the safe places (as in the locked place, faraway from home, source of utilized water and food)

-Pesticides containers are tied or covered strictly with warning sign.

1.5.1.4 Protective equipment

It refers to equipment that farmers use to prevent them away from pesticide poisoning as hat, eyeglasses, mask, and plastic or latex gloves, boot, long sleeves shirt, long pants.

1.5.2 Predisposing factors

Predisposing factors were the factors that provide the rational or motivation for the farmers to perform preventive behavior. In this study, the predisposing factors concerned to socio- demographic characteristics of the farmers; their knowledge about pesticide danger and its usage ; perception toward seriousness, susceptibility to danger of pesticide, perceived benefits and barriers to practice preventive behaviors.

1.5.2.1 Socio-demographic characteristics:

Socio-demographic characteristics referred to age, gender, number of children especially children are being in breast feeding, education, years of using pesticide and monthly family's income, employment status of rice farmers who are the respondents of this study

Age: In this study, the respondents are not younger than 15 years old

Gender: It includes to male and female.

Number of children: It means to numbers of children who live with respondent's family, especially children who are being in breast feeding time

Educational level: It refers to the highest educational level that the respondents can gain during the study time. It is categorized into:

-Illiteracy: it refers to the respondents who cannot read and write

-Primary school**:** it refers to the respondents who graduated at primary school level.

-Low secondary school: it refers to the respondents who graduated at low secondary school level.

-High secondary school: refers to the respondents who graduated at high secondary school level.

Years of using pesticides: It means to numbers of year that the rice farmers have used pesticides

Monthly monthly's income: total monthly income earned by all members of respondent's family

Employment status: in term of land that farmer own

-Self-employment: are farmers who their own land and use pesticide by themselves

-Wage earners: are the rice farmers who have their own land and they work for others as wage earner and use pesticide.

1.5.2.2 Knowledge of farmers

It refers to their understanding on the pesticide dangers and its usage safely according to the recommendation from significant people as agricultural office, Village Health Volunteers, Health Personnel, mass media, or guides in the leaflets.

1.5.2.3 Perception of the rice farmers

It refers to their perception on seriousness of pesticide dangers and susceptibility to get the dangers, in addition to the perception on benefits and perception toward barriers to practice preventive behaviors.

1.5.3 Enabling factors

Enabling factors are factors that facilitate or motivate predisposing factors to make the rice farmers easy to practice preventive behavior. In this study, enabling factors are included to their accessibility to source of information which related to pesticides danger and its usage in term of frequencies of receiving information and understanding of its contents, the availability of good protective equipment, mixing and spraying equipment prompt to use in the field.

1.5.3.1 Accessibility to the source of information

It refers to the perception or opinion of farmers on:

-Frequencies of receiving information from different sources**:** it refers to the information about danger of pesticides and how to use pesticide safely that farmers get form mass- media (television, radio); agricultural officers; village health volunteer or health personnel…, etc.

-The understanding of contents of the information gotten from different sources as mentioned above

1.5.3.2 Available of equipment

It refers to the perception of farmers toward protective equipment in term of:

-Having good protective equipment prompt to use in the field

-Having good mixing and spraying equipment prompt to use in the field

1.5.4 Reinforcing factors:

In this study, reinforcing factors refer to social support in which the farmers received from their family, relatives, neighbors, Village Health Volunteers

and health personnel in term of emotional support, informational support, and instrumental support.

Emotional support: it means to farmer's feeling of emotional support received or gotten from family, village health volunteer, health personnel that incentive them to perform preventive behavior.

Informational support: it refers to the perceptions of farmers about information related to pesticides use and health preventive behavior gotten from family, village health volunteer, health personnel.

Instrumental support: means to the perceptions of farmers about protective equipment supported from neighbor, relatives, and employers.

1.6 Scope and limitation of the study

Scope: study in the rice farmers who were living at 9 selected villages in Muang district, Suphanburi province.

Limitation: the result of this study cannot apply to other farmer groups such as sugar cane, gardener.

1.7 Expected outcome

It can be used for base line data to improve the projects that aims to tackle with the problems of inappropriate pesticide usage in Muang district, Suphanburi province

CHAPTER II
LITERATURE REVIEW

Part of literature review displayed the details about:

-General information of pesticides

-Danger of pesticides affects health

-Guidelines of practicing preventive behavior from danger of pesticides usage

-Precede - Proceed Model

-Reviewing of previous studies

As follows:

2.1 General information of pesticides

2.1.1 Definition of pesticide

Food Agriculture Organization (FAO) defines pesticides as any substance or mixture of substances intended for preventing, destroying, or controlling any pest, including vectors of human or animal disease, unwanted plants, or animal. It causes harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products, or animal foodstuffs, or which may be administered to animals for the control of insects, arachnids or other pests in or on their body.

2.1.2 Name of pesticide

Pesticide is named base on component of its chemical structures such as carbamate, organophosphate, or target pests. Depending on the target pest, there are specific terms for different pesticides, such as (18):

Target pests	Term used for pesticide
Fungi	Fungicide
Plants	Herbicide
Insects	Insecticide
Nematodes	Nematicide
Mites	Miticide
Rodents	Rodenticide
Viruses	Viricide
Birds	Avicide

That is one reason why some farmer can know and remember name of pesticide they are using now.

2.1.3 Classification of pesticides

Pesticides are classified in several ways, each have it own value for a given purpose. Some pesticides are classified on their toxicity, their structures their functions. Base on the target pest, there are specific terms for different pesticides

2.1.3.1 Classification of pesticide bases on their toxicity.

Acute toxicity values of a pesticide determine the toxicity category of the pesticide and the signal word(s) required on the pesticide label. The toxicity category is assigned based on the highest measured toxicity, oral, dermal, or inhalation; effects on the eyes and external injury to the skin are also considered. The category of toxicity and, therefore, the signal word(s) are based on the total formulation. Thus, the products that contain the same active ingredient but in different formulations may bear different signal words.

2.1.3.2 Classified base on chemical structure.

Based on its chemistry, pesticides can be divided into three groups: inorganic pesticides, organic pesticides and biological pesticides (19):

Inorganic pesticides:

Inorganic pesticides are those pesticides that do not contain carbon, which have a low acute toxicity to humans and animals.

Organic pesticides

Organic pesticides are carbon compounds used to control pests. Although organic pesticides can occur naturally, they are often human-made (synthetic). They get their name based on some aspect of their chemistry. For example, organophosphate pesticides contain phosphorus and carbamate pesticides have a carbamic acid base.

Synthetic organic pesticides do not naturally occur in the environment, available for use in schools.

The organophosphates are a large group of pesticides containing about 39 active ingredients, which vary from being moderately to very toxic to mammals. Some of the more toxic organophosphate insecticides can present a high risk of irreversible organophosphate poisoning in humans, from excessive exposure (substrate: parathion, malathion).

Carbamates like the organophosphates are cholinesterase inhibitors; however, their inhibition of this enzyme is reversible. Therefore, compared to the organophosphates, people excessively exposed to carbamates have a greatly reduced likelihood of acute nerve poisoning and a greatly increased recovery rate. Carbamates, like organophosphates, do not accumulate in the environment or fatty tissues of mammals. Both carbamates and organophosphates act as contact insecticides with some stomach poisoning activity (Carbaryl, baygon).

Others kinds of pesticides are: synthetic Pyrethroids, Fluorinated Hydrocarbons, Phenoxyaliphatic Acids, Arylaliphatic Acids or "Benzoics, Dinitroanilines (19).

Biological pesticides: this group contains the microbial pesticides, insect growth regulators, pheromones and the botanical pesticides such as Microbial Pesticides, Avermectins…, etc.

2.1.4.3 Classification by its functions and structures

Table 4 Classification of pesticides by its functions and chemical structures

Function	Name	Function	Name
Fungicides	Benzimidazols Carbamates Chlorinated Hydrocarbons Phthalimides Traizines	Insecticides	Carbamates Chlorinated Hydrocarbons Organophosphates Pyrethroids
Herbicides	Carbamates Phenoxies Triazines Uracils Urea	Nematicides Rodenticides	Brominated alkanes Carbamates Chlorinated alkenes Coumarin Indandione

From that type of pesticide, three common use chemical elements are insecticide, fungicide, and herbicide, all of those elements are hazardous to farmers and level of poison are up to chemical characteristic (20).

2.2 Danger of pesticides affects the health.

People were always warned that pesticide is very dangerous but they must know why and how dangerous they are

The first, pesticide penetrates body by several ways, such as skin, oral or inhaled. Pesticides are inhaled when the farmer is spraying pesticides. Cloth or Karma's covering the mouth and nose is not enough to prevent the pesticide entering the lungs. Pesticides enter the mouth and stomach when food polluted by pesticides is eaten, when a farmer eats, drinks or smokes without washing their hands after using pesticides, when people drink water contaminated by pesticides or when people drink the pesticide. Pesticides are absorption through the skin when a farmer mixes pesticides with bare hands; when he or she spills pesticides on his or her body; when the clothes of a farmer become soaked with pesticides, or when people walk barefoot through a field after pesticides have been or are being sprayed, or by washing clothes of someone who was exposed to pesticides (16). Study of Kunstadter P. show that men age 10 through 19 and age 20 through 39 have significantly higher exposure than women of those ages. Exposure levels among men age >20 were not associated with Thai literacy; women who were not literate in Thai had higher exposure levels than those who were literate (21)

The second, pesticide is especially susceptible to woman and children and it strongly impact in pregnant woman. If woman is pregnant or nursing a baby, touch pesticides, does not wash clothes that have pesticides on them, it means they touch her skin or if she breathe in their fumes, poisons can enter bloodstream. Blood will carry the poison through body, where it can harm liver, lungs, stomach, and other parts of body. The unborn baby can be poisoned when your blood enters the baby's body. (22).Since, the result can be in abortion, birth defects, or even death of new- born child. Some kind of pesticide such as DDT, dieldrin and aldrin may accumulate in the milk of the nursing mother and eventually poison the child through breast-feeding (18). Having measured 29 pesticides in plasma samples collected at birth between 1998 and 2001 from 230 mother and newborn pairs enrolled in the Columbia Center

for Children's Environmental Health prospective cohort study. Research has shown widespread pesticide use during pregnancy among this urban minority cohort from New York City. We also measured eight pesticides in 48-hr personal air samples collected from the mothers during pregnancy (23). Another research into the effects of pesticides on workers shows that uterine cancer is more common in women exposed to the pesticide (24). Women should also consider the health and safety of children engaged in agricultural labors.

Children, especially malnourished ones, are more susceptible to the hazardous effect of pesticide because of structure of their body. More than half of the tested children of farm workers who live in Douglas and Chelan counties in Washington State were exposed during the spraying season to pesticide levels that exceeded federal safety levels, according to University Washington researchers. That is even though the children themselves do not work in the field (24). Moreover, report from NRDC shows that: the children of farmers, farm workers, and agricultural communities -- including over 500,000 children under the age of six -- are surrounded by a virtual sea of pesticides. They come in contact with pesticides through residues from their parents' clothing, dust tracked into their homes, contaminated soil in areas where they play, food brought directly from the fields to the table, and contaminated well water. These children are likely to have the highest exposure to pesticides of any group of people in the country. Furthermore, farm children often accompany their parents to work in the fields, raising their pesticide exposures even higher. Many of the children with the greatest pesticide exposures are from migrant farm worker families, who are poor and usually people of color or recent immigrant (25). The highest rates of "dangerous" exposure are among children, age 1 through 9 years (39%) and 10 through 19 years (26.8%) (21).

The third, severity of any effects from pesticide exposure depend on the pesticide dose (degree of exposure) and type of pesticide. Typical symptoms of poisoning pesticide are:

Mild poisoning includes headaches, nausea, dizziness, fatigue, irritation of the skin, eyes, nose and throat, diarrhea, excessive sweating and loss of appetite.

Moderate poisoning: vomiting blurred vision, stomach pains, rapid pulse, sweating trembling, fatigue and nervousness

Severe poisoning: convulsions, respiratory failure, loss of consciousness, slow pulse, may cause death (18)

The mechanic is that chemicals attach the enzyme acetyl cholinesterase that stops nerve transmission. The suppression of this enzyme then causes continuous electrical nerve transmission which particularly affects the muscles, glands and smooth muscles that make the body organs function The most common mechanism of action is inhibition of the enzyme cholinesterase, which is essential for transmission of nerve impulses. Most pesticides in this category are organophosphorus or carbamate compounds. Proper functioning of the nervous system requires an enzyme called cholinesterase, which facilitates the transmission of nerve impulses. Cholinesterase-inhibiting pesticides disable this enzyme, resulting in symptoms of neurotoxicity---tremors, nausea, and weakness at low doses, paralysis, and death at higher doses. Most of these pesticides are insecticides with a similar mechanism of action in both insects and humans (8).

Using pesticide like a knife with two sides, it is used to control pest and unwanted plan but it also damage users if it has chance to contact with them. Not only the users but also other members in their family do affect especially children are victims of inappropriate using pesticide. The efficiencies can occur immediately after exposing (acute poison) or long time later (chronic poison). That is result why farmers should perform health preventive behavior

2.3 Guidelines of practicing preventive behavior from danger of pesticides usage

Preventive behavior while using pesticides means protect yourself by wearing clothes that cover as much of your body as possible. These clothes should protect

your skin from pesticide powder, dust, liquid, or spray. Wear long trousers or a long apron, and a long-sleeved shirt. Protect your feet with rubber boots or shoes. Wear a hat, which will not absorb water, and unlined plastic gloves that reach to your elbows. If wearing cloth or rubber gloves it will absorb the pesticides. Always wash your hands with soap and water after using pesticides. Never mix or measure pesticides with your bare hands -- use a stick instead. Protect your hands by wearing plastic gloves, or by tying plastic bags securely around your wrists. Do not use gloves made of cloth or leather. Cloth and leather can absorb the pesticide, which can then touch your skin. Never spray them on a windy day. The best time to spray is when there is no wind, usually in the early morning, or late in the afternoon. If there is just a little wind, spray in the same direction the wind is blowing. Then the pesticide will blow away from you, not back toward you. In addition, do not let it blow toward other people, animals, houses, or water supplies. Do not eat, drink, or smoke when using pesticides, because traces of the chemicals may be transferred from hand to mouth (26).

The amount of pesticides found daily on the outer most garments could sometimes be measured in gram/person. Research has shown that protective outer clothing may serve as an important barrier that effectively reduces the potential dermal exposure by as much as 90% and thus lowers the absorbed daily dose. Exposures to pesticides can be greatly reduced by the use of appropriate personal protective equipment. Batel and Hinz (1987) have shown large reduction in dermal exposure to the hand and head area by using gloves and hood. Popedoif (1987) concluded that dermal doses were reduced by coveralls and the use of hand protecting (gloves) can decrease 90 % of dermal exposure. Experiments using fluorescent traces mixed with pesticides provide strong visual example of how well personal protective equipment prevents exposure (Frenske 1987) (28).

It is necessary for the users to keep them safely from pesticides by washing hand with soap immediately after using it. Taking a bath, changing and separating protective clothes are also important. Protective equipments as well as mixing and spraying equipment should be cleaned after every time of using. It only in good

practicing if all equipment are clean faraway from source of utilized water and then kept in safe place. Either used pesticides container or no used pesticides should be dumped (26).

2.4 Theories

2.4.1 Precede- Proceed Model

PRECEDE-PROCEED are a planning model designed by Lawrence Green and Marshall Kreuter for health education and health promotion programs (29). Its overriding principle is that most enduring health behavior change is voluntary in nature. This principle is reflected in a systematic planning process, which seeks to empower individuals with understanding, motivation, and skills and active engagement in community affairs to improve their quality of life. This is also practical: Much research shows that behavior change is most likely and lasting when people have actively participated in decisions about it. In the process, they make healthy choices easier by changing their behavior and by changing the policies and regulations, which influence their behavior.

PRECEDE-PROCEED have nine phases. The first five of which are *diagnostic:* (1) *social* diagnosis of the self-determined needs, wants, resources, and barriers to them in the target community; (2) *epidemiological* diagnosis of the health problems; (3) *behavioral and environmental* diagnosis of the specific behaviors and environmental factors for the program to address; (4) *educational and organizational* diagnosis of the predisposing, enabling, and reinforcing conditions which immediately affect behavior; and (5) *administrative and policy* diagnosis of the resources needed and available in the organization, as well as the barriers and supports available in the organization and community.

The four remaining phases in PRECEDE-PROCEED are implementation and evaluation (process, impact, and outcome), with emphasis on using the latter to improve the former. Evaluation of the process begins as soon as implementation does, in order to detect problems early so they can be corrected. As implementation proceeds, the planner starts evaluating in the order in which program effects are

expected. First, its immediate effects (impacts) are evaluated, in order to determine the extent to which the program needs modification. Finally, when enough time has passed--as specified in the objectives--the ultimate intended effects on morbidity, mortality, and quality of life are assessed. This kind of phased evaluation allows you to see what works and what do not.

Theory is most likely to be informative during Phase 4 of the planning process suggested by PRECEDE-PROCEED, or the educational and organizational diagnosis. This phase focuses on examining factors that shape behavioral actions, and environmental factors. Behavioral actions--such as reducing intake of dietary fat, engaging in routine physical activity, and obtaining annual mammograms--are shaped by *predisposing, reinforcing*, and *enabling* factors, many of which are amenable to change. Environmental factors--such as availability of prevention services, hazardous workplace conditions, and reimbursement for cancer screening--are influenced primarily by *enabling* factors.

Predisposing factors provide the motivation or reason behind a behavior; they include knowledge, attitude, cultural beliefs, perception, and readiness to change, and so on.

Enabling factors make it possible for a motivation to be realized; that is, they "enable" persons to act on their predisposition; they include available resources, supportive policies, assistance, and services.

Reinforcing factors come into play after a behavior has begun, and provide continuing rewards or incentives; they contribute to repetition or persistence of behaviors. Social support, praise, reassurance, and symptom relief might all be reinforcing factors.

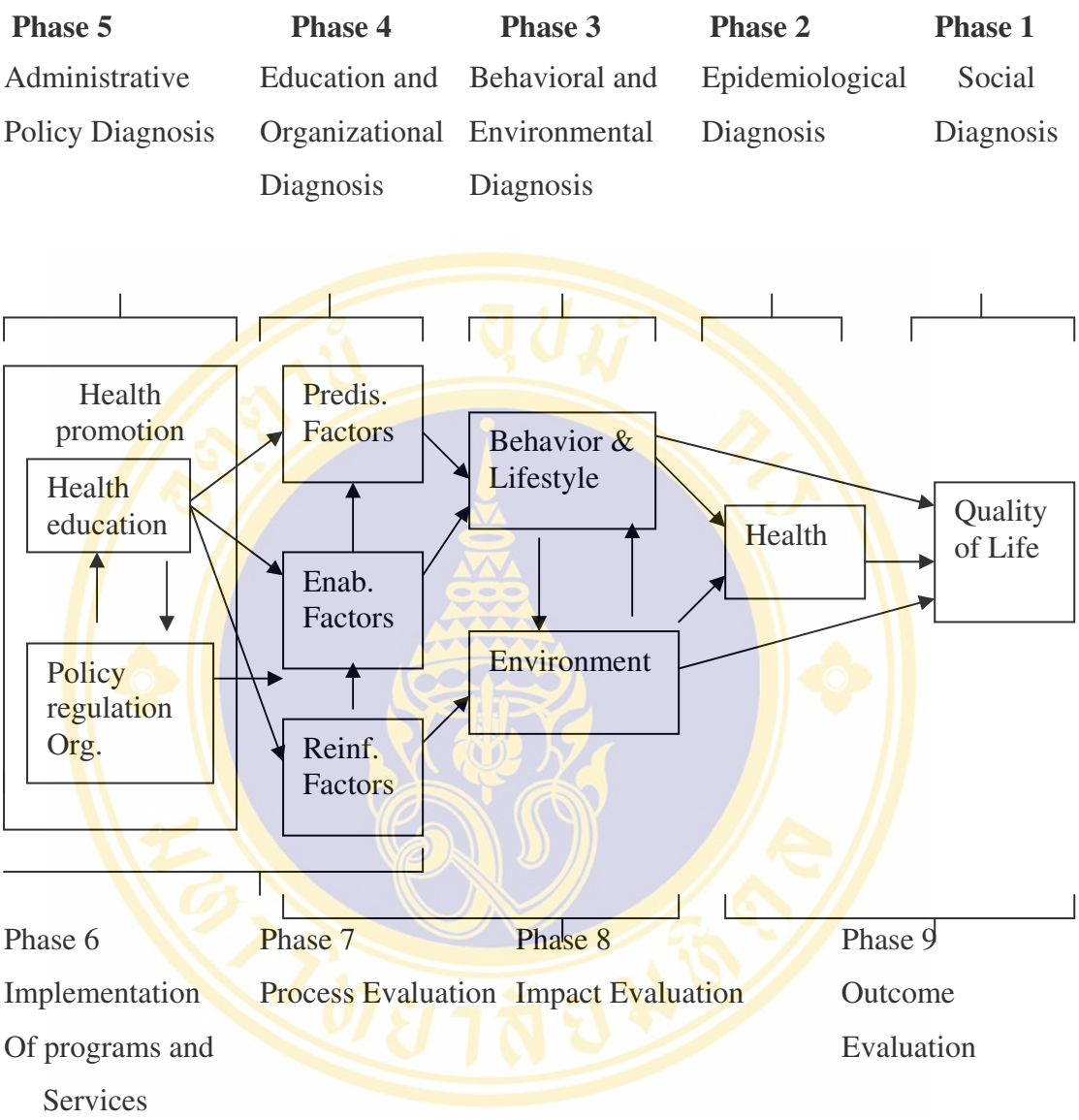

Figure 2: Proceed - Precede Model by Lawrence Green and Marshall Kreuter

2.4.2 Application of health models to the present study.

This study only can apply phase 4 to explain why farmers take action, in this study, it means perform preventive behavior. Phase 4 let us to know how much education and Organization diagnosis impact on protective behavior. This contains predisposing factors such as socio-demographic of farmers (age, sex, marital status, number of children, years of using pesticide, monthly income), knowledge of them about pesticide use and performing preventive behavior. Besides that, it concern

about perception of farmers includes of perceived seriousness, perceived susceptibility, perceived benefit, and perceived barriers of farmers as individual perception . Another part of phase 4 is enabling factors such as accessibility of equipment and available of equipment reinforcing factor. All together, would ultimately lead to the performing health preventive behavior among rice farmer. Practicing was therefore the final decision of following a preventive behavior, here was performing health preventive behaviors.

2.5 Review of related researchs

Some researches have been done in using pesticide safety with aspects of practicing protective behavior so far. In the following section, those studies will be discussed according to the study variables of this present study.

2.5.1 Practicing health behavior

Study of Kunstadter P. (surveys about pesticide exposure of ethnic minority H'mong farmers in North Thailand) (21): large numbers of individuals reported that they did not take appropriate precautions to prevent exposure to pesticides including wearing masks, gloves, boots or protective clothing, or staying out of fields after pesticides were applied. The highest proportions of those who did not take these precautions were children age 1 through 9 years, followed by those ages 10 through 19 years.

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Lojananont C.V. studied agriculturist's self-care behavior, environment, and consumer protection in pesticides uses in Pathumthani province conclusion that 22.4% had self- care behavior of using equipment to protect the private danger in the high level (15)

70.2 % of the water chestnut in Suphanburi had high behaviors of using pesticides level (27).

According to Khoanun O., 20.7 % of the farmers had high level of practicing preventive behaviors utilization of pesticides (35).

2.5.2 Predisposing factors

2.5.2.1 Study related to Socio-demographic characteristics

2.5.2.1.1 Age

Lojanamont V. C. when compared self-care behavior among two groups of farmer's mono culture and integrated farming in his study only declare the distribution of age: average age was 46 years, group older than 30 years old was 93.7 %(15). Majority of the water chestnut in Spirodok S. (27) study was 36-45 years old. According to Phonrat P., 66 % of his respondents were older than 30 years old (33), so did farmers' age in study of the Khoanun O (35).

It was found that age had significant correlation with knowledge of pesticides use among 188 traders in Nakornpathom according to study of Mayukhachot P. (31). In addition, Chaleosilp C. found age significant affected Health preventive behavior on pesticides use among gardeners in Phitsanuloke province (32).

The conclusion after reviewing studies related to behaviors on using pesticides more than two-third of the pesticide users were older than 30 years old and their age had a significant correlation to preventive behaviors.

2.5.2.1.2 Gender

Lojanamont C.V. (15), Spirodok S. (27), Phonrat P. (33) and Khoanun O. (35) showed that proportion of male respondents were higher than female. As variable of age, Lojananont did not mention correlation between sex and practicing self-care behavior (15).

Phonrat P. found that sex related to knowledge of using pesticide safety (33). However, Chaleosilp C. found that sex had no statistical correlation with farmer's behaviors regarding pesticides (31).

Among the farmers, women were less likely to wear protective clothing when applying pesticides than men did (21.

Through three studies, there was no conclusion about relationship between gender and practice preventive behaviors.

2.5.2.1.3 Education and income

Study of Kunstadter P. show: women had less education than men (21) did. In addition, in Lojananont's study, most of them (>85%) had education level at primary school (15). It was similar with water chestnut farmers in several studies (27, 33, and 35).

Phonrat P. identified that level of education were related to knowledge and behavior of pesticide use when author study knowledge, attitude and behavior pesticide use of agriculturist (33). Chaleosilp C. find education had no statistical relationship with those behaviors (32).

The relationship between educational level and behaviors of pesticide users was not given the same result among those studies.

2.5.2.1.4 Family's income

Lojananont C. V. found that 31.2% of farmers had yearly income between 25,000 and 50,000 (15). Phonrat P (33) and Khoanun O (35) also show that half of their subjects had annual family's income less than 60,000 Baht.

However, only Chaleosilp C. referred that annual income impacted on behaviors of using pesticide with statistical significance at level 0.001(32)

2.5.2.1.5 Year of using pesticide

In Lojananont's study, 71 % of farmers had more than 10 years of using pesticides. That group was high percentage because of high age of

target group (15). It was similar with study by Khoanun O, 67.5 % of the farmers used pesticides more than 10 years (35).

However, years of selling pesticide affected to knowledge of use pesticide safety among trader in the study of Mayukhachot P. (31). Years of using pesticides also significant associated to behaviors of using pesticides among agriculturists by studies of Chaleosilp C. (32), Phonrat P. (33), and Ditheesawatvate S. (34)

According to the studies above, years of using pesticides affected to behaviors of pesticide user. This homogenous result will help researcher to consider own result more easily.

None of study in this literature mentioned to number of children in family of farmers. It is difficult for researcher to review this sub-variable.

2.5.2.2 Knowledge of farmers on pesticide danger and its usage

It was found that there were not many pesticides user had good right knowledge on pesticides use in studies by Lojananont C.V. (21.1 %) (15), by Spirodok S (24.5 %) (27).

It also found that there was significant relationship between knowledge and practicing self-care behaviors in Lojananont' research (15), using pesticides behaviors among the water chestnut farmers, according to Spirodok S. (27);and among agriculturists, according to Ditheesawatvate S. (34) and Chaleosilp C (32).

Knowledge on pesticide usage was significant relationship with behavior of pesticide users, it is conclusion of all the studies that researcher review.

2.5.2.3 Perception of rice farmers to pesticide dangers and its usage

In Lojananont's studies (15), health perception was classified into three levels, 68.12% of agriculturists had the total health perception in the middle level, the high and the low level calculating 15.94% equally. There was no significant relationship between perceived seriousness, perceived susceptibility in pesticide uses and three part of health behavior at level 0.05 (p-value = 0.81; 0.68). However, perceived benefit of taking action and barrier to taking action had a significant affection to practice self-care behaviors among the agriculturists**.**

Khoanun O. studied health belief, preventive behavior, utilization of pesticides and toxicity among farmers in Nakornsawan province and conclusion: the factors had positive statistically significant correlation with preventive behaviors was perceived susceptibility (r = 0.1564, p-value = 0.001), perceived severity (r = 0.1333, p-value = 0.004), perceived benefit and barriers (r = 0.2148, p-value < 0.001) (35).

Study of Sitthisak S. showed that perceived severity, perceived susceptibility, perceived benefit and barrier was significant correlated to health preventive behavior (p<0.001) (36).

Three studies had the same result that perceived seriousness was significant relationship with behaviors of pesticide user, but they had different conclusion o relation between perceived susceptibility, perceived benefits, and barriers of practicing preventive behaviors.

2.5.3 Studies related to enabling factors

In the study of Lojananont, 86.7% of farmers got information and knowledge on pesticide use from agriculture offices, who visit them once per month; 78.7% information hot from television (15).

According to the study in Moultrie County to examine the behavior of wearing protective eyewear, having table of respondents to eyewear, they concluded

that: distribution of chemical personal protective equipment kits to farmers can have a slight positive effect on farmer's intentions and self-reported behaviors to wear chemical protective eyewear above those that do not receive a kit (38).

2.5.4 Social support

There were no research studied the support factors to practicing preventive behaviors

In summary, from the literature review, concept and theory, and related research it was concluded that many factors have an effect on the performing health preventive behaviors among rice farmers. There fore, in this study, the researcher selected phase 4 from Precede –Proceed Model as an educational and ecological assessment that included Predisposing, Enabling and Reinforcing factors to make motivation of taking action of farmers clearly

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research design

This research is cross-sectional descriptive study in which its main purpose was to study the socio-demographic characteristics, knowledge on pesticide and pesticides usage, perception toward pesticide usage, as well as the effect of accessibility to information related to pesticides, availability of good protective equipment, social support and performing health preventive behaviors. The study was conducted between 7th January-7th February 2004 in Muang district, Suphanburi province, Thailand.

3.2 Study area.

To compare with other districts, Muang district was selected as this study area due to it is nearest to Bangkok with convenient traffic system. 90 % of land in this district used for rice farming. There are 19 sub-districts in Muang district, and they divided into 123 villages with 3,293 rice-farming households. And the land are used for rice farming shown in table 5, it is counted to 205,000 out of 228,154 rais or 90% of this district land is used for rice farming.

Table 5 Data of land used for agriculturists farming in each region of Suphanburi province, 2003

District	Agriculture area (Rais)					
	Rice	**Farm product**	**Garden**	**Flower**	**Vegetable**	**Total**
Muang	205,000	2,745	19,471	-	938	228,154
Bangplama	171,160	2,77	7,330	30	886	182,176
Duembang	151,296	77,259	4,831	10	1,844	235,240
Nangbust donchodi	135,355	15,950	8,490	-	2,095	161,890
Samchuk	158,780	3,630	8,666	1,200	1,548	173,824
Sriprachan	132,700	15,260	16,690	200	8,456	173,306
Songdeenang	156,831	120,392	2,265	-	14,010	293,498
U-thung	181,589	127,721	5,529	-	5,645	320,484
Danchang	1,530	298,603	17,115	-	8,546	325,791
Nungyasoi	112,620	119,059	18,676	559	11,370	263,284

Source: Suphanburi Provincial Agriculture Office, 2003

3.3 Study Population

The study populations were Thai rice farmers who used pesticide directly, and their age more than 15 years old in Muang district, Suphanburi province, Thailand.

3.4 Sample size

Sample size for this study was calculated base on following statistical formula (sample size estimation):

$$N = \frac{Z^2_{\alpha/2} * p(1-p)}{d^2}$$

$$N = \frac{1{,}96^2 * 0.224(1-0.224)}{(0.05)^2} = 267$$

N: the desired sample size

Z: standard normal score at significant level of 0.05 (two sides test) =1.96

p.: proportion of population performs protective behavior in high level from previous study (27) = 0.224.

d:allowance for relative error, it equal to 0.05

3.5 Sampling technique and sample selection

Sampling technique used in this study was multistage sampling

3.5.1 Process 1: sampling of the district

Muang district was purposively selected by studying from the annual data of Agricultural Office of Suphanburi province. This district has the highest pesticide use and rice farmer household when compared to the others.

3.5.2 Process 2: Sampling of the sub district

There are 19 sub districts in Muang district. Sra-Kaew, Ta- Ling -Shun and Sanam-Cree were purposely selected due to they are the sub district with higher rice farming household compared with the others.

3.5.3 Process 3: Sampling of the villages

Villages at each sub district were divided into 2 groups (clusters) base on the geographical distribution of Health Center at each sub district, so these groups of villages were clustered and selected proportionately according to each sub-district.

Sub district	Village number	Chosen village number
Sra- Kaew	1, 2, 3, 5, 6	1, 6
	And 4, 7, 8, 9	7, 8
Ta-Ling-Chun	1, 2, 6	2
	And 3, 4, 5, 7	3, 7
Sanam -Cree	1, 2, 3	1
	And 4, 5, 6	6

From each cluster, numbers of villages were proportional sampled according to the density of villages in it and then simple random sampling technique was used to select villages.

3.5.4 Process 4: sampling of the households

Number of rice farming households at each village were proportionately selected according to their density as shown in table 5.These households at each village would be selected with systematic random sampling technique

Those processes were shown in the figure 4.

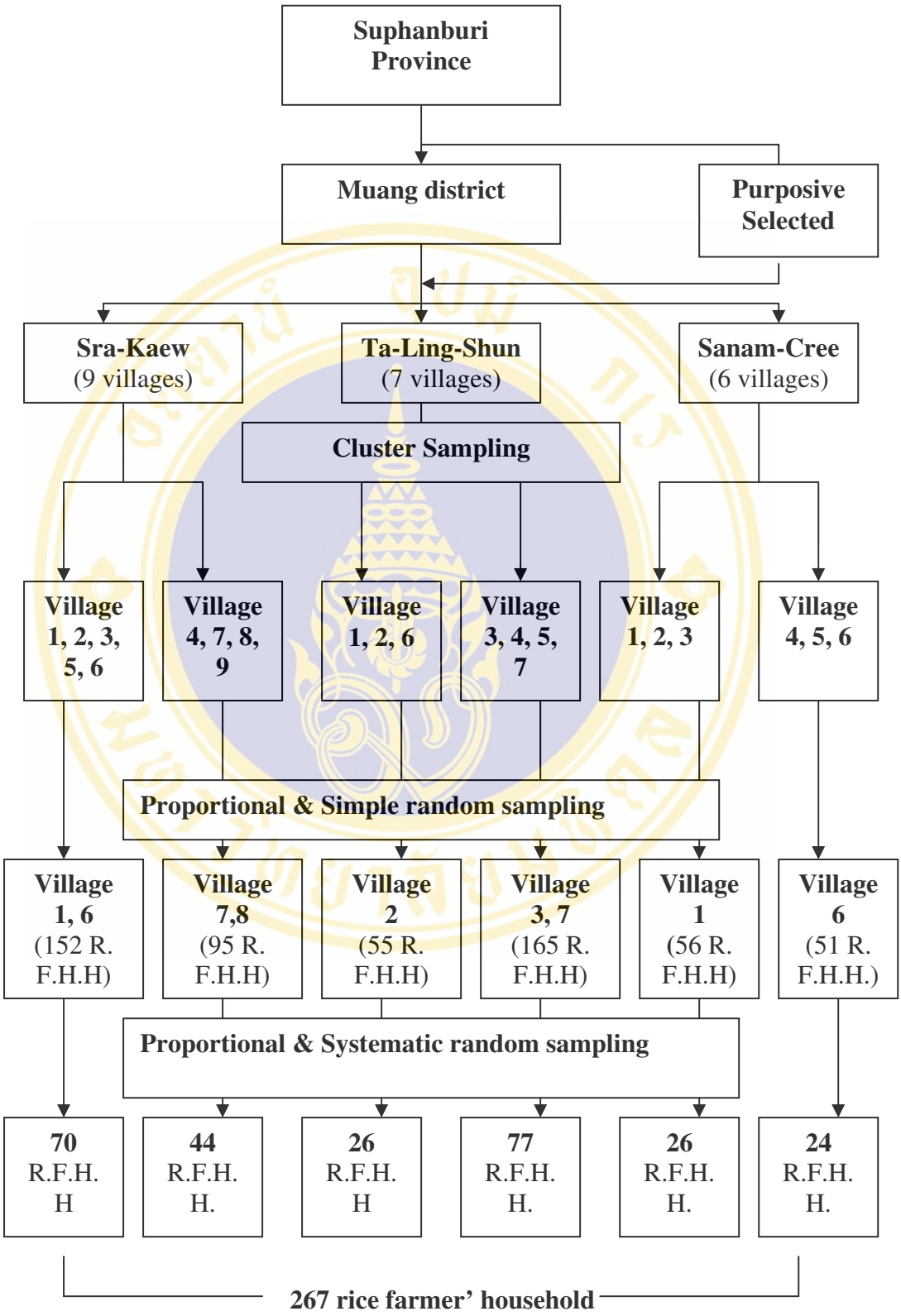

Figure 4: Diagram of sampling technique

3.6 Research instrument for data collection

The data was collected by using of structured questionnaire that were related to the factors affecting the performing preventive behavior among rice farmers who use pesticide. The questionnaires were divided into four parts as follow:

3.6.1 Practice preventive behavior

Practicing preventive behaviors among the rice farmers were divided into 3 parts and comprised of total 28 questions concerning with their practicing in term of frequencies to perform it. The target group had to choose only one choice and got the point as follows:

	Appropriate behaviors	Inappropriate behaviors
Often:	3 scores	0 score
Sometimes:	2 scores	1 score
Rarely:	1 score	2 scores
Never:	0 score	3 scores

Total scores of each the rice farmer would be ranked from 1st to 267th. The levels of performing health preventive behaviors were categorize based on Median as cut point value as follows:

High level: got scores equal or more than median of total scores

Low level: got scores less than median of total score

3.6.2 Predisposing factors

3.6.2.1 Socio-demographics of the rice farmers

Age: it was calculate in year. The values were categorized into four groups as 20-29, 30-39, 40-49 and equal or more than 50

Gender: this variable was categorized into two groups as male and female

Numbers of children: there were three groups as no child, one child, and two or more than two, especially children are being breast-feeding.

Educational levels: were divided into illiteracy, primary school, secondary school, and high school.

Monthly income: this variable was categorized into two groups as from 1,000-5,000 Baht and from 5,001-20,000 Baht.

Year of using pesticide: three level of this variable were divided into 5-10; 11-20 and 21-30 years

Employment status: it was self-employed rice farmers and wage earner

3.5.2.2 Knowledge

There were 9 closed questions with 4 choices. The correct answer was given 1 score, incorrect answer was given 0 score. Total scores was ranged from 0 to 9. Then it was classified according to the Bloom's scale as:

-Good knowledge: >80 % of total scores or from 8-9 score

-Faire knowledge: 60-80 % of total scores or from 6-7 score

-Poor knowledge: <60 % of total scores or 0-6 score

3.6.2.3 Perception

There were 32 questions divided into three parts regarding to perception of farmers about seriousness and susceptibility on pesticide danger, benefits of practicing preventive behaviors and barrier to take these actions. There are 16 positive questions and 16 negative questions. The score was regarded as follows:

	Positive questions	Negative questions
Agree	3 scores	1 score
Not sure	2 scores	2 scores
Disagree	1 score	3 scores

From total scores of each part of perception, the levels of it were classified according to the Bloom's classification as high, moderate, and low perception.

The perception on seriousness was consisted of 6 questions, number 3 and 5 were positive questions, numbers 1, 2, 4, 6, 7 were negative questions. Total scores in this part were18 and the levels of it were:

-High: > 80 % of total scores or from 15 to 18 scores

-Moderate: 60-80 % of total scores or from 11 to 14 scores

-Low: < 60 % of total scores or from 6 to 10 scores

The perception on susceptibility was consisted of 6 questions, positive questions were questioned number 2, 4, 5 and negative ones were 1, 3, and 6. Total scores in this part were 18 and the levels of perceived susceptibility were:

-High: > 80 % of total scores or from 15 to 18 scores

-Moderate: 60-80 % of total scores or from 11 to 14 scores

-Low: < 60 % of total scores or from 6 to 10 scores

The perception on benefits was included 6 positive questions (numbers 1, 4, 5, 7, 9, and 10) and 4 negative questions (numbers 2, 3, 6, and 8). Total scores in this part were 30 and the levels of perceived benefits were:

-High: > 80 % of total scores or from 25 to 30 scores

-Moderate: 60-80 % of total scores or from 18 to 24 scores

-Low: < 60 % of total scores or from 10 to 17 scores

The perception on barrier to practice preventive behaviors regards to 10 questions, 6 positive questions were 1, 4, 5, 9, 10, and 4 negative questions were 2, 3, 6, 7, 8. Total scores in this part were 30 and the levels of perceived barrier were:

-High: > 80 % of total scores or from 25 to 30 scores

-Moderate: 60-80 % of total scores or from 18 to 24 scores

-Low: < 60 % of total scores or from 10 to 17scores

3.6.3 Enabling factors:

3.6.3.1 Accessibility to information

-Question number 1: frequencies of accessibility to source of information; with answer "regular," the score given was 2, 1 score was given to the "irregular" answer and 0 score was given to the answer of "never".

-Question number 2: the understandable information.3 scores was given to the answer "good," 2 for "fair" and 1 for "poor."

Total scores in each question number were categorized into three levels based on Bloom's scale:

High level: > 80 % of total scores of each question

Moderate: 60-80 % of total scores

Low :< 60 % of total scores

3.6.3.2 Availability of good equipment

There were 2 questions in this part; question number 1 was availability of good protective equipment prompt to use in the field, question number 2 was availability of good mixing and spraying equipment prompt to use in the field. The score was provided as always- 3 scores, sometimes – 2 scores, rarely – 1 score, never – 0 score, and then total scores in this part was classified into three level follow based on Bloom's scale as:

High level: > 80 % of total scores (22-27 scores)

Moderate: 60-80 % of total scores (17-21 scores)

Low: < 60 % of total scores (9-16 scores)

3.6.4 Reinforcing factors:

The respondents were asked with questions about social supports as support from their family, village health volunteer, and health personnel that encourage them to practice preventive behavior. There was only 1 negative question (question number 6) and 10 positive questions; score was given to each as:

	Positive questions	Negative questions
Agree	3 scores	1 score
Not sure	2 scores	2 scores
Disagree	1 score	3 scores

Total scores in this part were 33; and 3 levels of supports were categorized based on Bloom's scale as:

High: > 80 % of total scores or form 27 to 33 scores

Moderate: 60-80 % of total scores or from 20-26 scores

Low: < 60 % of total scores or from 0 to 19 scores

3.7 Pre-test for questionnaire

Before going to the process of data collection, the researcher submitted questionnaire sheets to thesis advisors in order to check its content validity. Then, the questionnaires were adjusted in according to commends and suggestion of the thesis advisors. The questionnaires were pre-test with 30 farmers in Bang- Pla- Ma district, in Suphanburi province.

The results were then analyzed for its reliability. For the parts of perception and reinforcing factors by using Cronbach's alpha method, alpha value was 0.7158 and 0.6112. By using Kuder Richardson for another part of knowledge on pesticide use, the r_{KR-21} value was 0.4247 (more detail were shown in APPEDIX B). After that the questionnaires were adjusted again and were ready to use for data collection in the study area.

3.8 Data collection

Before data collection, the permission to carry out this study was gained from the director of Muang district, Suphanburi province, Thailand. The original English questionnaires then were translated into Thai language. There were six Health personnel from six Health Center, which were located in area of nine chosen villages,

were trained to be interviewers, and filled up the questionnaires in the community according to the answers of the interviewee.

3.9 Data analysis

After collecting, the questionnaires were screened and after that descriptive statistic such as number and percentage used to describe basic information on performing health preventive behavior. Spearman rank correlation and Pearson Chi-square test were used for statistical testing on the relationship between each independent variable and dependent variable. For all of the statistical test used in this study, the significant level was set up at alpha =0.05

CHAPTER IV
RESULTS

The data from 267 respondents, rice farmers, in Muang district, Suphanburi were analyzed and their results are presented in 5 parts as follows:

Part I: Practicing preventive behaviors, they were included:

-While using pesticides

-After using pesticides

-On days when not using pesticides

Part II: Predisposing factors, they were included:

-Socio-demographic characteristics of the respondents

-Knowledge of the rice farmers on pesticides usage

-Health perception of the rice farmers on: the seriousness of pesticides, the susceptibility of pesticides, the benefits, and barriers to practice preventive behaviors

Part III: Enabling factors, they were included:

-The accessibility to the source of information related to the pesticides usage

-The availability of the good equipment

Part IV: Reinforcing factors, they were included to emotional support, informational support, and instrumental support.

Part V: The correlation between independent and dependent variables

4.1 Part I: Practicing preventive behaviors

With the total practice scores of this part (84 scores), median scores as 69 scores (82.1 % of total scores) was used to divide the respondents into 2 groups. And it was found that 50.2 % of them had total scores higher or equal to this median value score (Table 6).

Table 6 Level of practicing preventive behaviors among the rice farmers

Level of practicing preventive behaviors	Number N= 267	Percent
High (69-80 scores)	234	50.2
Low (46-68 scores)	133	49.8
Median = 69 Min = 46 Max = 80		

4.1.1 Practicing preventive behaviors while using pesticides

From the table 7 the details of practicing preventive behaviors while using pesticides were illustrated. While mixing pesticides, most farmers had "always" followed the introduction one the label (92.5 %), used stick to stir the pesticides (88.4 %) and washed hand after mixing it (88.8 %), although only 29.6 % wore gloves and nearly to two-third covered nose during mixing.

During spraying the pesticide, in term of using protective equipment, most of them had "always" wore hat (91.8 %) and long sleeves shirt (96.6 %). but only some wore plastic gloves (18.7 %). They neither wore mask, eyeglasses, and boots nor sprayed and walked backward at 29.2 %, 20.2 %, 38.6 %, and 49.8 % respectively. 78-87 % sprayed in the windless and same direction of the wind, 86.9 %-92.5 % did not smoke, drink, or eat.

Table 7 Practicing preventive behaviors while using pesticides among the rice farmers

Statements	% level of practicing while using pesticides (N = 267)			
	Always	**Sometimes**	**Rarely**	**Never**
While mixing pesticides				
1. Wear the gloves during the mixing	29.6	39.7	9.7	21
2. Cover your nose during the mixing	65.5	31.1	3.0	0.4
3. Mix the pesticides follow on the labels	92.5	7.1	0.4	0.-
4. Use stick to stir the pesticide mixers	88.4	8.6	2.3	0.7
5. Wash hand after mixing it	88.8	10.11	1.1	0.-
While spraying pesticides				
1. Wear the hat during the spraying	91.8	7.4	0.4	0.4
2. Use mask to cover nose and mouth	34.5	30.0	6.3	29.2
3. Wear eyeglasses	27	28.0	6.4	38.6
4. Wear boots	31.1	37.5	11.2	20.2
5. Wear plastic gloves	18.7	34.8	10.2	36.3
6. Wear long sleeves shirt	96.6	2.2	0.4	0.8
7. Smoke cigarette	3.0	3.0	1.5	92.5
8. Drink water or eat food	3.4	4.1	5.6	86.9
9. Spray in the same direction of wind	86.5	12.0	0.4	1.1
10. Spray the pesticide and walk backward	1.5	33.0	15.7	49.8
11. Spray in windless time	78.28	21.4	0.4	0.-

With total scores of this part (48 scores), median score as 38 scores (79.2% of total scores) was used to separate the respondents into 2 groups. And it was found that, 50.9 % of them had their total scores higher or equal to this median score value (table 8).

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Table 8 Level of practicing preventive behaviors while using pesticides among the rice farmers

Level of practicing preventive behaviors while using pesticides	Number N = 267	Percent
High (38-47 scores)	136	50.9
Low (24-37 scores)	131	49.1
Median = 38 Min = 24 Max = 47		

4.1.2 Practicing preventive behaviors after using pesticides

Regarding to the practicing preventive behaviors after using pesticides, from 70 % to 90 % of the respondents practiced preventive behaviors after using pesticides in the right ways(table 9).

Table 9 Practicing preventive behaviors after using pesticides among the rice farmers

Statements	% level of practicing after using pesticides (N = 267)			
	Always	Sometimes	Rarely	Never
1. Clean hands with detergent immediately	83.5	12.0	4.1	0.4
2. Change clothes immediately when arrived home	77.5	20.6	1.9	-
3. Take a bath immediately after arriving home	81.3	17.2	1.5	-
4. Washing the spraying clothes separately	89.1	6.4	3.4	1.1
5. Wash (clean) protective equipment	84.3	15.0	0.7	-
6. Clean spraying equipment	70.4	25.1	3.0	1.5

From table 10, it was found that, median score (18 scores) equal to maximize score, was used to separate the respondents in to 2 groups. And it was demonstrated that 56.2 % of the subjects practiced preventive behaviors in every items of this part.

Table 10 Level of practicing preventive behaviors after using pesticides among the rice farmers

Level of the practicing preventive behaviors after using pesticides	**Number N = 267**	**Percent**
High (18 scores)	150	56.2
Low (6-17 scores)	117	43.8
Median = 18 Min = 8 Max = 18		

4.1.3 Practicing preventive behaviors on days when not using pesticides

The details of the part of practicing preventive behaviors on days when not using pesticides were shown in table 11 as follow. More than half of the subjects had 'always" kept pesticides in the safe place (54.3 %) (however, none of them put warning sign on it), and tied or covered it strictly). Almost of them had "always" kept protective equipment (80.5 %) and spraying equipment (77.2 %) in the safe place. Most of them (95.5 %) never used pesticide containers to store food or drinking water, only a few "always" buried or burnt used pesticides containers (6%).

Table 11 Practicing preventive behaviors on days when not using pesticides among the rice farmers

Statements	% level of practicing on days when not using pesticides (N = 267)			
	Always	**Sometimes**	**Rarely**	**Never**
1. Keep the pesticides in safe place and stick warning sign on it	54.3	21.4	5.2	19.1
2 .Keep spraying equipment in safety	77.2	19.1	1.1	2.6
3. Keep protective equipment in safety	80.5	16.9	0.7	1.9
4. Use the pesticide containers for storing food and drinking water	3.0	0.4	1.1	95.5
5. Bury or burn the used pesticide containers	6.0	34.5	22.5	37.0
6. Tie or cover pesticide strictly with label	64.8	21.4	10.1	3.8

With total scores of this part (18 scores), median scores as 14 9 (77.7 % out of total scores), was used to divide the respondents into 2 groups. It was showed that 63.3 % of the respondent had high level of practicing preventive behavior on days when not using pesticides (table 12).

Table 12 Level of practicing preventive behaviors on days when not using pesticides

Level of the practicing preventive behaviors on days when not using	**Number N = 267**	**Percent**
High (14-18 scores)	169	63.3
Low (4-13 scores)	98	36.7
Median = 14 Min =4 Max = 18		

4.2 Part I: Predisposing factors

4.2.1 Socio- demographic characteristics of the rice farmers

Regarding to socio-demographic characteristics (table 13), it was found that most of the rice farmers (97.4 %) were older than 30 years of age and proportion of male respondents (56.2 %) were slightly higher than that of female respondents. Most of them (86.9 %) got married, and almost (68.7 %) had children stayed with but none of them had breast-feeding children. Most of the subjects (89.1 %) had educational level at primary school. Although most of them (89.5 %) were self-employment but almost two-third of the subjects had monthly family's incomes less than 5000 Baht. Almost three-fourth of them had been used pesticides for more than 10 years.

Table 13 Distribution of the rice farmers' socio-demographic characteristics

Items	Number N = 267	Percent
Age		
25-29	7	2.6
30-39	66	24.7
40-49	78	29.2
50-65	116	43.5
Median = 47.05 Min =25 Max=65		
Gender		
Male	150	56.2
Female	117	43.8
Marital status		
Single	17	6.4
Married	232	86.9
Divorced/ widow	18	6.7

Table 13 Distribution of the rice farmers' socio-demographic characteristics (continues)

Items	Number N = 267	Percent
Number of children		
No children	84	31.5
1-2	148	61.1
>2	35	7.4
Median =1 Min = 0 Max = 8		
Number of child being in breast-feeding		
No	267	100
Education level		
Primary school	238	89.1
Secondary school	23	8.6
High school	6	2.3
Years of using pesticides		
5 – 10 years	68	25.5
11 - 20 years	109	40.8
21 – 30 years	90	33.7
Monthly income		
1,000 – 5,000	170	63.7
5,001 – 20,000B	97	36.3
Median = 5,000 Min = 1,000 Max = 20,000		
Employ status		
Self- employment	239	89.5
Wage-earner	28	10.5

4.2.2 The knowledge of the rice farmers on pesticide dangers and its usage

From table 14, it was shown that almost of the rice farmers had correct knowledge on danger of pesticides as pesticides could effect to fetus in womb of the pregnant user (62.9 %) and dizziness was its mainly harmful effect (77.5 %). When

being asked about knowledge on pesticides usage, most of them chose correct answer in parts of wearing gloves and covering nose with mask when mixing pesticides (88.0 %) and right way for mixing pesticides was doing in the field and the same direction of the wind (86.9 %). In addition, more than three-fourth of them had correct answers on appropriate time to spray pesticides were windless and mild sunlight time (77.9 %) and having meal at home was correct place to eat on the day of the spraying pesticides (79.8 %). However, only some (17.6 %) had correct answer on the right direction for spraying pesticides were the same direction of the wind and the user walk backward. Two-fifth of the respondents (40.5 %) had correct answer in washing hand immediately after using was correct way for safeties. More than half (54.3 %) chose correct answer in part of burying and burning were correct ways to get rid of the used pesticides container.

Table 14 Distribution of knowledge on pesticide dangers and its usage among the rice farmers

Statement	Correct answers	
	Number N = 267	Percent
1. Pesticides can cause harmful effects for fetus in womb of the pregnant user.	168	62.9
2. Dizziness is the mainly harmful effects of pesticides	207	77.5
3. Wear gloves and cover nose with mask when mixing the pesticides	235	88.0
4. Wash hand immediately after spraying is the correct ways for safeties	108	40.5
5. Windless and mild sunlight time are the appropriate time to spray pesticides	208	77.9
6. Eating meal at home on the day of spraying pesticides	213	79.8
7. Burying and burning is correct way to get rid of the used pesticide containers	145	54.3
8. Spraying pesticides the same direction of the wind and walking backward are right direction	47	17.6
9. The right way for mixing the pesticides are doing it in the field and the same direction of the wind	232	86.9

However, when total scores of knowledge were categorized the based on Bloom's criteria, it was found that only 13.5 % belong to high level, nearly to the same proportion of them had fair (46.4 %) and poor knowledge (40.1 %) respectively (table 15).

Table 15 Level of knowledge on pesticide dangers and its usage among the rice farmers

Level of knowledge	Number N = 267	Percent
Good (8-9 score)	36	13.5
Fair (6-7 score)	124	46.4
Poor (2-5 score)	107	40.1
Median = 6 Min= 2 Max= 9		

4.2.3 Perception of the rice farmers toward pesticide danger and its usage

4.2.3.1 Perception toward the harmful effects of the pesticides

Regarding to the perception on seriousness of the pesticides, the details were shown as follows. In parts of positive statement, most of the subjects (80.2 %) perceived that if no treatment, the harmful effect of pesticide may be deadly and 67.0 % of them perceived that accumulative effect of pesticide in body could cause kidney failure.

Besides, three-fourth of them perceived that pesticides can damage nervous system and prolonged contact with pesticides may cause brain damage. It seemed that the respondents was ambivalent among whether or not the chronic irritation from the pesticides can lead to skin cancer or the pregnant women can have abortion from pesticide exposure. Since the proportions of agreement, disagreement and undecided was equally distributed (table 16).

Table 16 Distribution of the rice farmers' perception toward seriousness of harmful effects of the pesticides

Statements (N = 267)	% level of perceived seriousness		
	Agree	Not sure	Disagree
1. Chronic irritation from pesticide can not lead to skin cancer	33.0	30.7	36.3
2. Pesticides can not damage nervous system	13.5	10.8	75.7
3. If no immediate treatment, the harmful effect of pesticides may be deadly	80.2	14.6	5.2
4. Prolonged contact with pesticide may not cause brain damage	12.7	11.2	76.0
5. Accumulative effect of pesticide in body can cause kidney failure	67.0	30.0	3.0
6. The pregnant woman can not have abortion from pesticides exposure	37.1	34.8	28.1

Furthermore, when the total scores of perception was divided according to the Bloom's scale, a few more than half of the subjects had high level of the perception toward the seriousness of the harmful effect of the pesticides, about two-fifth of them had moderate level (table 17).

Table 17 Level of the rice farmers' perception toward the seriousness of the harmful effects of the pesticides

Level of perceived seriousness	Number N = 267	Percent
High (15-18 score)	139	52.0
Moderate (11-14 score)	112	42.0
Low (9-10 score)	16	6.0
Median = 15 Min = 9 Max = 18		

4.2.3.2 Perception toward susceptibility to get harmful effects of pesticide

Concerning the perception on seriousness of the pesticides, the details were shown as follows. For the part of positive statements, most of them perceived that they were risky to get the allergy during spraying pesticide because they had sensitiveness (90.3 %) and since they always had meal in the field so they perceived that their food had high chance to be contaminated with pesticides (84.3 %). Although all the respondents had no breast-fed child, almost two-third of them (64. %) still perceived that the children might be harmed if parents were practicing pesticides spraying.

In addition, almost of them perceived that they were susceptible to get the pesticides poisoning because they did not always wear protective equipment (71.9 %) and even though their general health were strong but they were still susceptible to get harmful effects of pesticides (70 %). Nearly to half of them (49.4 %) perceived that although they took anti-histamine drugs they still had high chance to get the dangers of pesticides (table 18).

Table 18 Distribution of the rice farmers' perception toward susceptibility to the harmful effects of pesticides

Statements	% level of perceived susceptibility N = 267		
	Agree	Not sure	Disagree
1. You are not susceptible to get the pesticide poisoning because the protective equipment is not always to use	16.5	11.6	71.9
2. You have high sensitive immune therefore you are quite risky to get the allergy while spraying	90.3	6.0	3.7
3. Your general health is strong so you are not susceptible to get harmful effects of pesticides	19.5	10.5	70.0
4. Your food has high chances to contaminate with pesticides; due to you usually have meal in the field	84.3	9.7	6.0
5. You are(your wife is) breast feed the baby, so you are afraid that your child may be harmed	64.0	21.7	14.2
6. If you take anti-histamine drugs, you will have low chance to get the danger of pesticides.	28.5	22.1	49.4

Moreover, when categorized total scores of perception toward susceptibility to get harmful effect of pesticides according to Bloom's scale, it was found that a few more than two-third of the rice farmers had high perception toward the susceptibility of harmful effects of the pesticides level (table 19).

Table 19 Level of the rice farmers' perception toward susceptibility to harmful effects of pesticides

Level of perceived susceptibility	Number N = 267	Percent
High (15-18 scores)	181	67.8
Moderate (11-14 scores)	79	29.6
Low (8-10 scores)	9	2.6
Median = 16 Min = 8 Max = 18		

4.2.3.3 Perception toward benefits of practicing preventive behaviors

In part of perception toward benefits of practicing preventive behaviors, the details were shown as follow. Most of the subject perceived that reading label or leaflet before using pesticides was necessary to avoid misuse (98.9 %) and regular wearing protective equipment might reduce side effect of pesticides than irregular practices (97.4 %). However, only around two-third of them identified that using stick to mix pesticides, wearing long sleeves shirt and long pants could decrease getting danger of pesticides or wearing boot could prevent harmful effect from pesticides at 62.6 %, 69.3 % and 64.4 %. The same proportion of those respondents perceived that spraying pesticides in the same direction of the wind was safer than against it (69.3 %). However, 51.7 % of them had “agree” that their clothes would not be contaminated pesticides because they sprayed pesticides and walked backward.

Likewise, most of the respondents had high perception toward benefits of practicing preventive behaviors after using it, as they perceived that they could avoid danger of pesticides if they took a bath and changed spraying clothes immediately after using it (97.4 %). Most of them perceived that keeping pesticides separately, in the safe place with the warning sign could avoid abuse (97.8 %) and destroying or dumping the pesticides containers immediately after using was safe for their children (96.3 %) (table 20).

Table 20 Perception of the rice farmers toward benefits of practicing preventive behaviors

Statement	% level of perceived benefits (N = 267)		
	Agree	Not sure	Disagree
1. Reading label or leaflet before using pesticides is necessary to avoid misuse	98.9	1.1	0.-
2. Using stick to mix pesticides will not decrease getting dangers of pesticides	28.4	9.0	62.6
3. Spraying the pesticides in the same direction of wind is not safer than against its direction	21.4	9.3	69.3
4. Regular wearing protective equipment may reduce side effects of pesticides than irregulars practices	97.4	1.8	0.8
5. Take a bath and change clothes after spraying the pesticides immediately will avoid danger of pesticides	97.4	1.1	1.5
6. Wearing boots can not prevent harmful effects from pesticides	22.5	13.1	64.4
7. Spraying the pesticides and walking backward, the clothes will not be contaminated pesticides	51.7	10.5	37.8
8. Wearing long sleeves and long pants will not reduce the risks to get the dangers	26.6	4.1	69.3
9. Keeping the pesticides separately, in the safe place with the warning sign can avoid abuse	97.8	1.1	1.1
10. Destroying or dumping the pesticide containers immediately after use is safe for children	96.3	1.5	2.2

In addition, 68.2 % of the rice farmers had high level of perceived benefit of practicing preventive behaviors and none of them had low perception level after applying Bloom's scale to categorize its total scores (Table 21).

Table 21 Level of perception toward benefits of practicing preventive behaviors

Level of perceived benefits	Number N = 267	Percent
High (25-30 scores)	182	68.2
Moderate (18-24 scores)	85	31.8
Median = 27 Min = 18 Max = 30		

4.2.3.4 Perception on barriers to practice preventive behaviors

For details of perception toward barriers to practice preventive behaviors as shown in table 22, it was found as follow. Most of the respondents perceived that reading the label before mixing pesticides was not neither difficult nor wasted time (98.1 %), and they perceived that they had no problem if they wore hat and long sleeves shirt in the rice field during the hot weather (92.9 %). Nevertheless, more than half of the respondent perceived that spraying and walking backward made their work done slowly (64.4 %); it was difficult to walk when they wore boots in the field (58.4 %). Moreover, 39 % of them perceived that they were difficult to breath during wearing mask.

Besides, only around 15 % of them perceived that it was difficult to take a bath (17.6 %) or change clothes immediately after spraying pesticides (13.9 %) and washing separately spraying clothes was taken many detergents and wasted times (15.7 %).

Table 22 Distribution of farmers' perception toward barriers to practicing preventive behaviors

Statement	% level of perceived barriers (N = 267)		
	Agree	Not sure	Disagree
1. Reading the label before mixing pesticides is not difficult and not wasted time.	98.1	1.9	-
2. Spraying the pesticides and walking backward causes your work done slowly.	64.4	19.9	15.7
3. Wearing boots in the field is difficult to walk.	58.4	8.6	33.0
4. Hot weather does not cause any problem to wear hat and long sleeves during the rice field.	92.9	5.2	1.9
5. Washing the spraying clothes separately is taken many detergents and wasted times.	15.7	2.6	81.7
6. Wearing mask makes you difficult to breath	39.0	16.5	44.5
7. Changing the clothes every times after spraying the pesticides immediately is not difficult.	13.9	10.5	75.6
8. Having a bath immediately after spraying the pesticides is difficult.	17.6	13.9	68.5
9. Disposing pesticides container is not taken time	89.9	5.2	4.9
10. Protective equipment is cheap to buy.	95.1	4.1	0.8

Furthermore, after the total scores of their perception on barriers were classified into three levels based on Bloom's scale, it was presented that more than half of the respondents had moderate levels and a few less than that of them had high level (table 23).

Table 23 Level of the farmers' perception toward barriers to practice preventive behaviors

Level of perceived barriers	Number N = 267	Percent
High (25-30 scores)	122	45.7
Moderate (18-24 scores)	141	52.8
Low (16-17 scores)	4	1.5
Median = 24 Min = 16 Max = 30		

4.3 Part II: Enabling factors

4.3.1 Accessibility to the sources of information related to pesticides usage

4.3.1.1 Accessibility to the source of information in term of frequencies

Concerning the accessibility to the source of information in terms frequencies of receiving information from different sources, 89.9 % of the respondents received it regularly from label or leaflet of container, 39 % accessed to that information regularly on television. A little bit more than one-fifth got the information regularly from mass public, radio, and neighbors. In addition, a few of them received the information regularly from Village Health Volunteers, Health personnel and agricultural officers. The least source of information about pesticides use for the farmers was village broadcasting (table 24).

Table 24 Frequencies of receiving information related to pesticides usage from different sources

Sources	% level of frequencies receiving information (N = 267)		
	Regular	**Irregular**	**Never**
1. Posters, newspaper, pamphlet	22.7	46.1	26.2
2. Television	39.0	50.6	10.4
3. Radio	20.2	55.4	24.4
4. Village Health Volunteer	14.6	39.0	46.4
5. Health personnel	13.1	43.1	43.8
6. Agricultural officers	14.6	58.4	27.0
7. Village broadcasting	6.0	42.7	51.3
8. Neighbors	21.7	64.4	13.9
9. Leaflet or label from containers	89.9	10.1	-

Besides, the total scores of frequencies of receiving information was categorized based on Bloom's scale, nearly to two-third of them had low level as shown in table 25.

Table 25 Level of the frequencies of receiving information related to pesticides usage

Level of the accessibility	Number N = 267	Percent
High (15-18 scores)	26	9.7
Moderate (11-14 scores)	69	25.9
Low (2-10 scores)	172	64.4
Median = 9 Min = 2 Max = 18		

4.3.1.2 Accessibility to the source of information in terms of understandable

When being asked about the understanding content of the information from the label of pesticides container, 81.3 % of the respondent chose the answer "good." More than half of them had "good' understanding the contents of information related to pesticides usage from the mass publish (57 %), television (55 %). Even those sources seem to have better communicative ability to make farmers more understandable, which may due to they contained pictorial information that the farmers can see. However, those source of information mostly one-way communication and did not contained details. More ever, only half of them had good understanding the information related to pesticides from health personnel, others left seem to be not good understandable as radio (39.6 %), Village Health Volunteers (47 %), agricultural officers (39.5 %), village broadcasting (35.4 %) and neighbors (40 %) (table26).

Table 26 Distribution of the understandable contents of information from the source

Sources	% level of the understanding (N = 267)		
	Good	**Fair**	**Poor**
1. Posters, newspaper, pamphlet	57.0	43.0	-
2. Television	55.0	45.0	-
3. Radio	39.6	60.0	0.4
4. Village Health Volunteer	47.0	48.0	5.0
5. Health personnel	50.6	45.4	4.0
6. Agricultural officers	39.5	58.5	2.0
7. Village broadcasting	35.4	62.0	2.6
8. Neighbors	40.0	60.0	-
9. Leaflet or label from pesticides containers	81.3	17.2	-

Likewise, 47.9 % of the rice farmers had low level of understandable, approximately twice times compare with high level and moderate level after categorizing it according to Bloom's criteria (Table 27).

Table 27 Level of the understandable the contents of information from the source

Level of the understanding	Number N = 267	Percent
High (22-27 scores)	69	25.8
Moderate (17-21 scores)	70	26.2
Low (3-16 scores)	128	48.0
Median = 17 Min = 3 Max = 27		

4.3.2 Availability of equipment

For the details of the availability of good protective equipment was shown as follow. 93.3 % of the respondents had good woolen helmet and sedge hat; both were regular worn by them when spraying pesticides. All of them always had good long trousers, 99.3 % always had good long sleeves. Nevertheless, nearly one-third of them "always" had good mask, a few more than one-fifth "always" had good plastics gloves and eyeglasses. Likewise, most of them had good mixing and spraying equipment (Table 28).

Table 28 Distribution of availability of good equipment prompt to use in the field

	% level of availability of good equipment (N = 267)			
	Always	**Sometimes**	**Rarely**	**Never**
Protective equipment				
1. Hat/ turban	93.3	6.0	0.7	-
2 Eyeglasses	21.7	34.6	10.4	33.3
3. Mask	30.7	37.1	3.4	28.8
4. Plastic gloves	21.0	32.2	11.2	35.6
5. Long sleeves shirt	99.3	0.8	-	-
6. Long trousers	100	-	-	-
Spraying and mixing equipment				
1. Mixing stick	84.6	11.3	1.5	2.6
2. Mixing container	98.9	1.1	-	-
3. Spraying tank	98.5	1.5	-	-

Concerning to the level of availability of good equipment prompt to use in the field, more than half of the respondent (56.9 %) had high and 42.3 % had moderate level (Table 29).

Table 29 Level of availability of good equipment prompt to used in the field

Level of the availability of good equipment	**Number N = 267**	**Percent**
High (22-27 scores)	152	56.9
Moderate (17-21 scores)	113	42.3
Low (15-16 scores)	2	0.8
Median = 22 Min = 15 Max = 27		

4.4. Part III: Reinforcing factors

From Table 30, it was found that more than three- fourth of the respondents received the support from family (75 – 91 %) from relative (71.5 %), owner of pesticides store (92.9 %) and neighbors (73 %). Less than half of them received support from agricultural officers, village health volunteers, and village broadcasting.

Table 30 Distribution of receiving social support of the rice farmers

Statements	% level of social support (N = 267)		
	Agree	**Not sure**	**Disagree**
1. Family always warn to wear protective equipment	90.7	3.7	5.6
2. Family provokes to seek information related to pesticide usage from many media sources.	75.7	9.0	15.3
3. Family encourages to practice the preventive behaviors	90.6	4.9	4.5
4. Neighbors urged to utilize the protective equipment	73.0	18.4	8.6
5. Agriculturist office usually educates pesticide knowledge for the farmers during the meeting.	55.4	19.1	25.5
6. Never received any pesticide information from neighbors.	22.5	15.7	61.8
7. Owner of pesticide stores always give information related to pesticide usage	92.9	4.1	3.0
8. Village Health Volunteers always inform to avoid dangers of pesticides usage.	49.4	19.9	30.7
9. Village Health Volunteers usually disseminate pesticide information.	40.8	17.2	42.0
10. Always received pesticide information from Village Broadcasting.	36.7	15.4	47.9
11. Relative always supply protective equipment	71.5	10.5	18.0

Concerning to the total scores of reinforcing factors, this study indicated that 59.2 % of the subjects received high support level from family and society in term of emotional, informational, instrumental support when used Bloom's criteria to categorize its level (Table 31).

Table 31 Level of receiving social support of the rice farmers

Level of social support	Number N = 267	Percent
High (27-33 scores)	158	59.2
Moderate (20-26 scores)	91	34.1
Low (13-19 scores)	18	6.7
Median = 28 Min = 13 Max = 33		

4.5 Part V: The correlation between independent and dependent variable

4.5.1 The correlation between predisposing factors and practicing preventive behaviors on using pesticides

Some factors in part of socio-demographic as gender, marital status, educational level, employ status had no significant correlation with practicing preventive behaviors when using Chi-square to test them (p value>0.05) (table 32).

Table 32 Correlation between some of socio-demographic characteristics and practicing preventive behaviors

Socio-demographic	Level of behaviors				χ^2 (df)	p value
	High (N = 134)		Low (N = 133)			
	Number	Percent	Number	Percent		
Gender						
Female	56	47.6	61	55.4	0.450	0.502
Male	78	52.0	72	48.0	(1)	
Marital status						
Single	9	52.9	8	47.1	0.055	0.973
Married	116	50.0	116	50.0	(2)	
Divorce/widow	9	50.0	9	50.0		
Educational level						
High/secondary school	16	55.2	13	44.8	0.323 (1)	0.570
Primary school	118	49.5	120	50.5		
Employment status						
Self-employment	123	51.5	116	48.5	1.487	0.223
Wage-earner	11	39.3	17	60.7	(1)	

It was shown the relationship between some of socio-demographic characteristics, knowledge on pesticide danger and its usage , perception and practicing preventive behaviors at significant level 0.05 by using Spearman Rank Correlation (in the table 33).

It was found that, number of child stayed with the rice farmers as well as their monthly family' income had no significant relationship with three types of practicing preventive behaviors. However, the age had significant correlation with practicing preventive behaviors while using pesticides (r = 0.129, p = 0.035) and on days when not using pesticides (r= 0.12, p = 0.019). The number years of using

pesticides only positively and significantly related to behaviors while using pesticides (r = 0.123, p = 0.044).

Likewise, even through knowledge on pesticide danger and its usage had no statistical relation ship with practicing after and all the day out of using pesticides, but it significantly correlated with behaviors while using pesticides (r = 0.187, p = 0.002).

Regarding the perception, it was found that different types of perception had different relationship with three types of practicing. Perception toward seriousness of pesticides danger had only significant relationship with behaviors after using pesticides with r = 0.263, p = 0.000. Even though perception of the rice farmers toward susceptibility to the danger of pesticides did not significantly correlate to practicing preventive behaviors while using pesticides but it did with practicing after using(r = 0.265,p = 0.000) and on days when not using(r = 0.184, p = 0.002). Besides, the benefits of practicing preventive behaviors related significantly to behaviors after using pesticides only (r= 0.216, p = 0.000). Perception toward barriers to practice preventive behaviors had significant correlation with behaviors while using pesticides (r = 0.208, p = 0.001), after using pesticides (r = 0.347, p = 0.000) and on days when not using it (r = 0.159, p = 0.009).

Table 33 Correlation between predisposing factors and practicing preventive behaviors

Factors	Types of practicing preventive behaviors					
	While using		After using		Out of using	
	r	p	r	p	r	p
Age	**0.129**	**0.035***	0.099	0.108	**0.143**	**0.019***
Number of child	0.017	0.784	0.095	0.121	0.078	0.205
Monthly family' income	0.007	0.904	0.098	0.112	0.008	0891
Years of using pesticides	**0.123**	**0.044***	0.080	0.159	0.009	0.880
Knowledge	**0.187**	**0.002***	0.070	0.256	0.068	0.266
Perceived seriousness	0.057	0.353	**0.263**	**0.000***	0.062	0.311
Perceived susceptibility	0.070	0.252	**0.265**	**0.000***	**0.184**	**0.002***
Perceived benefits	0.075	0.221	**0.216**	**0.000***	0.008	0.819
Perceived barriers	**0.208**	**0.001**	**0.347**	**0.000***	**0.159**	**0.009***

*: significance at p value < 0.05

4.5.2 Correlation between enabling factors and practicing preventive behavior on pesticides usage

4.5.2.1 Correlation between accessibility to source of information related to pesticides and practicing preventive behavior on pesticides usage

Regarding the accessibility to source of information in term of frequencies of accessibility to the source of information, the result in this study showed that there were positive relationship between those frequency and practicing preventive behaviors while using (r = 0.428, p = 0.000), after using (r = 0.338, p = 0.000) and on days when not using (r = 0.206, p = 0.001).

The contents of information that is better understandable was significantly enabled the respondents to better in all three types of peptides using, while using(r = 0.430, = 0.000), after using (r = 0.304, p = 0.000) and on days when not using (r = 0.150, p = 0.014) (Table 34).

Table 34 Correlation between accessibility to the source of information and practicing preventive behaviors

Factors	Types of practicing preventive behaviors					
	While using		After using		Out of using	
	r	p	r	p	r	p
Frequencies of receiving information	**0.428**	**0.000***	**0.338**	**0.000***	**0.206**	**0.001***
Understandable contents of information	**0.430**	**0.000***	**0.304**	**0.000***	**0.150**	**0.014***

*: significance at p value < 0.05

4.5.2.1 Correlation between availability of good equipment prompts to use in the field and practicing preventive behavior on pesticides usage

From table 35**,** it was found that the availability of good equipment prompt to use in the field had moderately significant correlation with practicing preventive behaviors while using pesticides only with r = 0.662, p = 0.000.

Table 35 Correlation between availability of good equipment prompt to use in the field and practicing preventive behaviors

Factors	Types of practicing preventive behaviors					
	While using		After using		Out of using	
	r	p	r	p	r	p
Available of good equipment	**0.662**	**0.000***	0.012	0.842	0.076	0.215

*: significance at p value < 0.05

4.5.3 Correlation between reinforcing factors and preventive behavior

From the table 36, it was found that there were significantly positive relationships between the supporting from family and society and practicing preventive behaviors while using (r = 0.382, p = 0.000), after using (r = 0.428, p = 0.000), and on days when not using it (r = 0.209, p = 0.001).

Table 36 Correlation between social support and practicing preventive behaviors

Factors	Types of practicing preventive behaviors					
	While using		After using		Out of using	
	r	p	r	p	r	p
Support from family and society	**0.382**	**0.000***	**0.428**	**0.000***	**0.209**	**0.001***

*: significance at p value < 0.05

CHAPTER V
DISCUSSION

The predisposing, enabling, reinforcing factors and preventive behaviors on pesticides usage among the rice farmers in Muang district, Suphanburi province, Thailand were studied. Both descriptive and analytic results of the interesting variable were presented as follows.

5.1 Practicing preventive behaviors on pesticides usage among the rice farmers

According to the practicing preventive behaviors on pesticides usage among the rice farmers, it was revealed that 50.2 % of them had a high practicing level. That proportion were lower than those of the water chestnut farmers in Suphanburi (70.2 %) (27) but higher than those of the agriculturists in Pathumthani (22.4 %) (15). The different target groups, different area, different time, and different criteria of the studying caused the different results.

5.1.1. Practicing preventive behaviors while using pesticides

Moreover, among low practicing group, proportion of practicing preventive behaviors while using pesticides (49.1 %) was higher than that of others. It was found that, some of the respondents (21 %) had “never” and a few of them (9.7 %) had “rarely” worn gloves when mixing pesticides. Additional to, a very few of them (0.8 %) had “never” used stir to mix pesticides; they always used bare hand to mix it. It may be happened from the lacking of right knowledge on pesticides and pesticides use (40.1 %). The incorrect knowledge conveyed in their perception was that using stick to mix pesticides would not decrease getting dangers of pesticides (37.5%). It also due to a few of them lack of availability of good mixing stir prompt to use.

When the farmers were asked about gloves that they wore for both mixing and spraying, 36.3 % of the user had “never” used plastic gloves, the woolen and rubber ones became the regular equipment to protect their hand. However, owing to easy to absorb pesticides solution while the farmers were working with it, the cotton, canvas, and leather gloves are not acceptable for pesticides work (39), either are rubber gloves (40). The explanation of using incorrect gloves was most of them (89.9 %) had “regularly” accessed information from leaflet and label which had uncompleted information. From this, it may affect to the rice farmers’ knowledge; they may lack of good knowledge on the material needs to be used as standard gloves.

Even though majority of them (94.1 %) had high and moderate perception level but nearly one-third of them confirmed chronic irritation from pesticides can not lead to skin cancer; nearly one-fourth of them perceived that the pesticides can damage nervous system and more than those proportion also agree that prolong contact with pesticides may not cause brain damage. Especially, one-third of them perceived that pesticides exposure could cause abortion in pregnant woman. Since, the rice farmers seem did not fear of the danger of pesticides. Some of them (16.5 %) believed that even though they did not wear protective equipment, they still were not susceptibility to the pesticides effects. They though that only the user got pesticides effects, their children were free of those dangers (14.3 %) or if they took anti-histamine drug, they would not get any danger of pesticides (28.5 %). Moreover, they (35.6 %) lack of plastic gloves to use. All of those reasons can make clearly, why high proportion of the rice farmers did not wear plastic gloves during using pesticides.

Furthermore, 29.2 % of them had “never” worn mask. Some (31 %) used woolen helmet and some others took cotton T-shirt instead of the mask to cover nose, which also made them easy to breathe. With those covers, materials as cloth or Kramer’s covering were not enough to prevent the pesticides entering the lung (19). The explanations of the low proportion wearing mask while using pesticides were that they had attentiveness to use protective equipment but they try to get rid of the dangers of

pesticides according to their thinking. They used general protective equipment that can protect them from sunlight as mentioned above. In addition, the other reason was they lack of good mask to use (28.8 %) or they perceived that wearing mask made them difficult to breath.

Regarding to wearing boots and eyeglasses, 20.2 % and 38.6 % of the respondents never used these things. When being asked the benefits and barriers to wear boots, more than one-third of them agreed that wearing boots cannot prevent harmful effects from pesticides and made them difficult to walk (58.4 %). In addition, 33.3 % of them gave reason why they did not use eyeglasses was that they did not have it.

Likewise, 49.8 % of the subject had “never” sprayed and walked backward, due to spraying and walking foreword is convenient for their work than walking backward. Other reasons were they had low knowledge on pesticides usage, they lack of accessibility to two-ways information, they did not fear the danger of pesticides as mentioned. Moreover, nearly to two-fifth of them (37.8 %) disagreed that spraying and walking backward the clothes would not be contaminated pesticides, 64.4 % of them perceived doing like that caused their work done slowly. However, by this convenient way their clothes were contaminated with pesticides, especially when their clothes were not cotton jeans and work shirt (39).

Contrast with all action above, 92.5 % of the rice farmers had “always” mixed pesticides follow on the label. It may be due to 98.9 % of the respondents perceived that reading label before using was not difficult and not taken time, and it was necessary to avoid misuse. Label and leaflet also was the regular source of information that the rice farmers could access in this area. Even through nearly one-third of them agreed and did not sure about wearing long sleeves shirt and long pants would not reduce the risk to get the dangers but 96.6 % of them still wore these, only a few did not wear. It can be explained that the farmers though the long sleeves shirt just be used to protect them from sunlight, they did it as they wore woolen helmet and woolen gloves, that was reason why

92.88 of them perceived that hot weather did not cause any problem to wear hat and long sleeves shirt during the rice field. It was not surprised when there were still a few of the rice farmers sprayed pesticides against direction of the wind and in the strongly wind time, because more than 30 % of them had “agree” and “not sure” with spraying it the same direction of the wind was not safer then against it. Even through 92.2 % and 86.9 % of them had “never” smoked and eaten or drunk during spraying but still few of them did it when they took a rest during spraying. The lack of right knowledge, perception toward the seriousness and susceptibility of the pesticides can be explained this point.

However, when the rice farmers get older, had a longer time using pesticides, may be they had experience with the danger of pesticides, they practice it better ($r = 0.129$, $p = 0.035$ and $r = 0.123$, $p = 0.044$). Even through the poor contents of information related to pesticides usage they accessed, but the more they accessed it, understood it, the better behaviors they practiced ($r = 0.428$, $p = 0.000$ and $r = 0.430$, $p = 0.000$). The explanation of correlation between accessibility to information and practicing was due to the more the rice farmers accessed to the information and understood its contenys, higher right knowledge they got ($r = 0.218$, $p = 0.000$ and $r = 0.191$, $p = 0.001$). The more knowledge they had, the better practicing they did ($r = 0.187$, $p = 0.002$). From the right knowledge they got, the more no problem to practice they felt, the better practicing significantly they did ($r = 0.208$, $p = 0.001$). Moreover, the availability of good protective equipment prompt to use in the field significant enabled them to practice it ($r = 0.662$, $p = 0.000$). The important factors also significantly induced they practice was support from family and society ($r = 0.382$, $p = 0.000$). 52.43 % of them received high support from family and significant people in community. More its details, 90.64 % of the rice farmers agree that family support them to use protective equipments, practice preventive behaviors. They received information support from family (75.7 %), neighbors (61.8 %), owner of pesticides stores (92.9 %), village health volunteers, village broadcasting and health personnel (less than 50 %), agriculturist (55.4 %). 71.5 % of them were supplied protective equipment by their relative. Those factors urged them, reinforced them, and encouraged then to practice preventive behaviors

5.1.2. Practicing preventive behaviors after using pesticides

Concerning to practicing of the rice farmers after using pesticides, 56.2% of them had high level of practicing. More its details, most of them had "always" cleaned hand with detergent, washed spraying cloth separately and equipment, changed clothes and had a bath immediately after using. It due to only a few of them (9.7 %) had high accessibility to the information related to pesticides and 47.9 % had low understandable level. The less they accessed, the lower right knowledge they had ($r = 0.218$, $p = 0.000$). Because the wrong understanding about exposure as only the user got harmful effect of pesticides (37 %) and due to practicing preventive behaviors after using pesticides was keeping personal hygiene, since they did well.

Moreover, more than half of them had high-perceived seriousness of pesticides effects level. The details was 75.7 % of them perceived pesticides can damage nervous system, 80.2 % agreed that if no immediate treatment, the harmful effects of pesticides may be deadly. More than three-fourth of them perceived that prolonged contact with pesticides may cause brain damage. 67 % of the respondents decided to agree with accumulative effect of pesticides in body can cause kidney failure. The more seriousness of pesticides danger they perceived, the more they had a better practicing significantly ($r = 0.263$, $p = 0.000$).

Furthermore, 58.1 % of them had high-perceived susceptibility to pesticides dangers. 70 % perceived that their health was strong but they still were susceptible to get harmful effects of pesticides. Practicing preventive behaviors after using pesticides significantly positive related to perceived susceptibility with $r = 0.265$ and $p = 0.000$. Moreover, most of them agreed with taking a bath and changing clothes immediately after using would avoid danger of pesticides. The more benefits of practicing preventive behaviors they perceived, the better practicing significantly they had ($r = 0.216$, $p = 0.000$). Likewise, in part of perception of the rice farmers toward barriers to practice preventive behaviors, most of them had perceived that changing clothes immediately

after using was practicable and having bath after using was not difficult. When they felt less barriers they preferred to practice it better (r = 0.312, p = 0.000).

Finally, the accessibility to information related to pesticides usage in term of frequencies and understandable, the social support (as mentioned in part of practicing while using pesticides above) all significantly related to practicing after using pesticides with r = 0.338, p = 0.000; r = 0.304, p = 0.000 and r = 428, p = 0.000.

5.1.3. Practicing on days when not using pesticides

Regarding the practicing preventive behaviors on days when not using pesticides, 36.7 % of the rice farmers had low level of practicing. Moreover, nearly one-fourth of the subjects had "never," "rarely" keep pesticides in safe place and stick warning sign on it, and still some of them never tied or covered pesticides strictly. They did it even through most of respondents ever agreed with keeping pesticides safe an avoid abuse. Still a few of them never kept both spraying and protective equipment in the safe place. It may be happened from the convenience in daily life, some of them lack of right knowledge, and did not fear to the danger of pesticides can effect to their family and mind to environment surround their family (as mentioned in part of practicing while using pesticides). Furthermore, only a few of them buried or burnt used pesticide containers, most of them collected and sold even if they agreed with destroying or dumping them was safe for child (96.3 %) and not taken time (89.9 %). They did like that due to economics benefits, knowledge and perception problem as mentioned above.

Nevertheless, the result of 63.9 % of them had high level of practicing preventive behaviors on days when not using pesticides also was found out. The older they got, the more experience of pesticides danger they had, the better practicing significantly they did (r = 0.143, p =0.019). The more susceptibility to pesticides danger, the better behaviors they had (r = 0.184, p = 0.002). The more no barriers to practice preventive behaviors on days when not using pesticides they perceived, the better behaviors they practiced (r = 0.159, p = 0.009). The significant accessibility to the

information in term of frequency and understandable led to the better behaviors they had(r = 0.206, p = 0.001 and r = 0.150, p = 0.014). Their practicing was also significantly related to support from family and society with r = 0.209 and p = 0.001.

The answer for why 50.2 % of the subjects had a high practicing level but they still had chance to get pesticides poisoning seem to be explored. The majority of the rice farmers had low and moderate knowledge on pesticides and pesticides use due to most of them accessed to the uncompleted information. From the incorrect knowledge, it conveyed to perception, they did not fear the danger of pesticides. Even through they knew it, had intend to practice preventive behaviors but they still decline the danger of pesticides by using protective sunlight equipment replace special equipment for pesticide usage, they made their work be expedient. Even through higher proportion of them did well practicing after using pesticides and on days when not using pesticides than those who did while using pesticides but the most common exposures occur during mixing or spraying (10), It can explain they still have high chance to get pesticides poisoning. That is also the reason why every year, there are more than 50 cases of occupational-pesticides poisoning in Suphanburi.

5.2 Predisposing factors

5.2.1 Socio-demographic characteristics

The interesting factors in the part of socio-demographic characteristics were age. Most of the respondents were married men older than 30 years old (97.4 %). This group was higher proportion than that one in the studies by Lojananont C.V. (93.3 %) (15), by Siripok S (47.9 %) (27), by Phonrat P. (66 %) (33) and Khoanun O. (63 %) (35). The explanation of older aging was that day by day as the changing of society, the younger people moved to city to earn more money, or they moved to other occupation due to rice farm did not bring much profits (the evident was average monthly family' income was 5000 Baht), but require work hard. However, the older they got, the better behaviors significantly they practiced on pesticides usage while using and on the day out.

It may happened from the older they got, the more times they received information (r = 0.230, r = 0.000) and understood it (r = 0.225, p = 0.000), the better knowledge they had and better behaviors they practiced while using and on days when not using. This study was similar with previous study by Chaleoshilp C. in Nakhonpatom (32).

The proportion of men in this study was 56.2 %. It was not much higher than that of water chestnut in research by Sripodok S. (53.1%) (27), of orangery farmers by Phonrat O. (57.3 %) (33), but lower than that of agriculturists by Lojananont C.V. (75.6 %) (15) and farmers by Khoanun O. (76.7 5) (35). The difference proportion of gender may be happened from the difference type's occupations. Nevertheless, the gender factor was not significant relation to practicing but the female likely to practice preventive behaviors less than male. It was similar with Kunstadter P. conclusion (21)

As the result from studies by Lojananont C.V. (15), Phonrat P. and (33) Khoanun O (35), majority of the subject in this research got married. However, there was not much difference between proportion of married, single and divorce respondents among the high practicing group (p value > 0.05). The support also did not significantly relate to the marital status (p value >0.05).

In this study, 68.5 % of the rice farmers stayed with children but none of them had child was fed by breast milk. Even through they had children stayed with, their practicing was not better than those did not have. That due to most of them had poor knowledge about the exposure.

Besides, most of them (89.1 %) had highest educational level at primary school. It was similar with the result from Sripodok S. (27), Lojananont C.V. (15) Phonrat P. and (33) Khoanun O (35). The educational level did not significantly relate to the knowledge, perception, practicing but the limited general acquaintance bring forward to the moderate or low knowledge on pesticides usage, the high perception but low performance (15).

However, majority of the target group used pesticides from 11 to 20 years because of their old age. It was the same out come with the studies by Lojananont C. V. (15), Khoanun O. (35). Nevertheless, in this study, there were significant correlation between using pesticides time and practicing but there were not in Lojananont C. V.'(15). Chaleoship C. (33), Ditheesawatvate S. (34) also found out the significant relationship between them in her study. Undergo a long time contacted with pesticides, they might have experience of pesticides danger, then they practiced preventive behaviors better.

Likewise, most of them were self-employed with family' income ranged from 1,000 – 5,000 Baht per month. The family' income did not significantly affect practicing preventive behaviors.

5.2.2 Knowledge on pesticide danger and its usage

Regarding to the knowledge of the respondents, only 13.5 % of the respondents had good knowledge, 46.4 % had fair knowledge on pesticide danger and its usage. It was a little lower proportion than outcome in study of Sripodok S. (27) and Lojananont C.V. (15), almost one fourth of the respondents had right knowledge level.

The low proportion of good knowledge may be happened from most of them accessed to the uncompleted information as leaflet and label, even through majority of them understood its contents well but the poor information could not give the low educational respondent good knowledge. However, for the two-way information that could give them completed information as form agricultural officers, health personnel, and village health volunteers, only some of them accessed it. Any ways, the more times they accessed information, the better knowledge they had ($r = 0.218$, $p = 0.000$) and the more understood its contents, the better knowledge they had, too ($r = 0.191$, $p = 0.000$). From the understanding and then they brought it to practice, from the experience, they also applied in the daily activities. The good knowledge and good support would force

them to had good practice on pesticides usage. The better knowledge they had, the better behaviors they practiced while using pesticides (r = 0.178, p = 0.002).

The significant relationship between knowledge on pesticides usage and practicing preventive behaviors in this study was similar with previous studies by Lojananont C. V. (15), Sripodok S. (27), Chaleosilp C. (33), Ditheesawatvate S. (35).

5.2.3 Perception on pesticides danger and its usage

Concerning to part of health perception, more than half of the rice farmers had high level of perceived seriousness of pesticide dangers (perceived susceptibility to pesticide side effects, benefits of practicing preventive behaviors and 48.7 % of them perceived there were less barriers to practice preventive behaviors. They perceived the seriousness, the susceptibility of pesticides danger, the benefit of practicing because they had experience about it. However, when being asked about the seriousness of pesticides effect as on skin, fetus in womb of maternal user, the respondents gave different answers. Even through histamine drug cannot reduce the chance to get poisoning but it seem to be difficult for them to make decision. They perceived there were not much barriers to practicing preventive behaviors because the equipment they used was not specific for applying pesticides. They felt covering nose was not difficult to breathe due to they wore woolen helmet, or hot weather did not cause any problem for wearing long sleeves shirt because it help them avoid the heat of sunlight.

Moreover, the higher seriousness of pesticides danger they perceived, the better behaviors they practiced while using pesticides (r = 0.263, p = 0.000). The higher susceptibility to harmful effects of pesticides they perceived, the better behaviors significantly they had after using pesticides (r = 0.265, p =0.000) and on days when not using pesticides(r = 0.184 and p = 0.002). In addition, perceived benefits of practicing preventive behaviors only were importantly associated with practicing preventive behaviors after using pesticides (r = 0.216 and p = 0.000). The more no barriers to practice preventive behaviors they perceived the better behaviors significantly they

practiced while using pesticides (r = 0.249 p = 0.001), after using it (r = 0.312, p = 0.000) and on days when not using it (r = 0.329, p = 0.009).

This study had different result with previous studies by of Khoanun O. (35), Sitthisak S. (36), and Lojananont C. V. (15). Khoanun O. found that all types of perception significantly related to preventive behaviors among the farmers in Nakhonsawan province. After studying preventive health behaviors on pesticides use among gardeners in Phitsanuloke province, Sitthisak S. had the same conclusions as Khoanun O. However, according to study of Lojananont, the agriculturist's self-care behaviors depended on perceived benefits and barriers significantly. She assumed that the due to the low educational level so the farmers did not practice as the received perception. They would be accustomed to the convenience in daily life from using pesticides that was not changeable the practice such as having the perception but did not follow (15).

The explanation of perceived seriousness, perceived susceptibility, and perceived benefits had no significant relationship with practicing preventive behaviors while using pesticides was found out. Though the rice farmers had high perception but due to they lacked of availability of standard protective equipments prompts to use in the field as plastic gloves, mask, and boots, they could not practiced preventive behaviors well while using pesticides.

Even having high-perceived seriousness and perceived benefits but due to the convenience in daily working, the economics benefits, the farmers did not care about environment and family' health, since perceived seriousness and perceived benefits had no significant correlation with practicing preventive behaviors on days when not using pesticides.

5.3 Enabling factors

5.3.1 Accessibility to the source of information

The result of the part of enabling factors was shown that only few of the respondents (9.7 %) had high level of accessibility to source of information in term of frequencies. The main accessing source was one-way information as newspaper (22.7 %), television (39 %), and label of the container (89.9%). The contents from those one was basic information about pesticides usage such as should wear mask, gloves, wash hand, not use container to store drink, keep pesticides faraway from food. However, it did not show detail the kind of gloves, clothes, hat that they should use the direction of the wind they should choose, the frequency of washing equipments. It seems to be poor information. The two-ways information as village broadcasting, Village Health Volunteers, Health Personnel, agricultural officers, only some of them accessed. It might happened from the village broadcasting was not on the way to the field and far away from field, where they worked, from their house, those place that they could easy to access. Moreover, the fact that, the Health personnel, Village Health Volunteers did not have to responsibility to the rice farmers how to use pesticides, they did it excepted when they acted role of the relatives, the neighbors of the rice farmers. The agricultural officers who offered the rice farmers the detail using pesticides only educated those one or two times per year, but nearly one–third of them “never” attend the meeting with Agricultural officers. The frequencies of accessibility to the information significant related to right knowledge of the farmers ($r = 0.218$, $p = 0.000$).

However, in the study of Lojananont C. V., high proportion of the respondents had gotten information from Agricultural officers. This dissimilar due to the District Agricultural Office was near to the area that the researcher collected data. Moreover, the Agricultural officers in there educated those respondents one time per month (15) that was more often than in Suphanburi province.

The lacking of right knowledge on pesticides usage should be solved by education pesticides usage on the mass media, leaflet, and label of containers, by increasing frequencies agricultural officers visit rice farmers, forming community participant. From the right knowledge, the information will convey to perception, with the high support from family and society, their practicing will be better. Anyway , the frequencies of accessibility to the information had a statistical correlation with practicing preventive behaviors while using pesticides ($r = 0.428$ and $p = 0.000$), after using it ($r = 0.338$ and $p = 0.000$), on days when not using it ($r = 0.206$, $p = 0.001$).

Likewise, most of the subject who accessed these “poor” contents of one-way information had agreed those were “good” or “fair” understandable but the reading label and strictly follow as well as well understand label was not enough (3) for the farmers had right knowledge on pesticides and pesticides use. Moreover only half of those accessed the information from agricultural officers, who must responsibility to the farmers to use pesticides, agreed that it was good communicable. Village Health Volunteers and village broadcasting seems to be not good communicable. Anyway , the understandable contents of information significantly correlated with practicing preventive behaviors while using ($r = 0.430$, $p = 0.000$), after using ($r = 0.304$, $p = 0.000$), on days when not using pesticides ($r = 0.150$, $p = 0.014$).

However, there was no previous study concerned to that relationship.

5.3.2 Availability of good equipment prompt to use in the field

The other factors that enable to practice preventive behavior on pesticides usage were the available of good equipment. 56.9 % of the rice farmers had own equipment. Most of them had high and moderate level of availability of good equipment. Nevertheless, more than one-third of them had “never” had eyeglasses, plastic gloves, and more than one-fourth never had mask, either. The important protective equipment needs to protect them from danger of pesticides were absented.

However, the availability of good protective equipment had a positive strongly significant correlation with practicing preventive behaviors while using pesticides with r = 0.679 and p = 0.000. The availability of good spraying and mixing equipment had no significant relation with practicing; it due to all of the rice farmers had it. There was no previous study related to availability of good equipment in researcher' literature review.

5.4 Reinforcing factors

Regarding to the reinforcing factors, 52.4 % of the rice farmers had high level of social support. More than 90 % of them agree with family warned them to wear protective equipment, encouraged them practice preventive behaviors, provoked them seek information related to pesticides usage from media. Most of them also agreed that their neighbor always urged them to utilize protective equipment or offer them pesticides information as mentioned in the part of accessibility to source of information. Besides, the support by significant people in community as Village Health Volunteers, Agricultural officers, relatives, who give them officially pesticides information, protective equipment directly or indirect way through village broadcasting seems to be not as much and strong as they received from family, owner of pesticides store and relative. They received from mass media, mass public with inadequate information, and from family, important people in community with adequate information on pesticides usage. They admitted that relatives also give them equipment incase they were lack of it. They received mental support, information support and instrument support, which strengthen them to practice preventive behaviors. The evident for this point was the significant correlation between the support of family and society and practicing preventive behaviors while using pesticides (r = 0.382, p = 0.000), after using (r = 0.428, p = 0.000), on days when not using (r = 0.209, p = 0.001).

CHAPTER VI
CONCLUSION AND RECOMMENDATION

The aim of this study was not only found out the practicing preventive behaviors on pesticides usage among the rice farmers in Muang district, Suphanburi province but also explored the relationship between predisposing, enabling and reinforcing factors and their practicing preventive behaviors too. Total 267 rice farmers were interviewed by face to face communication after being chosen by simple random sampling, from 7th January2004 - 7th February 2004. The data was analyzed with number, percentage, median, minimum, maximum, Pearson Chi-square and Spearman rank correlation. The results were shown as follows:

6.1 Conclusion

Based on median value (69 scores or 82.1 % of total scores), it was found that 50.2 % of the rice farmers had higher practice score level than its. For the details of types of practicing were showed as follows. 50.9 % of the respondents had higher practice score level than median value (79.2 % of total scores) as cut off point in part of practicing preventive behaviors while using pesticides. 56.2 % had higher that level than median value equaled to maximized value for the practicing after using pesticides. For the practicing on days when not using pesticides, 63.3 % of the rice farmers had high practicing level.

Regarding to the predisposing factors, in part of socio-demographic characteristics, a few more than half of the respondents were male; most of them had age more than 30, got married, had children stayed with. Almost of them contacted with pesticides more than 10 years and had family' monthly incomes less than 5,000 Bath. Primary school was highest educational level of most of the self-employment subjects. Besides, even though some of them (13.5 %) had good knowledge on pesticide danger and its usage but

majority of them had high and moderate perception toward danger of pesticides and its usage.

In part of enabling factors, most of the rice farmers had moderate and low level of accessibility to source of information in terms of frequencies and understandable.. However, almost of them had high and moderate availability good equipment prompt to use in the field level.

Besides, in part of reinforcing factors, 59.2 % of the rice farmers had high support level from family and society, 34.1 % had moderate level.

In part of correlation, the age had a significant relationship with practicing preventive behaviors while using ($r = 0.129$, $p = 0.035$), on days when not using ($r = 0.143$, $p = 0.019$) but years of using pesticides only significantly and positively correlated to practicing while using pesticides ($r = 0.123$, $p = 0.044$). Knowledge on pesticides and pesticides use had a significant and positive relationship with practicing preventive behaviors while using pesticides ($r = 0.187$, $p = 0.002$). Practicing preventive behaviors after using pesticides were significantly and positively correlated to perception toward seriousness ($r = 0.263$, $p = 0.000$), susceptibility ($r = 0.265$, $p = 0.000$), benefits ($r = 0.216$, $p = 0.000$) and barriers ($r = 0.347$, $p = 0.000$). While practicing while using pesticides only significantly and positively depended on the perceived barriers ($r = 0.208$, $p = 0.001$); practicing on days when not using were significantly and positively related with perception on susceptibility ($r = 0.184$, $p = 0.002$) and perception toward barriers ($r = 0.159$, $p = 0.009$). All three types of practicing preventive behaviors was significantly and positively associated with accessibility to source of information in term of frequencies of receiving information and the understandable its contents; with social support. However, availability of good equipment prompt to use in the field only significantly correlated to behaviors while using pesticides ($r = 0.662$, $p = 0.000$).

6.2 Recommendation

6.2.1 Recommendation from the finding

The following suggestions have been made based upon the findings of the results from this study for improve the right practicing preventive behaviors on pesticides usage among the rice farmers.

1 The Agricultural officers should educate the right knowledge on the pesticides danger and its usage (especially emphases on the material of pesticide protective equipment, direction for spraying, how to keep pesticides and its container safely) for the rice farmers. Due to one or two times per year, as they did before seem to be rare for the farmers with busy working farm, the frequencies should be higher; and the ways to communicate to them should be easy for them to understand the contents of information.

2 There should be formed Village Agricultural Volunteers, who will be instructed the right knowledge on pesticide danger and its usage, also their activities should be adjoined with instructing these knowledge to the farmers in their daily works. They should encourage the farmers practice appropriately preventive behaviors on pesticides usage regularly. The Village health Volunteers should involve in educating the rice farmers right knowledge on pesticide danger and its usage.

3 The information on appropriately pesticide usage should disseminate through mass media (television, radio, and leaflet), village broadcasting necessary regularly. Especially, in leaflet and label of the pesticide containers should reveal more details about material, which need to protect hand and lung. Village broadcasting should be located in the convenient place for the farmers easy to access.

4 The pesticide company should sell plastic gloves and mask together (in one pack) as promotion to give them high chance to have good protective equipment prompt to use.

5 Not only to educate the rice farmers use pesticides safely, the Agricultural officers, the information in mass media also should convince them use biological pesticides instead of chemical synthetic pesticides. The group of farmers use biological pesticides (fertilized microorganism) should be encouraged to be the model group.

6.2.2 Recommendation for further study

The following recommendations were given for the best further research.

1 Because this research studies only the rice farmers in Muang district, Suphanburi province, it should also study in other areas to get overview of situation of pesticides for setting up the policy and criteria to control and prevent using pesticides inappropriately.

2 The researcher should study preventive behavior on pesticides usage among the migrant laborers because they often had low educational level, and low chance to access quality information related to pesticides usage and social support.

3 The researcher should inspect the blood concentration of cholinesterase enzyme in the pesticide user.

4 Due to in some area, some farmers started using biological pesticides, the further studies should compare this group with chemical pesticides user group in term of attitude, motivate and benefits to improve the appropriate behaviors.

5 Due to this study used only a quantitative method to survey and investigate the correlation between selected independent variables, it should employ qualitative method as in-depth interview, observation to find out in some more details in natural setting than using only a quantitative research.

6 Based on the results of this study, they should be used in action research through Appreciate Influence Control Technique or Future Search Conference technique for improving the appropriate behaviors among the rice farmers in community.

7 The researcher should evaluate the changing preventive behaviors after launch “action research” among the rice farmers in community.

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APPENDIX

APPENDIX A
QUESTIONNAIRES

PREVENTIVE BEHAVIORS ON PESTICIDES USAGE AMONG THE RICE FARMERS IN MUANG DISTRICT, SUPHANBURI PROVINCE, THAILAND

PartI: Predisposing factors

1.1. Socio-demographic characteristics of farmers:

Please check (√) on the only one correct answer or complete sentences below:

1. How old are you?.....
2. Gender: 1.Male [ ] 2.Female [ ]
3. Marital status 1.Single [ ] go to #6
   2. Married [ ]
   3. Divorced [ ]
   4. Widow [ ]
4. Do you have children stay with you?
   1. Yes (please specify)……
   2. No [ ]
5. Do you have your children who being in breast-feeding?
   1. Yes [ ]
   2. No [ ]
6. How many years have you used pesticides?.....
7. Yours highest education level:
   1. Illiteracy [ ]
   2. Primary school [ ]
   3. Secondary school [ ]
   4. High school [ ]
8. Your family' monthly income:……Baht

9. Employable status:

1. Self- employment [ ]
2. Wage earner [ ]

1.2 Knowledge of farmers on pesticides and pesticides use

According to the knowledge suggested or guided from health personnel, Agricultural officers or other formal sources, how do you know about these questions? Please make a circle around the choice that is the most correct answer

1. Which one is correct answer for you?
   1. People who live near to the rice field which use the pesticides do not have any chance to get the pesticide harmful effects.
   2. Pesticides do not any effects for child who fed breast milk from the maternal user
   3. Pesticides can cause harmful effects for fetus in womb of the pregnant user
   4. Only the direct user can get the harmful effects of pesticides
2. What are the mainly harmful effects of pesticides?
   1. Constipation
   2. Heart disease
   3. Dizziness
   4. All are correct
3. Which is the correct ways for mixing the pesticides?
   1. Wear gloves but do not cover nose with mask
   2. Wear gloves and cover nose with mask
   3. Do not wear gloves but cover nose with mask
   4. Do not wear gloves nor cover nose with mask
4. After using pesticides, which is the correct ways to keep you safety?
   1. Wash hand immediately after spraying pesticides
   2. Wash hand after arriving home immediately
   3. Change cloth after arriving home
   4. Both 2 and 3

5. What is the appropriate time to spray pesticides?

1. Windless time
2. Mild sunlight time
3. Any time
4. Both 1 and 2 are correct

6. Where is correct place for you eat you meal on the day of the spraying pesticides?

1. In the field
2. At home
3. At the place close to the field
4. All are correct

7. What one is the correct way for you to get rid of the used pesticide container?

1. Burn or bury
2. Clean and reuse
3. Throw it away
4. Collect and sell

8. Which one is the right direction for spraying pesticides?

1. The same direction of the wind and walk backward
2. Opposite direction of the wind and walk backward
3. The same direction of the win and walk forward
4. Both 1 and 3 are correct

9. Which one is the right way for mixing the pesticides?

1. Mixing in the field and in the same direction of the wind
2. Mixing in the house
3. Mixing in the field and against the direction of the wind
4. Mixing in the field and do not consider the direction of the wind

1.3. Perception of the rice farmers about pesticides dangers and its usage

Instruction: Interviewer gives a check (√) mark in the bracket corresponding to interviewee' opinion or feeling

Agree: means the farmer thinks the statement corresponds to his feeling, opinion or his perception.

Not sure: means the farmer is difficult to judge can not decided whether the statement corresponds to his feeling, opinion or not

Disagree: means the farmer thinks the statement not correspond to his feeling, opinion or his perception

This part divided 4 sections:

-Perceived seriousness in pesticide: 6 questions

-Perceived susceptibility in pesticide use: 6 questions

-Perceived benefits of practicing preventive behaviors: 10 questions

- Perceived barrier to practice preventive behaviors: 10 questions

1.3.1. Perception of farmers about seriousness of pesticide dangers

Statement	Agree	Not sure	Disagree
1. Chronic irritation from pesticide can not lead to skin cancer			
2. Pesticides can not damage nervous system			
3. If no immediate treatment, the harmful effect of pesticides may be deadly.			
4. Prolonged contact with pesticide may not cause brain damage			
5. Accumulative effect of pesticide in your body can cause kidney failure			
6. The pregnant woman can not have abortion from pesticides exposure			

1.3.2. Perception of farmers about susceptibility on pesticide danger

Statement	Agree	Not sure	Disagree
1. You are not susceptible to get the pesticide poisoning because the protective equipment is not always used			
2. You have high sensitive immune therefore you are quite risky to get the allergy while spraying the pesticide			
3. Your general health is strong so you are not susceptible to get harmful effects of pesticides			
4. Your food has high chances to contaminate with the pesticides; due to you usually have meal in the field.			
5. You are(your wife is) breast feed the baby, so you are afraid that your child may be harmed			
6. Taking anti-histamine drugs, you will have low chance to get the dangers of pesticides.			

1.3.3 Perception of the rice farmers on benefit of practicing health preventive behaviors

Statement	Agree	Not sure	Disagree
1.Reading label or leaflet before using pesticides is necessary to avoid misuse			
2.Using stick to mix pesticides will not decrease our opportunity to get dangers of pesticides			
3. Spraying the pesticides in the same direction of wind is not safer than against its direction			
4. Regular wearing protective equipment may reduce side effects of pesticides than irregulars practices			
5. Take a bath and change clothes after spraying the pesticides immediately will help you avoid danger of pesticides			
6. Wearing boots can not prevent harmful effects from pesticides			
7. Spraying the pesticides and walking backward, the clothes will not be contaminated pesticides			
8. Wearing long sleeves shirt and long pants will not reduce the risks to get the dangers			
9. Keeping the pesticides separately, in the safe place and with the warning sign can avoid abuse			
10. It is safe for the child if you destroy or dump the pesticide container immediately after using			

1.3.4 Perception of the rice farmers on barriers of practicing the preventive behaviors

Statement	Agree	Not sure	Disagree
1. Reading the label before mixing pesticides is not difficult and not wasted time.			
2. Spraying the pesticides backward causes your work done slowly.			
3. Wearing boots in the field is difficult to walk.			
4. Hot weather does not cause any problem to wear hat and long sleeves during the rice field.			
5. Washing the spraying clothes separately is taken many detergents and wasted times.			
6. Wearing mask makes you difficult to breathe.			
7. Changing the clothes every times after spraying the pesticides immediately is not difficult.			
8. It is difficult to have a bath immediately after spraying the pesticides.			
9. Disposing pesticides container is not taken time			
10. Protective equipment is cheap to buy.			

Part II: Enabling factors

2.1 Accessibility to source of information

Interviewer will fulfill or check (√) mark in the bracket only one answer as respondents specified

Frequencies of receiving information from different sources

1 Do you often receive any health information related to pesticide usage from these information sources?

Source	Regular	Irregular	Never
1. Mass published materials as posters, newspaper, pamphlet			
2. Television			
3. Radio			
4. Village Health Volunteer			
5. Health personnel			
6. Agricultural officers			
7. Village broadcasting			
8. Neighbors			
9. Leaflet or label from pesticides containers			

2. How do you think about the contents of the mentioned information sources in term of understandable?

Source	Good	Fair	Poor
1. Mass published materials as posters, newspaper, pamphlet			
2. Television			
3. Radio			
4. Village Health Volunteer			
5. Health personnel			
6. Agricultural officers			
7. Village broadcasting			
8. Neighbors			
9. Leaflet or label from pesticides containers			

2.2 Availability of good equipment

Availability of good protective equipment:

1. Do you have your own protective equipment?

1. Yes [ ]
2. If no, what did you do?
   1. Do not use [ ]
   2. Borrow from others [ ]
   3. Given from others [ ]
   4. Other specify [ ]

2. Do you have good protective equipment prompt to use in the field?

	Always	**Sometimes**	**Rarely**	**Never**
1. Hat/ turban				
2 Eyeglasses				
3. Mask				
4. Plastic gloves				
5.Long sleeves shirt				
6. Long trousers				

Availability of good spraying and mixing equipment:

3. Do you have good spraying and mixing equipment prompt to use in the field?

	Always	**Sometimes**	**Rarely**	**Never**
1. Mixing stick				
2. Mixing container				
3. Spraying equipment				

Part III: Reinforcing factors

Interviewer read out the sentence one by one and ask the respondent to specify the choices that they think to it as only one correct answer.

Statement	Agree	Not sure	Disagree
1. Your family always warn you to wear protective equipment			
2. Your family provokes you to seek information related to pesticide usage from many media sources.			
3. Your family encourages you to practice the preventive behaviors.			
4. Your neighbors urged you to utilize the protective equipment.			
5. Agriculturists usually educate pesticide knowledge for the farmers during the meeting.			
6. You never received any pesticide information from neighbors.			
7. You are always given information related to pesticide usage from owner of pesticide stores.			
8. Village Health Volunteers always inform you to avoid dangers of pesticides usage.			
9. Village Health Volunteers usually disseminate pesticide information for your family.			
10. You are always received pesticide information from Village Broadcasting.			
11. If you do not have enough protective equipment your relatives always supply you			

Part IV: Practicing preventive behaviors

Introduction: Interviewer checks (√) in the bracket, according to the respondent's answer, following criteria:

Always done means the farmer practice preventive behavior every time or 7 or more of 10 times for using pesticides

Sometimes done means the farmer sometimes practice preventive behavior when using pesticide 4 to 6 from 10 times of using pesticide

Rarely done: means the farmer rarely practice preventive behavior when he uses pesticide or doing 1 to 3 from 10 times of using pesticides.

Never done means the farmer never practice preventive behavior when using pesticide

5.1 While using the pesticides

Mixing the pesticides

Activities	Always	Sometimes	Rarely	Never
1. Wear the plastic gloves during the mixing				
2. Cover your nose during the mixing				
3. Mix the pesticides follow on the labels				
4. Use stick to stir the pesticide mixers				
5.Wash your hand after mixing immediately				

Spraying the pesticides

Activities	Always	Sometimes	Rarely	Never
1. Wear the hat during the spraying				
2. Use mask to cover nose and mouth				
3. Wear eyeglasses				
4. Wear boots				
5. Wear plastic gloves				
6. Wear long sleeves shirt				
7. Smoke cigarette				
8. Drink water or eat food				
9. Spray in the same direction of wind				
10. Spray the pesticide and walk backward				
11. Spray only in the windless time and less strong sunlight time				

4.2 After using it

Activities	Always	Sometimes	Rarely	Never
1. Clean your hands with detergent immediately after using it.				
2. Change your clothes immediately when you arrive home.				
3. Take a bath immediately after arriving home.				
4. Washing work clothes separately out of normal clothes.				
5. Wash (clean) protective equipment after using.				
6. Clean spray equipment far away from the source of utilized water.				

4.3 On days when not using it

Activities	Always	Sometime	Rarely	Never
1. Keep the pesticides in safe place and stick warning sign on it				
2 .Keep spraying equipment in safe place				
3. Keep protective equipment in safe place				
4. Use the pesticide containers for storing food and drinking water				
5. Bury or burn the container after using the pesticides				
6. Tie or cover pesticide strictly with label				

APPENDIX B

TEST RELIABILITY

1. Knowledge: reliability analysis scale (ALPHA)

		Mean	Std Dev	Cases
1.	K2.1	.8000	.4068	30.0
2.	K2.2	.1000	.3051	30.0
3.	K2.3	.9333	.2537	30.0
4.	K2.4	.9667	.1826	30.0
5.	K2.5	.8667	.3457	30.0
6.	K3.2	.9333	.2537	30.0
7.	K3.3	.9333	.2537	30.0
8.	K6	.9000	.3051	30.0
9.	K10	.1667	.3790	30.0
10.	K1.1	1.0000	.0000	30.0
11.	K1.2	1.0000	.0000	30.0
12.	K1.3	1.0000	.0000	30.0
13.	K1.4	1.0000	.0000	30.0
14.	K3.1	1.0000	.0000	30.0
15.	K3.4	1.0000	.0000	30.0
16.	K4.1	1.0000	.0000	30.0
17.	K4.2	1.0000	.0000	30.0
18.	K4.3	1.0000	.0000	30.0
19.	K4.4	1.0000	.0000	30.0
20.	K4.5	1.0000	.0000	30.0
21.	K4.6	1.0000	.0000	30.0
22.	K4.7	1.0000	.0000	30.0
23.	K5.1	1.0000	.0000	30.0
24.	K5.2	1.0000	.0000	30.0
25.	K5.3	1.0000	.0000	30.0
26.	K7	1.0000	.0000	30.0

27.	K8	1.0000	.0000	30.0
28.	K9	1.0000	.0000	30.0

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
K2.1	5.8000	1.1310	.6308	.	.4599
K2.2	6.5000	1.5000	-.3230	.	.5727
K2.3	5.6667	1.1954	.1657	.	.4000
K2.4	5.6663	1.1368	.4665	.	.3305
K2.5	5.7773	.8230	.6532	.	.1405
K3.2	5.6667	1.1954	.1657	.	.4000
K3.3	5.6667	.9885	.5924	.	.2445
K6	5.7000	1.3207	.0885	.	.4953
K10	6.4333	1.0126	.2561	.	.3554

Alpha = 4247

N of Cases = 30.0

N of Items = 9

2. Perception: reliability analysis scale (ALPHA)

		Mean	Std Dev	Cases
1.	P.SE.5	1.9667	.1826	30.0
2.	P.SU.3	2.9000	.3051	30.0
3.	P.SU.4	2.9333	.3651	30.0
4.	P.SU.5	2.9000	.3051	30.0
5.	P.SU.6	2.8000	.6103	30.0
6	P.BE.6	2.9333	.3651	30.0
7.	P.BE.7	1.9667	.3198	30.0
8.	P.BA.5	2.9333	.3651	30.0
9.	P.BA.6	2.9333	.3651	30.0
10.	P.SE.1	3.0000	.0000	30.0
11.	P.SE.2	3.0000	.0000	30.0
12.	P.SE.3	3.0000	.0000	30.0
13.	P.SE.4	3.0000	.0000	30.0
14.	P.SE.63	.0000	.0000	30.0
15.	P.SU.1	3.0000	.0000	30.0
16.	P.SU.2	3.0000	.0000	30.0
17.	P.BE.1	3.0000	.0000	30.0
18.	P.BE.2	3.0000	.0000	30.0
19.	P.BE.3	3.0000	.0000	30.0
20.	P.BE.4	3.0000	.0000	30.0
21.	P.BE.5	3.0000	.0000	30.0
22.	P.BE.8	3.0000	.0000	30.0
23.	P.BE.9	3.0000	.0000	30.0
24.	P.BE.1	3.0000	.0000	30.0
25.	P.BA.1	3.0000	.0000	30.0
26.	P.BA.2	1.0000	.0000	30.0
27.	P.BA.3	1.0000	.0000	30.0
28.	P.BA.4	3.0000	.0000	30.0

29.	P.BA.7	3.0000	.0000	30.0
30.	P.BA.8	3.0000	.0000	30.0
31.	P.BA.9	3.0000	.0000	30.0
32.	P.BA.10	3.0000	.0000	30.0

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
P.SE.5	22.3000	3.0448	.4654	.	.6946
P.SU.3	21.3667	2.5851	.7099	.	.6413
P.SU.4	21.3333	2.7816	.3775	.	.6933
P.SU.5	21.3667	2.5851	.7099	.	.6413
P.SU.6	21.4667	1.9816	.5941	.	.6497
P.BE.6	21.3333	3.4713	-.1690	.	.7826
P.BE.7	22.3000	2.8379	.4032	.	.6897
P.BA.5	21.3333	2.7816	.3775	.	.6933
P.BA.6	21.3333	2.7816	.3775	.	.6933

Alpha = .7158

N of Cases = 30

N of Items = 9

3. Social support: reliability analysis scale (ALPHA)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
RE1	25.7667	12.7368	.2472	.7720	.5972
RE2	26.0333	10.8609	.4714	.6585	.5462
RE3	25.7667	12.8747	.1981	.8556	.6026
RE4	26.0000	11.5172	.3286	.5604	.5768
RE5	26.3333	9.3333	.6469	.7266	.4869
RE6	26.4667	14.1195	-.1986	.6503	.7058
RE7	25.7333	12.9609	.3196	.5790	.5976
RE8	26.5333	9.0851	.6851	.9457	.4735
RE9	26.8667	9.1540	.6838	.9046	.4754
RE10	27.1000	10.3000	.5948	.7733	.5175
RE11	26.2333	15.5644	-.4327	.5149	.7145
RE12	26.5000	13.5690	-.0508	.5192	.6321

Alpha = .6112

N of Cases = 30

N of Items = 12

BIOGRAPHY

NAME	NGUYEN THI PHUONG MAI
DATE OF BIRTH	December 09, 1973
PLACE OF BIRTH	Lao cai district, Lao cai province, Vietnam
INSTITUTION ATTENDED	Hai phong Medical University, Hai phong, Viet nam, 1991-1997 Medical Doctor
	ASEAN Institute for Health Development Mahidol University, Salaya, Thailand 2003-2004 Master of Primary Health Care Management
FELLOWSHIP	JICA and DTEC
RESEARCH GRANT	
PRESENT POSITION	Lecturer of Biochemical Department, Hai phong Medical University, Hai phong, Vietnam